Digitrax®

Complete Train Control
Run Your Trains, Not Your Track!

SE8C SIGNAL DECODER

Features & Specifications

- Control signals on your layout:
    - Manually with any LocoNet Throttle and Command Station.
    - Automatically with detection and compatible computer software.
- Drives as many as 32 signal heads with popular LED signal types:
    - Bi-color LED searchlights with 2 or 3 leads.
    - Three-LED heads with common anode or common cathode.
    - Can drive B&O or Pennsy-type heads.
    - Designed to model most US signalling systems.
    - Built in current limiting resistors for setting brightness of LEDs.
- Simple modular wiring:
    - Modular Plug 'N Play system.
    - Each Signal Driver Cable drives four heads.
    - Includes sample Signal Driver Cable and Test Signal Mast.
- Drives either
    - 8 slow motion turnout machines such as Circuitron's Tortoise™ OR
    - 8 semaphore signals using slow motion turnout machines.
- Provides 16 inputs:
    - 8 control lines for local turnout control.
    - 8 occupancy sensor inputs.
- Use with DC or DCC controlled layouts.
- **A computer & compatible software are necessary to realize the full feature potential of the SE8C.**

Accessory Products make SE8C installation easy!

These items are available for purchase separately:

Signal Mast Base Kit: Includes 3 Signal Masts that can be used as Signal Mast Bases in any scale or can be painted and detailed and used as N-scale signal masts.

Signal Driver Cable Kit: Materials for making 2 Signal Driver Cables for SE8C. Includes 20' of 10-wire Signal Driver ribbon cable & 8 10-Pin sockets.

Signal Mounting Hardware Kit: Under layout mounting hardware for Signal Driver Cables and sockets. 6 metal signal straps and 6 signal spacers.

Terminal Strip Mounting Kit: Includes terminal strip board with resistors installed for easy installation.
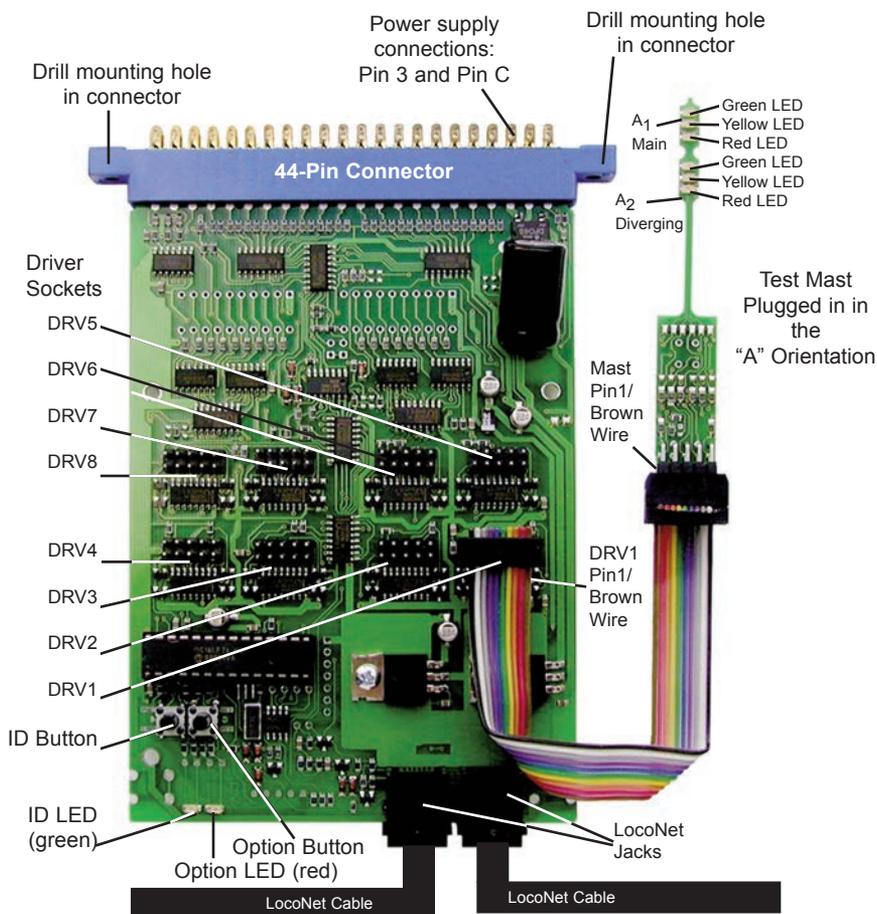
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Parts List

1 SE8C Signal Board
1 Digitrax Test Mast
1 Instruction Manual

1 Test Signal Driver Cable, 6"
1 44-Pin Edge Connector

Additional Equipment/Software Required To Run SE8C

Operation of the SE8C requires a Digitrax LocoNet Throttle and Command Station OR compatible software such as Railroad & Company, WinLok or JMRI and others. See www. digitrax.com/SE8chome.htm for links to LocoNet compatible software.

Drill mounting hole in connector

Power supply connections: Pin 3 and Pin C

Drill mounting hole in connector

A_1 Main
Green LED
Yellow LED
Red LED

A_2 Diverging
Green LED
Yellow LED
Red LED

44-Pin Connector

Test Mast Plugged in in the "A" Orientation

Driver Sockets

DRV5
DRV6
DRV7
DRV8

Mast Pin1/ Brown Wire

DRV4
DRV3
DRV2
DRV1

DRV1 Pin1/ Brown Wire

ID Button

ID LED (green)

Option Button
Option LED (red)

LocoNet Jacks

LocoNet Cable

LocoNet Cable

LocoNet Jacks-Use LocoNet cables to connect to Command Station/Throttle or PC with control software

Introduction to the Digitrax SE8C

The Digitrax Signaling System is organized around the concept of "security elements" which are similar to what U.S. prototype railroads call "plants." The Digitrax SE8C signal decoder displays aspects for up to 32 heads for 8 individual security elements (plants) using either a LocoNet Throttle or a computer with compatible software. When used with associated occupancy detectors and compatible software, the SE8C can be set up to protect the turnout as shown by the example below. The SE8C decodes switch commands from a throttle or associated software so that the appropriate aspects are displayed on the signal heads.

Each security element is made up of three legs designated A, B, & C. Every piece of track on your layout can be broken down into security elements to describe how each detection section connects to the other sections on your layout.
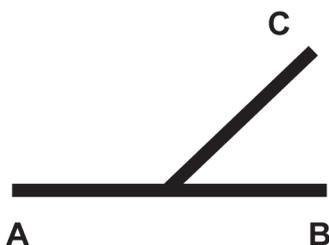
Note that:
1. A to B, A to C, B to A, and C to A are the only possible connections.

2. B to C connection is not possible.

Occupancy detection is required for the Digitrax Signaling System to function. Occupancy detection inputs can be handled by any LocoNet compatible occupancy detector (Any BDL16 Series Occupancy Detectors or BD1 Occupancy Detectors used with DS54s will work).

Transponding is **NOT** needed for the Digitrax Signaling System.

The SE8C sends its output to the signal driver boards to drive the signal heads. Each SE8C has 8 sets of signal drivers, each capable of driving a set of signal masts. Each set of masts can have up to four heads and each head can have up to four different lamps or a multi-color searchlight. The heads may be on separate single masts, dual masts, or gantries. Each mast has its own signal driver. In practice, each set of signal masts usually corresponds to the track controlled by a single security element.

Each SE8C signal decoder and occupancy detector is connected to LocoNet so that all security elements on the layout can communicate with each other as the occupancy of each detection section of track changes. Since the Digitrax Signal

System communicates through LocoNet, it does not need DCC to work. The SE8C signal decoders and BDL16 Series occupancy detectors can communicate directly with other LocoNet devices on the layout, they do not need a command station for this communication. This means that they can be used on non LocoNet DCC systems and DC systems where LocoNet is added to support signaling.

The SE8C lets you control of signals manually from your Digitrax throttles or automatically through LocoNet compatible computer software such as Railroad & Company, WinLok and others.

Pre-Installation Set Up & Testing

We recommend testing your new SE8C prior to installation on your layout. The following testing procedures will help familiarize you with the general operation of the SE8C. No track power is required for testing, but you will need a working LocoNet connection and throttle or PC running DCC control software.

Pre-Installation Set-Up

1. Solder one wire from a 12V AC or 15V DC power supply to Pin 3 and the second wire from the power supply to the Pin C on the 44-Pin edge connector. This powers the SE8C. Multiple SE8Cs can be powered by a single shared power supply as long as you provide at least 100mA for each SE8C. This power supply should not power any devices other than SE8C and BDL16 series detectors.

2. Connect a working LocoNet to either LocoNet Jack on the SE8C using a LocoNet cable. These jacks bridge through LocoNet so you can daisy chain from one LocoNet device to the next. Your working LocoNet can be from either a PC running DCC control software or a LocoNet command station and throttle.

3. The SE8C is shipped from the factory with the Test Mast and Test Signal Driver Cable already connected to the DRV1 connection on the SE8C ready for testing. One signal driver cable connector should be plugged into the SE8C board so that the brown wire (Pin 1) is to the right (Figure 1), closest to the edge of the board. The test mast should be plugged into the other connector on the cable so the face of the mast is toward you and the brown wire is on the left. This is called the "A" orientation.
   Note: There is a small arrowhead on the Signal Driver Cable connectors over the brown wire that points to Pin 1 of the cable. Pin 1 of the Signal Mast is indicated by the square pad on the bottom left Pin on the front of the mast.

4. Power up SE8C. The green ID LED will light up. The red Option LED will blink when a LocoNet message is seen. The red LEDs on the test mast will light.

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5. Before testing, be sure the SE8C is set to factory settings. If settings have been changed, reset the SE8C to its factory settings as follows:

    a. Press and hold the Option Button until the red LED starts to blink.
    b. Release the button, the red and green LEDs will blink alternately indicating that you are in Option Switch programming mode.
    c. Go into SWITCH mode on your throttle or PC.
    d. Select Switch 20.
    e. Close and then Throw the switch to reset the factory settings.
    f. Press and hold the Option button until the red LED stops blinking.
    g. Release the Option button and the green LED will stay lit.

Pre-Installation Testing - "A" Orientation Signals

Your SE8C has 8 Driver Sockets (DRV1-DRV8). You can plug a Signal Driver Cable into each SE8C Driver Socket to control as many as four signal heads per Driver Socket, each with 4 lighting aspects, enough to control the signal elements for a single security element (or plant) as illustrated below. Whether the signal driver operates as the A_1/A_2 or as the B/C signals is determined by the orientation in which the Signal Mast Base is plugged in to the sub-road bed base.

Sample Layout Security Element (or Plant)

"A" Orientation

turnout

"BC" Orientation

C siding

B main

A_1 main
A_2 diverging (dwarf)
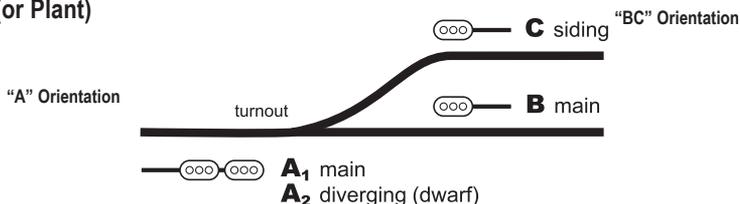
6. To test the operation of the top signal (A_1 - Main) of the test mast, select Switch 257 using a throttle or PC control program. Close the switch, the top signal should change to green. Throw the switch and the signal should change back to red. Toggle between red and green aspects by throwing and closing Sw257. Next, select Sw258 and close the switch. The top signal should change to flashing yellow. Throw Sw258 and the signal changes to steady yellow. The last switch command sent to the signal overrides the previous command and is remembered by the SE8C until changed.

A_1 Head - Main Aspects		Switch	Position
1	Red	257	Thrown
2	Green	257	Closed
3	Yellow	258	Thrown
4	Flashing Yellow*	258	Closed

7. To test the operation of the lower signal (A_2 - Diverging/Dwarf) of the test mast, select Sw259 using a throttle or PC control program. Close the switch, the lower signal should change to green. Throw the switch and the signal should change back to red. Toggle between red and green aspects by

throwing and closing Sw259. Next, select Sw260 and close the switch. The lower signal should change to flashing yellow. Throw Sw260 and the signal changes to a steady yellow.

A$_2$ Head - Diverging Aspects		Switch	Position
1	Red	259	Thrown
2	Green	259	Closed
3	Yellow	260	Thrown
4	Flashing Yellow*	260	Closed

* Flashing Yellow aspect can be changed with OpSw settings. See SE8C Option Switch Settings.

Pre-Installation Testing - "B/C" Orientation Signals

8. Unplug the Test Signal Mast, turn it around so that it faces the opposite direction relative to the Signal Driver Cable. Pin 1 of the Test Signal Mast will be plugged into the socket over the black wire of the Signal Driver Cable. This is called "B/C" Orientation.

9. To test the operation of the lower signal (B-Main) of the Test Mast, first select Sw261 using a throttle or PC train control program. Close the switch, the lower signal should change to green. Throw the switch and the signal should change back to red. Toggle between red and green aspects by throwing and closing Sw261. Now select Sw262 and close the switch. The lower signal should change to flashing yellow. Throw Sw262 and the signal changes to a steady yellow.

B Head - Main Aspects		Switch	Position
1	Red	261	Thrown
2	Green	261	Closed
3	Yellow	262	Thrown
4	Flashing Yellow*	262	Closed

10. To test the operation of the upper signal (C-siding) of the test mast, first select Sw263 using a throttle or PC control program. Close the switch, the lower signal should change to green. Throw the switch and the signal should change back to red. Toggle between red and green aspects by throwing and closing Sw263. Now select Sw264 and close the switch. The should change to flashing yellow. Throw Sw264 and the signal changes to a steady yellow.

C Head - Siding Aspects		Switch	Position
1	Red	263	Thrown
2	Green	263	Closed
3	Yellow	264	Thrown
4	Flashing Yellow*	264	Closed

* Flashing Yellow aspect can be changed with OpSw settings. See SE8C Option Switch Settings.

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11. Test the other SE8C Driver Sockets to verify the aspects show properly and there are no cable or connector problems. The factory settings for controlling aspects are listed in the table below.

SE8C Factory Default Settings for Board ID 01

SE8C Driver Socket	Lighting Aspect		"A" Orientation Signals				"B/C" Orientation Signals			
			A_1–Main		A_2–Diverging		B–Main		C–Siding	
			Switch	t/c	Switch	t/c	Switch	t/c	Switch	t/c
DRV1	1	Red	257	t	259	t	261	t	263	t
	2	Green	257	c	259	c	261	c	263	c
	3	Yellow	258	t	260	t	262	t	264	t
	4	Fl Yel*	258	c	260	c	262	c	264	c
DRV2	1	Red	265	t	267	t	269	t	271	t
	2	Green	265	c	267	c	269	c	271	c
	3	Yellow	266	t	268	t	270	t	272	t
	4	Fl Yel*	266	c	268	c	270	c	272	c
DRV3	1	Red	273	t	275	t	277	t	279	t
	2	Green	273	c	275	c	277	c	279	c
	3	Yellow	274	t	276	t	278	t	280	t
	4	Fl Yel*	274	c	276	c	278	c	280	c
DRV4	1	Red	281	t	283	t	285	t	287	t
	2	Green	281	c	283	c	285	c	287	c
	3	Yellow	282	t	284	t	286	t	288	t
	4	Fl Yel*	282	c	284	c	286	c	288	c
DRV5	1	Red	289	t	291	t	293	t	295	t
	2	Green	289	c	291	c	293	c	295	c
	3	Yellow	290	t	292	t	294	t	296	t
	4	Fl Yel*	290	c	292	c	294	c	296	c
DRV6	1	Red	297	t	299	t	301	t	303	t
	2	Green	297	c	299	c	301	c	303	c
	3	Yellow	298	t	300	t	302	t	304	t
	4	Fl Yel*	298	c	300	c	302	c	304	c
DRV7	1	Red	305	t	307	t	309	t	311	t
	2	Green	305	c	307	c	309	c	311	c
	3	Yellow	306	t	308	t	310	t	312	t
	4	Fl Yel*	306	c	308	c	310	c	312	c
DRV8	1	Red	313	t	315	t	317	t	319	t
	2	Green	313	c	315	c	317	c	319	c
	3	Yellow	314	t	316	t	318	t	320	t
	4	Fl Yel*	314	c	316	c	318	c	320	c

* Flashing Yellow aspect can be changed with OpSw settings. See SE8C Option Switch Settings.
See www.digitrax.com/SE8chome.htm for settings for other Board IDs.

SE8C Address Ranges for Signals and Other LocoNet Devices

The SE8C uses switch addresses to operate the signals, so you may need to change some factory settings to make it work in conjunction with turnouts that

are already installed on your layout. Be sure that when you configure the SE8C that the switch address ranges you select to operate the signals do not conflict with other devices, like DS54s, already installed. We strongly recommend that you keep accurate documentation of the address ranges used to control all devices on the layout to avoid conflicts that might cause problems. Without this record it can be very difficult to debug problems.

The factory default setting for the SE8C's Board ID is "01" which will control as many as 8 slow motion turnout machines using switch addresses Sw01 to Sw08 *and* 32, 4-aspect signal heads using the signal switch addresses Sw257 through Sw320 (64 consecutive switch addresses). See SE8C Default Settings for Board ID 01.

Setting the Board ID is the only way to change the range of switch addresses used to control slow motion turnouts with the SE8C. Signal switch addresses can be changed from the factory settings using Option Switch 17 (see section Changing The Signal Control Address Range).

Setting the Board ID

1. Press the ID button down and hold it until the Green LED starts blinking, then release the button.
2. Using your Throttle or PC train control software, select the switch address that will become the Board ID Number and issue a switch command.
3. The Green LED will stop blinking when the slow motion turnout address and signal control address ranges have been updated.
4. The following table details the slow motion turnout and signal switch address ranges associated with each SE8C Board ID Number:

Board ID (Press ID Button, set Sw# for Board ID number)	Slow Motion Turnout Machine Switch Address Range 8 Per SE8C	Signal Control Switch Address Range 4 Aspects Per Head 64 Per SE8C	Signal Control Switch Address Range 2 Aspects Per Head 32 Per SE8C
01 (factory setting)	Sw01-Sw08	Sw257-Sw320	Sw257-Sw288
02	Sw09-Sw16	Sw321-Sw384	Sw289-Sw320
03	Sw17-Sw24	Sw385-Sw448	Sw321-Sw352
04	Sw25-Sw32	Sw449-Sw512	Sw353-Sw384
05	Sw33-Sw40	Sw513-Sw576	Sw385-Sw416
06	Sw41-Sw48	Sw577-Sw640	Sw417-Sw448
07	Sw49-Sw56	Sw641-Sw704	Sw449-Sw480
08	Sw57-Sw64	Sw705-Sw768	Sw481-Sw512
09	Sw65-Sw72	Sw769-Sw832	Sw513-Sw544
10	Sw73-Sw80	Sw833-Sw896	Sw545-Sw576
11	Sw81-Sw88	Sw897-Sw960	Sw577-Sw608
12	Sw89-Sw96	Sw961-Sw1024*	Sw609-Sw640

*A Board IDs above12 require a computer train control program to access the switch address ranges above Sw1000. See www.digitrax.com/SE8chome.htm for expanded Board ID table with slow motion turnout switch address ranges available for use.

Changing The Signal Control Address Range

We do not recommend changing the signal control address range unless you have a very good reason and have taken steps to be certain that changing these addresses will not affect the operation of other devices on the layout. If you determine that you need to change the signal control address range use the following steps:

1. Press and hold the Option Button on the SE8C board until the red LED starts to blink. Release the Option Button. The red and green LEDs should blink alternately indicating that the SE8C is in Option Switch mode. Switch commands issued while in OpSw mode will change the SE8C's option settings.

2. Using your throttle or PC, select Sw17 and issue a "closed" command. This tells the SE8C that the next switch command issued will define the new signal control switch address range for this Board ID.

3. Select a switch address that will define the range of 64 addresses that you wish to use to control the signal heads. For example, issuing a "closed" command for Sw685 defines the range Sw641-Sw704.

4. Exit OpSw mode by pressing the Option Button then releasing it when the alternating LED flashing stops.

   NOTE: Setting the Board ID to 13-24 will provide a slow motion turnout machine switch address range Sw97-Sw192 and signal control switch address range of Sw1025-Sw2048. The switch address range Sw1000-Sw2048 can be accessed only by using a computer train control program.

Setting Up The SE8C For Your Layout

We strongly recommend that you keep an accurate record of all SE8C Board ID numbers and the switch addresses used to control slow motion turnout machines and signals. You should also keep track of which signal is associated with each SE8C board and specifically which Driver Socket on that board controls the signal. This will help in troubleshooting any problems that may occur during operation. (See sample Signal Location Record Form.)

Each layout device that uses a switch address for control must have a unique address. If a switch address for any device on your layout falls within the range of your selected SE8C signal control switch address range, each time a signal aspect is changed using that switch control address, it will also activate the other device. When this happens, resolve the conflict by changing one of the addresses.

The SE8C signal switch address range is set up in groups of 64 addresses. See Setting the Board ID Section for factory set ranges for each SE8C Board ID. When changing the factory settings for a Board ID, make sure that you are not selecting a switch address range already in use by another device on the layout.

The useable range of switch addresses is limited by the switch setting device's capability to select addresses. For example, the DT300 and DT400/DT402 can select switch addresses Sw01 through Sw999. A UT1 can only access switch addresses through Sw99. A DCC computer controlled system can access through Sw2048.
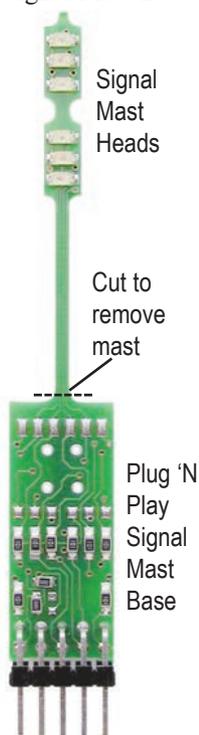
Signal Masts

The Digitrax Plug 'N Play Signal Mast consists of signal mast with two signal heads, each with three integrated LEDs and a Plug 'N Play Signal Mast Base that makes it easy to connect the Signal Mast to the SE8C Signal Driver Cable. The test mast included with your SE8C is an N-scale sized signal mast. The mast can be decorated using third party components to create a finished N-scale signal mast or it can be cut from the base and you can attach any of a variety of types of model signal masts in any scale you choose to the Plug 'N Play Mast Base. Digitrax Plug 'N Play Signal Masts are available in a Signal Mast Bast Kit which consists of 3 Digitrax Signal Masts.

The Plug 'N Play Signal Mast Base has a 10-Pin plug that simply plugs into the sockets on the SE8C Signal Driver Cables, current setting resistors (LED brightness) and pads for wiring alternative types of signal masts. The SE8C can accommodate a variety of signal types including searchlight signals with either 2-lead or 3-lead type bicolor green/red LEDs.

The SE8C signal control cables can be mounted in a horizontal clamp under the layout and an access hole, or slot, can be cut to allow the signal to be plugged in from above. Using this method there is no need to wire the fragile signals and wires from underneath the layout. Scenery and/or a relay base can be used to cover the plug-in hole. All signals and wiring can be bench tested for correct operation before installation on the layout. The Plug 'N Play Signal Mast Base can also be used with conventional mast mounts as a to make them plug and play.

Warning: Current setting resistors with a minimum value of 100 ohms must be used with all LEDs operated with your SE8C. These resistors are incorporated into the Digitrax Plug 'N Play Signal Mast Base board. If you do not use this board, you must add your own resistors to prevent damage to the board.

Signal Mast Heads

Cut to remove mast

Plug 'N Play Signal Mast Base

Customizing the Signal Masts

You can use the Digitrax Signal Mast Base for connecting any signal mast in any scale you want to use to the Signal Driver Cable.

1. Cut the Digitrax Signal Mast off the Plug 'N Play Signal Mast Base.

2. Set the angle and height for the new mast and solder it to the large pad provided on the back of the Signal Mast Base. (See figure next page). Or use the 4 holes in the board for a pair of retaining wires to hold the signal mast in place. Be sure to insulate the Signal Mast Base from the signal you are attaching if there is any chance that it might touch the traces on the circuit board and cause a short circuit!

3. The Plug 'N Play Signal Mast Base provides the resistors required for connecting the LEDs on the signal mast. Solder the wires from your signal mast directly to the associated pads on the Signal Mast Base as indicated in the following schematics and photos.

For clarity, the following examples use a line name for each Signal Mast Base solder pad to avoid confusion with wire colors. In the first example, 3/3 Signal heads with green, yellow and red LEDs, the line names correspond to the LED colors. One Signal Mast Base must be used for the A_1/A_2 signal heads (A Orientation) and one for the B and C signal heads (B/C Orientation). See figure Sample Layout Security Element (Plant)--for a typical signal location.
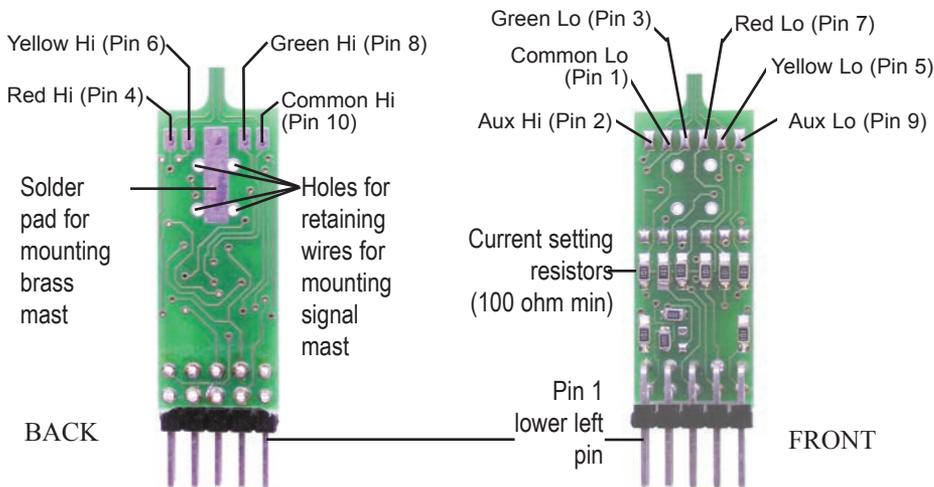
Signal Head Examples:

3 over 3 dual "G" type signal heads such as the Tomar H-866, can be connected to a Plug 'N Play Signal Mast Base (with the signal mast removed). The white common anode lead (for both heads) connects to Common Lo (Pin 1) pad and the signal's longer wires from the red/green/yellow LEDs from the Lower (dwarf) signal head connect to Red Lo (Pin 7), Green Lo (Pin 3) and Yellow Lo (Pin 5) pads on the front of the Signal Mast Base. The shorter 3 wires from the upper head connect to the pads on the back Red Hi (Pin 4), Yellow Hi (Pin 6) and Green Hi (Pin 8).

Single signal heads such as Tomar H-856 (type "G"-3 LED vertical) or H-855 (3 LED target) connect the white common to Common Lo (1) and connect the 3 color leads to the Lo (1, 5, 7) pads for the dwarf signal or the Hi (4, 6, 8) pads for the mainline signal. The combinations are shown in the schematic.
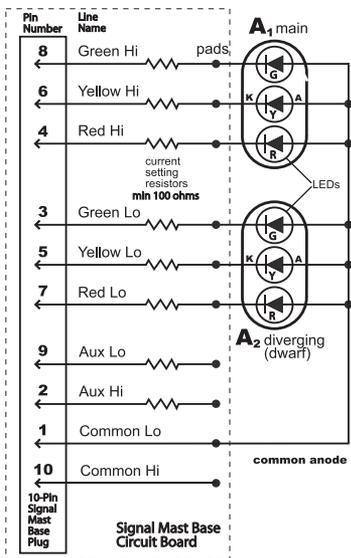
2-LED signals, such as Tomar N-857 with only red and green LEDs, omit the yellow pad connection and use the red and green pads for LED control.

## Plug 'N Play Signal Mast Base (pad number and pin out)

Yellow Hi (Pin 6)   Green Hi (Pin 8)

Red Hi (Pin 4)   Common Hi (Pin 10)

Solder pad for mounting brass mast

Holes for retaining wires for mounting signal mast

BACK

Green Lo (Pin 3)   Red Lo (Pin 7)

Common Lo (Pin 1)   Yellow Lo (Pin 5)

Aux Hi (Pin 2)   Aux Lo (Pin 9)

Current setting resistors (100 ohm min)

Pin 1 lower left pin

FRONT

Signal Schematic
3/3 Dual Signal Heads (Green, Yellow, Red)

Wiring for A_1 (main) and A_2 (diverging-dwarf)
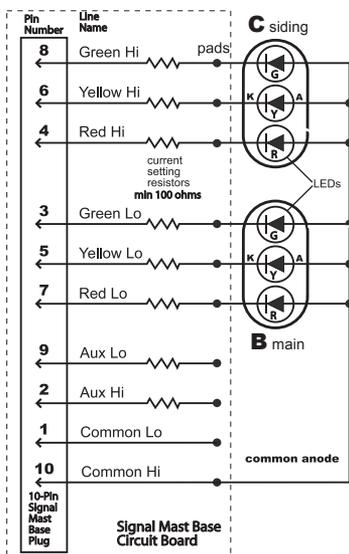
Wiring For B (main) and C (siding)

If common cathode signals are used, K&A on all LEDs will be reversed and you must set OpSw05 & OPSw08 to closed

Signal Driver Ribbon Cable Pin Out

The signal driver ribbon cable pin out is:

| Signal Driver Cable Color	Phase A Pin 1 to Brown	Line Name	Phase B Pin 1 to Black	Line Name
Brown	Pin 1	Common Lo	Pin 10	Common Hi
Red	Pin 2	Aux Hi	Pin 9	Aux Lo
Orange	Pin 3	Green Lo	Pin 8	Green Hi
Yellow	Pin 4	Red Hi	Pin 7	Red Lo
Green	Pin 5	Yellow Lo	Pin 6	Yellow Hi
Blue	Pin 6	Yellow Hi	Pin 5	Yellow Lo
Violet	Pin 7	Red Lo	Pin 4	Red Hi
Gray	Pin 8	Green Hi	Pin 3	Green Lo
White	Pin 9	Aux Lo	Pin 2	Aux Hi
Black	Pin 10	Common Hi	Pin 1	Common Lo

Installing Searchlight Signals

The SE8C can be used with searchlight type signals with either 2 or 3 wire bi-color green/red LEDs. Leads from the signal can be soldered directly to the pads on the Signal Mast Base or to additional lengths of wire and then connected to the Signal Mast Base. If you are using additional lengths of wire, it is a good idea to keep your wire colors consistent to simplify troubleshooting. The wiring diagram for the 2-wire and 3-wire searchlight type signals is shown in the following two diagrams. Be careful when working with fine wires from the signal heads, they are easily broken. We recommend that you wire and test the signals and their LEDs prior to installation on the layout.

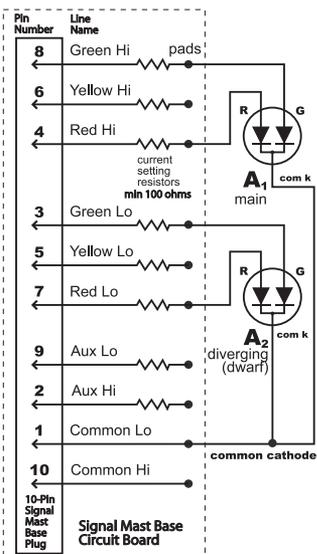## 2-Wire Bi-color Searchlight Signal Schematic(Standard Polarity)
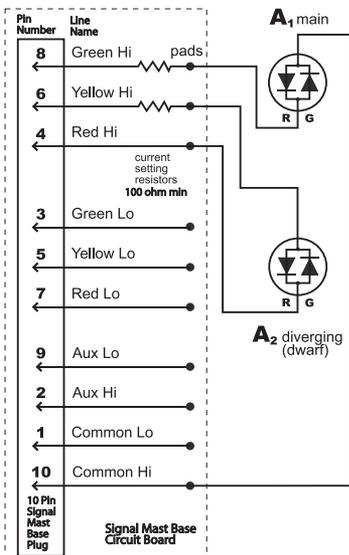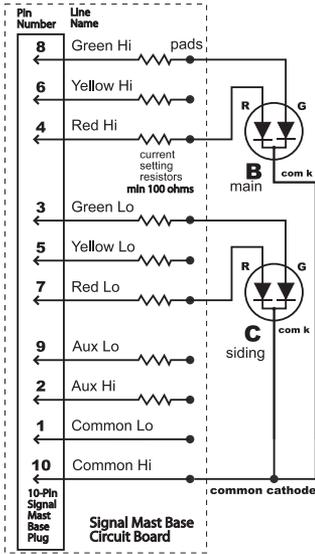

Wiring for A₁ (main) and A₂ (diverging or dwarf)
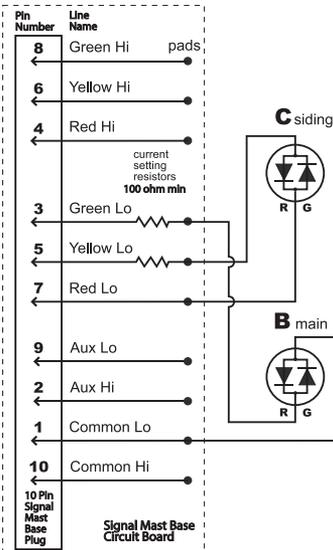
Wiring For B (main) and C (siding)

3-Wire Bi-color Searchlight Signal Schematic

Wiring for A₁ (main) and A₂ (diverging or dwarf)

Wiring For B (main) and C (siding)

Installing Position Light Signals And Semaphores

The SE8C can be used with position light type signals like those used by the Pennsylvania RR and the B&O/N&W. Leads from the signal can be soldered directly to the pads on the Signal Mast Base or to additional lengths of wire and then connected to the Signal Mast Base. Signals can be either common anode or common cathode types. It's simpler if you use all the same type for consistency in the setting up and troubleshooting your layout. If you are using additional lengths of wire it is a good idea to keep your wire colors consistent to simplify installation and troubleshooting. **The wiring diagrams for the Pennsy and B&O/N&W signals are available at www.digitrax.com/SE8chome.htm.**

The SE8C can also be set up to use the 8 turnout motor drive outputs to support 8 three-position semaphore type signals using slow motion type turnout machines, such as the Tortoise™ brand turnout machine. These 8 semaphore signals are available in addition to the standard 32 LED signal heads on the 8 Signal Driver Control Cables and occupy a separate address range. The SE8C automatically sequences the three possible mechanical arm positions to match 3 aspects of red, green and yellow using a position sense feedback wire from the slow motion turnout machine's auxiliary contacts. **Complete instructions for installing semaphores on your layout are available at www.digitrax.com/SE8chome.htm.**

Installing The SE8C Board and Signals On Your Layout

Test your signals and SE8C board settings to be sure that everything is working as expected before installing them on your layout. See previous sections for information on testing the SE8C board and wiring and testing masts.

It is best to start with a plan for your signal placements noting the location of each signal head on your layout diagram. Group the signal heads by plant or other convenient groups of four signal heads to reduce your wiring requirements and minimize problems in setup. Keep a record of each signal location and the SE8C Driver Socket and Signal Driver Cable used to control it. A sample of the suggested record keeping format follows.

Digitrax Signal Location Record

SE8C Board ID

| Cable	Signal A$_1$		Signal A$_2$		Signal B		Signal C	
	Adr	Location	Adr	Location	Adr	Location	Adr	Location
DRV1								
DRV2								
DRV3								
DRV4								
DRV5								
DVR6								
DRV7								
DRV8								

Locate the SE8C board on your layout to minimize the number of long cable runs. The SE8C board can be mounted on the underside of the layout or on a pull-out table/tray for added convenience. See the Advanced Transponding Application Note on www.digitrax.com for photographs of an example wiring panel.

1. Drill mounting holes in the end of the 44-Pin connector or mount using existing holes and right angle brackets.

2. Screw the 44-Pin connector to the wiring panel board.

3. Solder the leads from the 12V AC or 15V DC power supply to Pin 3 and Pin C of the 44-Pin connector.

4. Push the fingers at the edge of the SE8C board into the 44-Pin connector until it is firmly seated.

Making Signal Driver Cables
The SE8C uses a 10-wire ribbon cable, called a Signal Driver Cable, to connect each Driver Socket on the board (DRV1-DRV8) to the set of four signals that it controls. To make Signal Driver Cables you can use any 10 wire, 30 AWG ribbon cable and four 10-Pin sockets. Digitrax offers a Signal Driver Cable Kit which includes 30' of 10 wire ribbon cable and 8-10 pin connectors, enough to build 2 Signal Driver Cables. Follow these simple instructions to make your Signal Driver Cables:

1. Cut 10-wire ribbon cable to the length you need. When measuring the distance from the SE8C location to the signals, allow enough cable to provide for twisting the cable into position under the layout, securing the cable and connectors to the sub-roadbed base and to allow plugging in the Signal Mast Base. Make the cuts straight and square across the ribbon cable. Use a marker to mark the points where the socket for each signal will be placed on the signal driver cable.

2. Separate the two pieces of the 10-Pin connectors. Be careful not to break the latches on the top part of the connectors as you separate them.

3. Lay the ribbon cable into the grooves in the bottom part of the connector. For the connector on the end of the cable, the cable should extend through the connector no more than 1/16" beyond the end of the connector. The cable may be placed in the bottom part of the connecter with the brown wire to the right (shown below) or left as long as the top part is placed with the Pin 1 indicator arrow over the brown wire for installation.


Pin 1 mark

Pin 1 mark
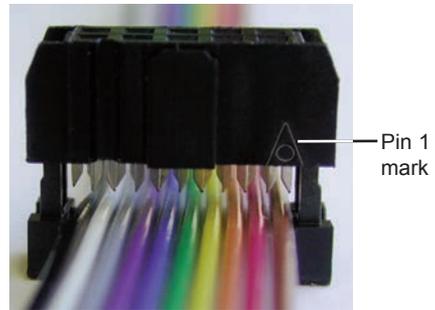
4. Place the top part of the connector, metal pins toward the cable, over latches on the bottom part of the connector. The Pin 1 indicator arrow on the side of the connector should be over the brown wire.

5. Squeeze the two parts of the connector together around the ribbon cable. The easiest way to do this is in a vise using wood blocks to protect the socket from being crushed. Repeat the steps for each socket. For making installation easier, the socket can face in either direction, as long as the Pin 1 indicator arrow is above the brown wire.

6. Test the completed Signal Driver Cable prior to installation on your layout using the procedures detailed in the Pre-Installation Testing Procedures Section. Once testing is complete, the signal driver cable is ready to be plugged into one of the SE8C's driver sockets.

You will need eight Signal Driver Cables if you want to hook up all of the 32 signals that can be controlled by each SE8C.

Installing Signals On Your Layout

Locate the SE8C near the center of a high density signal area on the layout to minimize the length of the cable runs required. Make up Signal Driver Cables to match the run requirements for each plant where you plan to install signals. You can also use the SE8C to control the turnout associated with each plant using wires from the 44-Pin connector to a slow motion turnout machine. Alternately, the turnout control capabilities can be used to control semaphores. See www.digitrax.com/SE8chome.htm for information about installing semaphores.

The orientation of the Signal Mast Base relative to the Signal Driver Cable determines how the signal heads will work. Each Signal Driver Cable controls as many as four signal heads using two signal orientations-Signal heads A_1 and A_2 are controlled using orientation A and signal masts B and C are reversed to use orientation B.
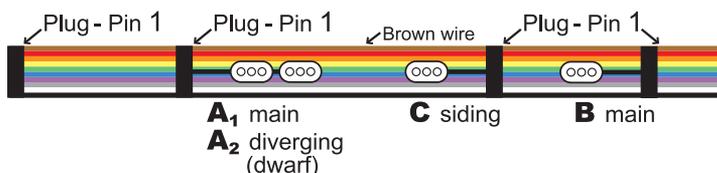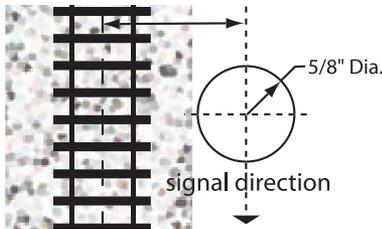
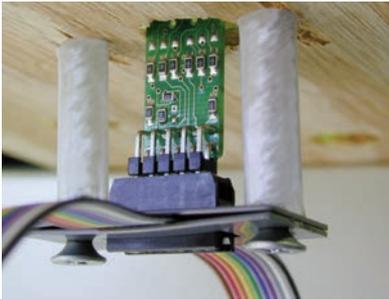

Signal Driver Cable Example

When setting up your wiring, keep in mind the direction each signal head must face after installation. Generally speaking, with the mast on the right side of the track in the direction of travel, Pin 1 of the plug is closest to the rail centerline for the A_1/A_2 mast and farthest away from the centerline for the B & C plugs, the orientation of the signal head will be correct. This will require twisting or folding the Signal Driver Cable to create the correct placement of B and C signal heads.

The signal heads can be mounted in several different ways using the Plug 'N Play Signal Masts, Signal Driver Cable and its sockets. Mark the locations where the signal will be placed in the layout. If using the Plug 'N Play Signal Masts, drill a 5/8" hole next to the track as indicated in the following figure. This will allow the base of the mast to pass through the layout board and plug into the Signal Driver Cable below the board. the hole can be filled with modeling clay to hold the mast upright and allow for a little movement in case the mast is accidentally bumped during operation of the trains. There are several alternatives for mounting the Signal Driver Cables and their sockets under the layout.

Location of Signal Mast Through Hole

5/8" Dia.

signal direction

Sample Plug 'N Play Signal Driver Cable Mounting Options

Here the Signal Mast Base is plugged into a Signal Driver Cable's Socket which is mounted under the layout using Signal Spacers and Metal Signal Straps. These components are available in the Signal Mounting Hardware Kit which consists of 6 Straps and 6 Spacers..

Here two Metal Signal Straps are used to hold the Signal Driver Cable's Socket in place. The Signal Mast Base is inserted through a hole in the layout and the hole is filled with clay to hold the signal mast upright.

Here Metal Signal Straps are used to twist the Signal Driver Cable under the layout to position the sockets in the proper orientation for signal installation. The last socket on the Signal Driver Cable is held in place with clay alone.

Installing Turnouts and Feedback Input

The SE8C will control as many as eight slow motion turnout machines, like Circuitron's Tortoise. It also provides as many as eight inputs for detection. The 44 connector pin out is detailed on the following page.

Detection Section Inputs

DS01 to DS08 (see figure opposite page) are inputs from occupancy detectors that provide at least +5V (max 22V) when occupied, and 0V when unoccupied. The SE8C sends occupancy messages to LocoNet when these inputs change. If these detection section inputs are not disconnected, they will report "unoccupied". Occupancy reporting can be turned off by changing OpSw 13 to closed.

Local Switch Inputs for Turnout Operation

SW01 to SW08 (see figure opposite page) are inputs that allow a local switch mounted on the layout to operate the slow motion turnout machine. For example, SW01 when connected to the +VE sensor common (Pin 2 in figure) will reverse the voltages on SMTM1A and SMTM1B to change the position of turnout 1. SW02 controls local turnout 2 , etc. For each connection to +VE sensor common the slow motion turnout machine swaps direction and a Switch message is sent to LocoNet to report the new position of the turnout.

This local control can be disconnected by setting OpSw 15 to closed, in which case the 8 slow motion turnout machines can still be controlled by the system via LocoNet or the DCC track input while the local switch inputs have no effect.

Disabling Throttle Control of Head Aspect Display

To disable Throttle control of head aspect display, use the DCS100's OpSw 27 with a PC software signal controller that can map out the Signal control address range as not being controlled from LocoNet/throttles. This same feature can be used to selectively allow access to parts of the system such as mainline turnouts.

Pin Outs for SE8C 44-Pin Edge Connector

NOTE: Do not connect any wires to the terminals 1, 20, 21, 22, A, X, Y, or Z.

Pin	Left	Right	Pin
A	no connection	no connection	1
B	-VE sensor return	+VE sensor common	2
C	Power Input 2	Power Input 1	3
D	SMTM 1 A	SW01	4
E	SMTM 1 B	DS01	5
F	SMTM 2 A	SW02	6
H	SMTM 2 B	DS02	7
J	SMTM 3 A	SW03	8
K	SMTM 3 B	DS03	9
L	SMTM 4 A	SW04	10
M	SMTM 4 B	DS04	11
N	SMTM 5 A	SW05	12
P	SMTM 5 B	DS05	13
R	SMTM 6 A	SW06	14
S	SMTM 6 B	DS06	15
T	SMTM 7 A	SW07	16
U	SMTM 7 B	DS07	17
V	SMTM 8 A	SW08	18
W	SMTM 8 B	DS08	19
X	no connection	no connection	20
Y	no connection	no connection	21
Z	no connection	no connection	22

Rail A — Booster — Rail B

Slow Motion Turnout Machine, such as Tortoise™

To Slow Motion Turnout Machines

To Momentary Switches and/or Occupancy Detectors.

momentary switch for local turnout control

red / black — Occupancy Detector BD1 or equivalent

Detection Section 01

Customizing Your SE8C

The SE8C board can be set up to meet the signaling requirements of your layout using the Option Switch programming mode. To change Options:

1. Press the Option Button on the SE8C board down until the red LED starts to blink, then release the button. The red and green LEDs will blink alternately indicating that the SE8C is in Option Switch mode. Switch commands issued while in OpSw mode will change the SE8C's current settings.

2. Using your Throttle or PC, select the option switch you want to change and issue the appropriate command. Refer to the following table to determine which option switches and settings to use.

3. Exit OpSw mode by pressing the Option Button then releasing it when the alternating LED flashing stops.

Tech Support for Your SE8C

See www.digitrax.com/SE8chome.htm for our SE8C troubleshooting application note BEFORE you call Digitrax tech support. This application note will walk you through some of the most common tech support issues.

We will be glad to assist you by phone and to verify that your SE8C is working properly if it is connected according to the pre-installation set up and testing procedures described in this manual. Once the SE8C is installed on your layout is more difficult for us to assist you with troubleshooting because the SE8C can be used in so many different ways and in so many different settings. We are not experts in signaling practice, that is up to you.

Advanced Topics Covered at www.digitrax.com/SE8chome.htm

1. Position Light Signals: Pennsylvania RR Permissive Position Signals, Pennsylvania RR Absolute Position Signals, B&O and N&W RR Color Position Signals.

2. Semaphore Signals using slow motion turnout machines.

3. Using 2 aspect mode. The signal control address range will be in blocks of 32 instead of 64.

4. Broadcast address control range allows the aspects of all the signal heads to be set with a single switch command at the broadcast address.

5. How to use SE8C with non-LocoNet DCC layouts.

6. How to use SE8C with DC layouts.

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Digitrax gives a one year *"No Worries" Warranty* against manufacturing defects and accidental customer damage on all Digitrax products.

Visit www.digitrax.com for complete warranty details and instructions for returning items for repair.

SE8C Option Switch Settings

OpSw	t - thrown	c - closed
01	SE8C Mode Operation	Reserved
02	4 Aspects per head (2 Signal control addresses)	2 Aspects per head (1 Signal control address)

OpSw03	OpSw04	OpSw05	Head Types- for SE8C DRV 1 to 4
t	t	t	DRV1-4 3/3 Dual Heads, Common Anode
t	t	c	DRV1-4 3/3 Dual Heads, Common Cathode
t	c	t	DRV1-4 Searchlight 3 wire LED, Common Anode
t	c	c	DRV1-4 Searchlight 3 wire LED, Common Cathode
c	c	t	DRV1-4 Searchlight 2 wire LED, Standard polarity
c	c	c	DRV1-4 Searchlight 2 wire LED, Reverse polarity

OpSw06	OpSw07	OpSw08	Head Types- for SE8C DRV 5 to 8
t	t	t	DRV5-8 3/3 Dual Heads, Common Anode
t	t	c	DRV5-8 3/3 Dual Heads, Common Cathode
t	c	t	DRV5-8 Searchlight 3 wire LED, Common Anode
t	c	c	DRV5-8 Searchlight 3 wire LED, Common Cathode
c	c	t	DRV5-8 Searchlight 2 wire LED, Standard polarity
c	c	c	DRV5-8 Searchlight 2 wire LED, Reverse polarity

OpSw09	OpSw10	Indication of 4th Aspect
t	t	4th Aspect Flashing Yellow
t	c	4th Aspect Flashing Red
c	t	4th Aspect Dark – Use for approach lighting
c	c	4th Aspect Flashing Green

OpSw	Thrown	Closed
11	default	Semaphore mode (for slow motion turnout machine output)
13	default	Disable DS (detection section) reporting input messages
14	default	Enable SW command from LocoNet (not track packets)
15	default	Disable local switch toggle command
17	default	Next SW command sets signal control address range
18	default	Next SW command sets broadcast address range
19	default	Next SW command sets semaphore control address range
20	default	Set FACTORY default settings
21	Normal operation	Exercise Signal Head Pattern 1 (all heads)

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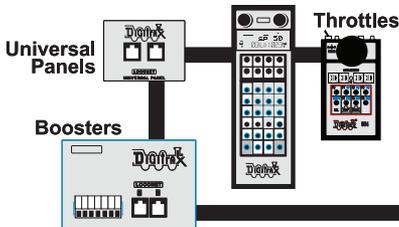**Zephyr**™

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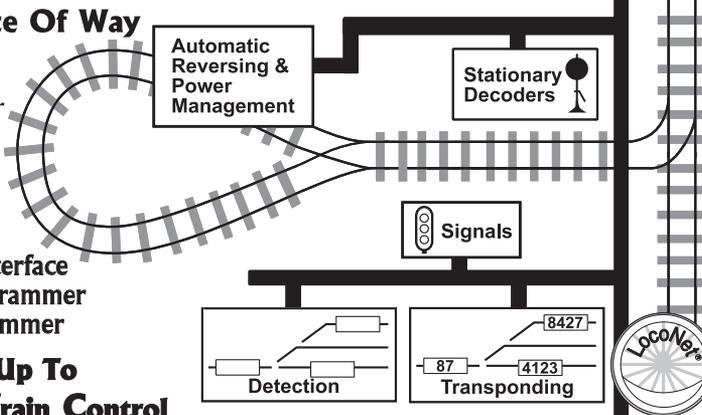
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