MANUAL

# THEMOTORMAN

Automatic Train Shuttle Controller

**www.iascaled.com**


**IOWA SCALED ENGINEERING** – ELECTRONICS MADE EASY!

The **Motorman** is an automatic train shuttle controller for both DC and DCC locomotives. Using TrainSpotter infrared proximity detectors at each end, the **Motorman** will continuously drive the train back and forth, automatically stopping and reversing at the end of track. With control of the speed, locomotive address, delay time, and other settings, a fully customized experience can be created.

### Features

- Control DC or DCC locomotives
- Stores settings for up to 15 locomotives
- Adjustable acceleration and deceleration rates
- Operates any long or short DCC address, including consists
- Supports intermediate stops (with additional sensors)
- Operates up to 6 accessory decoders based on selectable trigger events
- Fully integrated unit with simple, intuitive interface
- Built-in track short circuit protection
- Optional track power switch for use with existing DC / DCC system

### Typical Applications

- Train show demo layouts
- Museum displays
- Home layout automation

### Kit Contents

- Control unit with LCD and buttons
- Faceplate & hardware (pre-installed)
- 12V / 3A power supply
- 2x TrainSpotter infrared detectors

## INSTALLATION

### Wiring

The Motorman is supplied with a custom faceplate. It can be attached permanently to the layout fascia or a wall using screws through the four corner holes.

Power for the Motorman is provided by the supplied 12V DC power supply. Plug the barrel jack into the corresponding jack (J1) on the back side of the unit. **See Figure 1**.

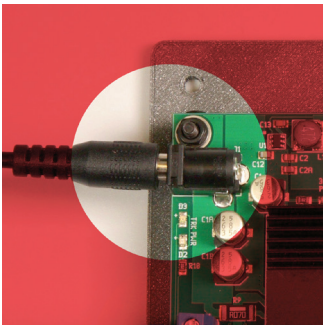


**Figure 1**

***When the Motorman is connected to the track, no other boosters or throttles can be connected to the track. Make sure the track section is isolated or damage to the Motorman will result. An optional track power switch is available to help isolate the Motorman and other track power sources.***

Connect the track feeders to terminal block J2. **See Figure 2**. For DCC use, the polarity does not matter. If using DC mode, then the physical direction corresponding to forward and reverse will depend on the polarity of the feeder wires connected to the terminal block. If you end up with the direction opposite what you desire, then simply swap the two track wires in the terminal block.

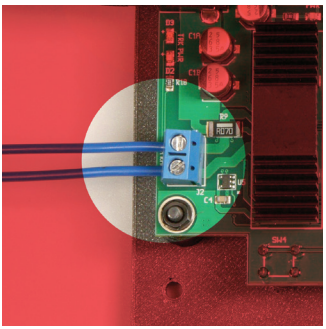


**Figure 2**

## Sensors

The left and right TrainSpotter end sensors connect to the terminal blocks J4 and J6 as shown in **Figure 3**. The red wires go to the +12V terminal. The black wires go to the GND terminal. The white wire from the left sensor goes to the LEFT terminal while the other white wire connects to the RGHT terminal. The inputs are active low, so any number of open drain output end sensors can be connected in parallel (i.e. to the same terminal).

If you wish to use current-based detectors, an isolated block will be needed for the "trigger zone". Any block detector that provides an open drain output can be used in place of the infrared TrainSpotter sensors, though obviously we recommend the Iowa Scaled Engineering CKT-BD1.

Optionally, intermediate sensors can also be installed for mid-run pauses. Inputs for left and right sensors are provided (labeled I-L and I-R, for intermediate left and right respectively), so that deceleration can stop the locomotive at approximately the same center point each time, based on deceleration rate. If current-based detection is used to cover the entire station block, or if the desire is to only use a single IR sensor, then connect the detector output to both the I-L and I-R terminals.

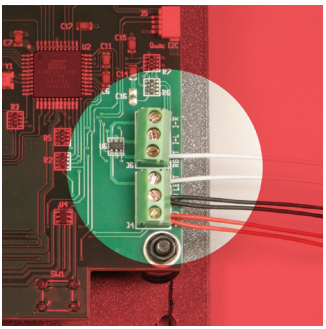


**Figure 3**

***The sensor inputs (LEFT, RGHT, I-L, and I-R) are only rated to 3.3V. Do not exceed this or the Motorman will be damaged. Any open-drain sensor output should be safe.***

## Optional Track Power Switch

An optional upgrade kit is available that provides a high-current power switch for swapping control of the track between the Motoman and an existing DC or DCC system. The upgrade kit comes with a new faceplate, the switch, and instructions for upgrading the system. See the Iowa Scaled Engineering website for details.

## Equipment Direction vs. Track Direction

An important concept to understand is the difference between track direction and equipment direction. Think of the problem this way – a locomotive can go forward or reverse independent of which direction it's currently pointed. If you set a DCC

locomotive on the track, forward is relative to the locomotive, not to which direction it is headed on the track. The locomotive can go forward to the left, or it can go forward to the right, depending on which way it's pointed.

For the sensors installed along the track, their direction is always the same, because their relation to the track doesn't change. One will be to the left, one will be to the right.

In this manual, the two ends of the track will be denoted as "left" and "right", whereas the two directions of equipment travel will be denoted as "forward" and "reverse".

## GETTING STARTED

This assumes that you already have the Motorman connected to the track and you're ready to run your first piece of equipment.

### Step 1

If your locomotive is DC, go to the Configuration → DC/DCC Output screen (page 15) and change the output type to DC. If your locomotive is DCC, go to the Locomotive Configuration screen (page 12) and set configuration 01 for your locomotive address.

### Step 2

Place your locomotive on the track somewhere between the end sensors. It should accelerate in what the Motorman thinks is the forward direction. The main screen should show "LRN", indicating that the Motorman is learning which direction is forward.

### Step 3

The engine will run until it reaches either end sensor, and at that point, the Motorman now knows if left is forward or right is forward. From this point, the locomotive will continue running between the two points and stopping at intermediate stations as configured.

## DIAGNOSTIC LIGHTS

A green LED on the back side, labeled “3.3V PWR” next to the heatsink, indicates that the unit is getting power.

Near the output, there is a blue and an amber LED. These indicate that track power is being applied. Blue indicates one polarity, and amber indicates the other. For DCC, both should be lit. For DC, only one will be lit, corresponding to the direction of travel (amber = forward, blue = reverse).

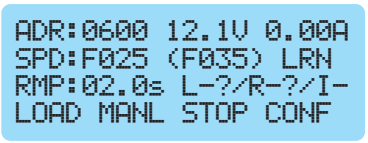
## USER INTERFACE

The interface to the Motorman is based around the LCD screen and the four buttons beneath the screen. Each button acts as a “soft key” with its function defined by the text on the bottom row of the LCD screen. This makes navigating the various screens easy and intuitive.

The main screen is displayed by default and provides a quick overview of the most important details. The configuration screens can be accessed using the buttons under the screen.

### The Main Screen

The main screen shows, at a glance, the status of the Motorman.




#### *Address*


The left side of first line shows you the address currently being controlled (“ADR:”). If the Motorman is set to DC operation, this will show *DC* rather than a DCC address. If a short DCC address is being controlled, the address will be displayed as “s123”, whereas long DCC addresses are displayed as four digits.

### *Track Voltage / Current*


The track voltage and current draw are displayed on the right side of the first line. In the event that too much current is being drawn (such as in a short) or the power driver on the back of the Motorman overheats, this will display **FAULT** instead.

### *Current and Target Speed*


The start of the second line shows the current direction and speed and, in parentheses, the target direction and speed. Direction is F for forward and R for reverse, followed by a speed percentage (0-100%) of maximum. The target speed is the maximum speed and direction commanded – how fast the current speed accelerates or decelerates to that is based upon the ramp rate. Target speed is set as part of the locomotive profile.

### *Ramp Rate*


On the third line, the current ramp rate is displayed on the left. This is the number of seconds it will take for the locomotive to accelerate from full stop to the set target speed, or to decelerate from the set target speed down to a full stop. Ramp rate is set as part of the locomotive profile.

### *Sensor Inputs*


On the right half of line three, the sensor input status is visible, along with how they correspond to the current equipment direction. The left hand sensor information is on

the left hand side of the slash and starts with an L. The right hand sensor information is on the right side of the slash.

The character immediately following the L or R indicates the current sensor status. A dash (-) indicates that no sensors are currently activated. An asterisk (*) indicates that the left or right end sensor is currently activated.


If midpoint stops are enabled (Configuration → Midpoint Stops, page 16), the /I- will appear on the end. Otherwise, these spaces will be blank. When a midpoint sensor is tripped, an R will appear for right intermediate triggered, an L for left intermediate triggered, or an A for both right and left intermediate triggered.

### *Operational State*


The current operating state is shown on the right side of the second line.

**LRN – Learning:** the Motorman is learning which track direction corresponds with forward. Once an end sensor is reached, that track direction (left or right) will be deemed "forward" until such time that the locomotive is changed, the STOP key is pressed (configurable), or the power is cycled. This association between left/right and forward/reverse will be indicated in the "Sensor Inputs" section of the main screen.

**FWD – Forward Travel:** The locomotive is commanded to go forward at the speed commanded in the profile until either the end stop sensor is reached, or an intermediate sensor opposite the forward end is reached. If the end stop sensor is tripped, the state will go to FDC. If the intermediate sensor is tripped, the state will go to FID.

**REV – Reverse Travel:** The locomotive is commanded to go reverse at the speed commanded in the profile until either the end stop sensor is reached, or an intermediate sensor opposite the reverse end is reached. If the end stop sensor is tripped, the state will go to RDC. If the intermediate sensor is tripped, the state will go to RID.

**FDC – Forward Deceleration:** The forward direction end stop sensor has been tripped and the speed is decreasing to zero, as set by the locomotive's ramp rate. Once the current speed reaches zero, the state will transition to FTR.

**FTR – Forward to Reverse Delay:** The locomotive has stopped its forward travel and is waiting the configured Endpoint Delay (See Configuration → Endpoint Delay, page 16) to reverse direction. Once the delay has expired, the state will transition to REV

**RDC – Reverse Deceleration:** The reverse direction end stop sensor has been tripped and the speed is decreasing to zero, as set by the locomotive's ramp rate. Once the current speed reaches zero, the state will transition to RTF.

**RTF – Reverse to Forward Delay:** The locomotive has stopped its reverse travel and is waiting the configured Endpoint Delay (See Configuration → Endpoint Delay, page 16) to reverse direction. Once the delay has expired, the state will transition to FWD

**FID – Forward Intermediate Deceleration:** A forward intermediate sensor has been tripped and the equipment is decelerating to zero speed. Once the speed reaches zero, the state will transition to FIW.

**RID – Reverse Intermediate Deceleration:** A reverse intermediate sensor has been tripped and the equipment is decelerating to zero speed. Once the speed reaches zero, the state will transition to RIW.

**FIW – Forward Intermediate Wait:** The locomotive has stopped in the forward direction at an intermediate sensor, and will wait for the configured delay (See Configuration → Midpoint Delay, page 16). Once the delay expires, state will transition to FIA.

**RIW - Reverse Intermediate Wait:** The locomotive has stopped in the reverse direction at an intermediate sensor, and will wait for the configured delay (See Configuration → Midpoint Delay, page 16). Once the delay expires, the state will transition to RIA.

**FIA – Forward Intermediate Acceleration:** The locomotive is accelerating forward out of an intermediate stop. As soon as the tripped intermediate sensor clears, the state will transition to FWD.

**RIA – Reverse Intermediate Acceleration:** The locomotive is accelerating in reverse out of an intermediate stop. As soon as the tripped intermediate sensor clears, the state will transition to REV.

### *Main Screen Keys*


**LOAD** – Enter the Load Locomotive screen. Loads a new pre-saved locomotive configuration to active in DCC mode. See Load Locomotive screen below. If the unit is in DC mode, equipment is not individually addressable and the LOAD key will not be present.

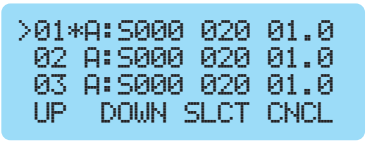
**MANL** – Enter the Manual Adjustment screen. See page 11. Allows manual control of the direction and maximum speed.

**STOP** – Stop operation. Brings the locomotive to an immediate stop (no ramp rate) and optionally resets the operating state to learning mode (see Configuration → Stop Relearns Direction, page 17). Upon stopping, this key changes to "RUN!" to restart operations.

**RUN!** – Starts operation. Upon starting, this key changes to STOP.

**CONF** – Enter the Configuration screen. See page 11.

## LOAD LOCOMOTIVE

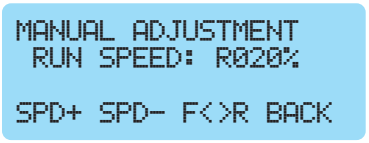



The Load Locomotive screen appears when the "LOAD" key is pressed on the main screen. Each row represents one saved DCC locomotive configuration (see Locomotive Configuration screen, page 12). There are a total of 14 DCC configuration slots available.

The > character is a cursor, showing you which configuration you are about to select. After that, each line shows the configuration slot number, the DCC address, maximum speed (0-100%) and ramp rate (00.1-25.5 seconds) of each configuration. In addition, the currently active configuration will be marked with an asterisk (*).

Use the UP/DOWN key to select the configuration and press the SLCT key to select it. To cancel without selecting a new configuration, press the CNCL key.

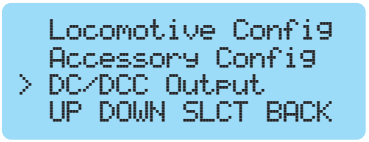
## MANUAL ADJUSTMENT




The Manual Adjustment screen allows you to tweak the running speed and direction of the current locomotive configuration. This allows you to fine-tune how fast you want the locomotive to go without going back through the configuration process. Note that any changes here are only effective until a new locomotive configuration is loaded, or power is cycled.

Use the SPD+ and SPD- keys to adjust the speed in 1% increments. F<>R will change the direction of the locomotive. BACK exits to the main screen.

## CONFIGURATION



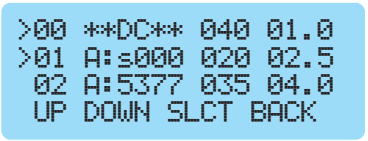

The Configuration screen allows you to change how the Motorman behaves. Use the UP / DOWN keys until the cursor (>) is on the option you want to change, and then press the SLCT (select) key.

Configurable options are as follows:

- **Locomotive Config** – Configure the 14 DCC locomotive slots as well as the DC slot.
- **Accessory Config** – Configure accessory decoders to react to the Motorman
- **DC/DCC Ouptut** – Switch between DC and DCC output on the track
- **Endpoint Delay** – Configure the number of seconds (0 to 255 seconds) that equipment should wait when reaching either end sensor.
- **Midpoint Delay** – Configure the number of seconds (0 to 255 seconds) that equipment should wait when stopped because of a midpoint sensor.
- **Midpoint Stops** – Configure whether intermediate stops (midpoints) are currently enabled. If disabled, intermediate sensor inputs will be ignored.
- **Pause on Start** – Configure whether the unit will immediately start running the last active configuration upon startup, or if it will load the configuration but start in a paused state.
- **Stop Relearns Direction** – Configure whether the unit will go back to learning mode (to associate forward with the left or right sensor) in the event that the stop key is used from the main screen.

- **Backlight Timeout** – Configure the unit to shut off the backlight after 1 to 255 seconds of no keypresses, or always keep the display backlight active.
- **Turn Off Backlight** – Turn off the backlight immediately (regardless of timeout).
- **Diagnostics** – Show internal diagnostic information.
- **Factory Reset** – Remove all configuration options and return the unit to factory original configuration.

## LOCOMOTIVE CONFIGURATION




The Locomotive Configuration screen allows you to configure and store up to 15 locomotive configurations – one for DC operation and 14 for DCC operation.

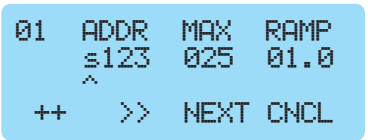
Configuration 00 is always DC, and is the only configuration for DC.

Configurations 01 to 14 are for DCC operation.

Each line shows the configuration slot number, DCC address (or **DC** for slot 0), maximum speed (0 to 100%) and ramp rate (0.1 to 25.5 seconds).

Use the UP/DOWN key to select the configuration to change and press the SLCT key to go into the Configure Locomotive screen #1. The BACK key will take you back to the Configuration screen.

## CONFIGURE LOCOMOTIVE #1



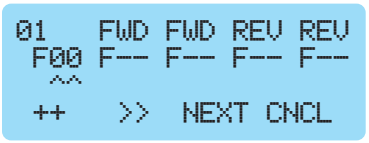

This screen allows you to set the locomotive address (if using one of the DCC configurations 01 to 14), maximum speed, and ramp rate. The configuration number being edited is in the upper left corner. Maximum speed (MAX) is 1 to 100%. The ramp rate (RAMP) is the number of seconds to accelerate between stopped and maximum speed, or decelerate between maximum speed and stopped.

The ++ key will increment the field pointed to by the cursor. The >> key will move the cursor (^) to the next field.

For configuration 00 (DC), SAVE will appear for the third key, since there are no functions for DC control. For configurations 01 to 14, the third key will display NEXT,

taking you to Configure Locomotive #2 screen. To cancel without saving any changes, press the CNCL key.

## CONFIGURE LOCOMOTIVE #2




This screen allows you to set DCC decoder function behavior. The left-most function (under the configuration number) is always active no matter the direction of travel, and can be used for things like "engine start" on sound decoders that need to be active for the locomotive to move. There are two additional functions for forward and two for reverse. These functions will only be active when a locomotive is moving in that direction of travel, and otherwise will be off.

F-- indicates that no function is selected. F00 to F28 will activate that function. F29 and above, supported by some European manufacturers as an extension of the NMRA standard, are not currently supported.

The ++ key will increment the field pointed to by the cursor. The >> key will move the cursor (^) to the next field. The NEXT key will send you to Configure Locomotive #3 screen. To cancel without saving any changes, press the CNCL key.

## CONFIGURE LOCOMOTIVE #3


This screen allows you to set DCC functions that are activated when the locomotive is accelerating and when the locomotive is decelerating. The ACC function will be active from when the locomotive starts accelerating until the current speed matches the target speed. The BRK function will be active from when the locomotive trips the end stop (or intermediate) sensor until the endpoint (or midpoint) delay expires. The BRK function is typically set to the brake function on a DCC decoder to decelerate the locomotive quickly in the event high momentum settings are used (e.g. for use with the ProtoThrottle Realistic Control Stand Throttle).

F-- indicates that no function is selected. F00 to F28 will activate that function. F29 and above, supported by some European manufacturers as an extension of the NMRA standard, are not currently supported.

The ++ key will increment the field pointed to by the cursor. The >> key will move the cursor (^) to the next field. The SAVE key will save the configuration changes you've made to the selected locomotive configuration. To cancel without saving any changes, press the CNCL key.

## ACCESSORY CONFIGURATION

```
>00 0000 DISBL C [C]
 01 0000 DISBL C [C]
 02 0000 DISBL C [C]
 UP  DOWN SLCT BACK
```

The Accessory Configuration screen allows you to configure and store up to 6 accessory decoder configurations (00 to 05) that will activate based on triggers. This screen allows you to see all of them at a glance and select one to change.

From left to right, each row shows the accessory slot number (00-05), the accessory decoder extended address (0001-2044), the trigger mode, the current state (S=set, C=cleared), and the startup state in braces.

Use the UP/DOWN key to select the accessory configuration to change and press the SLCT key to go into the Configure Accessory Screen. The BACK key will take you back to the Configuration screen.

## CONFIGURE ACCESSORY

```
ACC ADDR INIT TRIGR
00  0001 SET  LS-RC
    ^
 ++   >>  SAVE CNCL
```

The Accessory Configuration Screen allows you to change the behaviour of a given accessory configuration. It shows you the accessory configuration number on the left, followed by the accessory address, its initial state when the unit powers up (set or cleared), and its trigger mode.

The ++ key will increment or cycle through the field pointed to by the cursor. The >> key will move the cursor (^) to the next field. The SAVE key will save the configuration changes you've made to the selected locomotive configuration. To cancel without saving any changes, press the CNCL key.

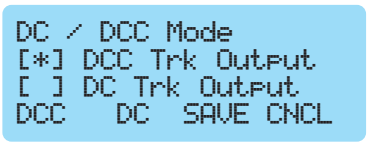
Trigger mode governs when the accessory decoder is changed. Options are:

- **DISBL – Disable** – Do not use this accessory configuration at all. No initialization will be sent, and it will never change in response to sensor input.
- **LS-RC – Left Set, Right Clear** – Set the accessory when the left end stop sensor is

triggered, clear the accessory when the right end stop sensor is triggered.

- **LC-RS – Left Clear, Right Set** – Clear the accessory when the left end stop sensor is triggered, set the accessory when the right end stop sensor is triggered.
- **LSTOG – Left Stop Toggle** – When the left end stop is reached, toggle the state of this accessory address (set will go to clear, clear will go to set). The right end stop has no effect.
- **RSTOG – Right Stop Toggle** – When the right end stop is reached, toggle the state of this accessory address (set will go to clear, clear will go to set). The left end stop has no effect.
- **XSTOG – Both Stop Toggle** – When either end stop is reached, toggle the state of this accessory address (set will go to clear, clear will go to set).
- **INIT – Initialize Only** – Set the accessory decoder to its configured initial state only when the unit powers up. Never changes based on sensors.
- **LE_ST- Left End Station Trigger** – Set the accessory when a locomotive reaches the left end stop sensor and clear it when it departs.
- **RE_ST- Right End Station Trigger** – Set the accessory when a locomotive reaches the right end stop sensor and clear it when it departs.
- **XE_ST- Left End Station Trigger** – Set the accessory when a locomotive reaches either end stop sensor and clear it when it departs.
- **LI_ST- Left Intermediate Station Trigger** – Set the accessory when a locomotive reaches the left intermediate sensor (right-bound equipment approaching an intermediate stop) and clear it when it departs.
- **RI_ST- Right Intermediate Station Trigger** – Set the accessory when a locomotive reaches the right intermediate sensor (left-bound equipment approaching an intermediate stop) and clear it when it departs.
- **XI_ST- Left Intermediate Station Trigger** – Set the accessory when a locomotive approaches an intermediate stop from either direction, and clear when it departs

## DC/DCC OUTPUT




The DC/DCC Output screen selects whether the Motorman acts as a DCC command station or a regular DC throttle.

The DCC key selects DCC mode while the DC key selects DC mode. The SAVE key will save the selected setting. To cancel without saving any changes, press the CNCL key.

## ENDPOINT DELAY


The Endpoint Delay screen configures the delay at each end of the run, in seconds, from when the equipment is sent a zero speed command until the equipment is sent a command to run in the opposite direction.

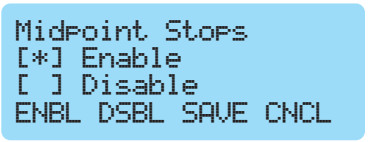
The ++ key will increment the digit pointed to by the cursor. The >> key will move the cursor (^) to the next field. The SAVE key will save the changes you've made to the endpoint delay. To cancel without saving any changes, press the CNCL key.

## MIDPOINT DELAY


The Midpoint Delay screen configures the delay at each midpoint stop, in seconds, from when the equipment is sent a zero speed command until the equipment is sent a command to run in the opposite direction. This is only effective if midpoint sensors are installed and midpoint stops are enabled (see Midpoint Stops screen below).

The ++ key will increment the digit pointed to by the cursor. The >> key will move the cursor (^) to the next field. The SAVE key will save the changes you've made to the midpoint delay. To cancel without saving any changes, press the CNCL key.

## MIDPOINT STOPS

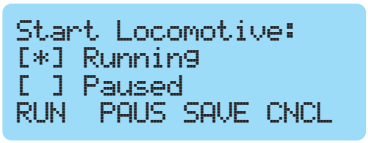



The Midpoint Stops screen configures whether midpoint stops are enabled. The default is disabled, to prevent any glitches on the unconnected midpoint sensor lines from disrupting normal operation. If you have midpoint sensors connected and want equipment to stop at midpoints, enable this feature.

The ENBL key enables midpoint stops and the DSBL key disables midpoint stops.

The SAVE key will save the selected setting. To cancel without saving any changes, press the CNCL key.

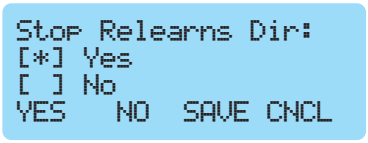
## PAUSE ON START




The Pause On Start screen configures whether the last selected locomotive will start running as soon as the unit powers up, or will start up paused and wait for the user to hit the RUN! key on the main screen before moving.

The RUN key sets the unit to start running on power-up. The PAUS key sets the unit to start up with equipment paused. The SAVE key will save the selected setting. To cancel without saving any changes, press the CNCL key.

## STOP RELEARNS DIRECTION




The Stop Relearns Direction screen configures whether the relationship between the left/right sensors and forward/reverse locomotive direction is forgotten each time the STOP key is pressed. If set to Yes, each time the STOP key is pressed, the relationship will be forgotten and then relearned by the Motorman when the RUN! key is pressed. If set to No, the initial relationship will be remembered and used regardless of pressing the STOP or RUN! keys.

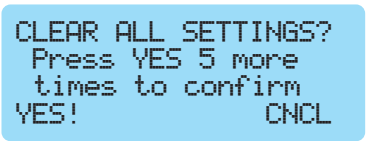
The YES and NO keys toggle between the two behaviors. The SAVE key will save the configuration changes you've made. To cancel without saving any changes, press the CNCL key.

## BACKLIGHT TIMEOUT


The Backlight Timeout screen configures how long the backlight will stay on after a key is pressed, from 10 to 250 seconds or never turning off. Given the long life of backlights on LCDs, rated in the tens of thousands of operating hours, it isn't necessary to turn the backlight off. However, in a dark room the display may be distracting. This default is value is "None", which means "never turn off the backlight".

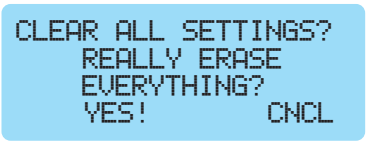
The ++ key will increment the time by 10 second increments. The -- key will decrease the time by 10 second increments. The SAVE key will save the changes you've made to the backlight timeout. To cancel without saving any changes, press the CNCL key.

## FACTORY RESET




The Factory Reset screen can be used to reset the Motorman and clear all configuration settings, restoring it back to the factory defaults. Doing so is purposefully a bit difficult, since we don't want users to lose their settings accidentally. If you get to this screen and do not want to wipe out all of your configurations, just press the CNCL key.

If you really do want to perform a factory reset, press the YES! key five times and you'll be presented with this screen:




Press the YES! key one more time (now on the second key instead of the first) to erase all configuration information. The unit will restart with from-the-factory settings.

## ORDERING INFORMATION

| Model | Description |
|---|---|
| CKT-PINGPONG | Automatic Train Shuttle |
| CKT-PINGPONG-SW | Track Power Switch and Faceplate Kit |

## RELATED PRODUCTS

| Model | Description |
|---|---|
| CKT-IRSENSE | Reflective Infrared Proximity Sensor |
| CKT-IRSENSE-2PC | Reflective Infrared Proximity Sensor with Remote Sensor |
| CKT-IRSENSE-RA | Reflective Infrared Proximity Sensor with Right-Angle Sensor |
| CKT-BD1 | DCC Current-Based Block Detector |

### Open Design

Iowa Scaled Engineering is committed to creating open designs that users are free to build, modify, adapt, improve, and share with others.

The design of the CKT-PINGPONG hardware is open source hardware, and is made available under the terms of the Creative Commons Attribution-Share Alike v3.0 license, a copy of which is available from:
**http://creativecommons.org/licenses/by-sa/3.0/**

Design files can be found on the Iowa Scaled Engineering website:
**http://www.iascaled.com/store/CKT-PINGPONG**

The official Iowa Scaled Engineering firmware for the CKT-PINGPONG is free software: you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation, either version 3 of the License, or (at your option) any later version.
A copy of the GNU GPL can be found at:
**http://www.gnu.org/licenses/gpl.html**

New firmware can be flashed into the CKT-PINGPONG through J3.
Stable releases of firmware and source code can be found on the Iowa Scaled Engineering website.

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