SC-12 CONTROL SYSTEM IN ACTION

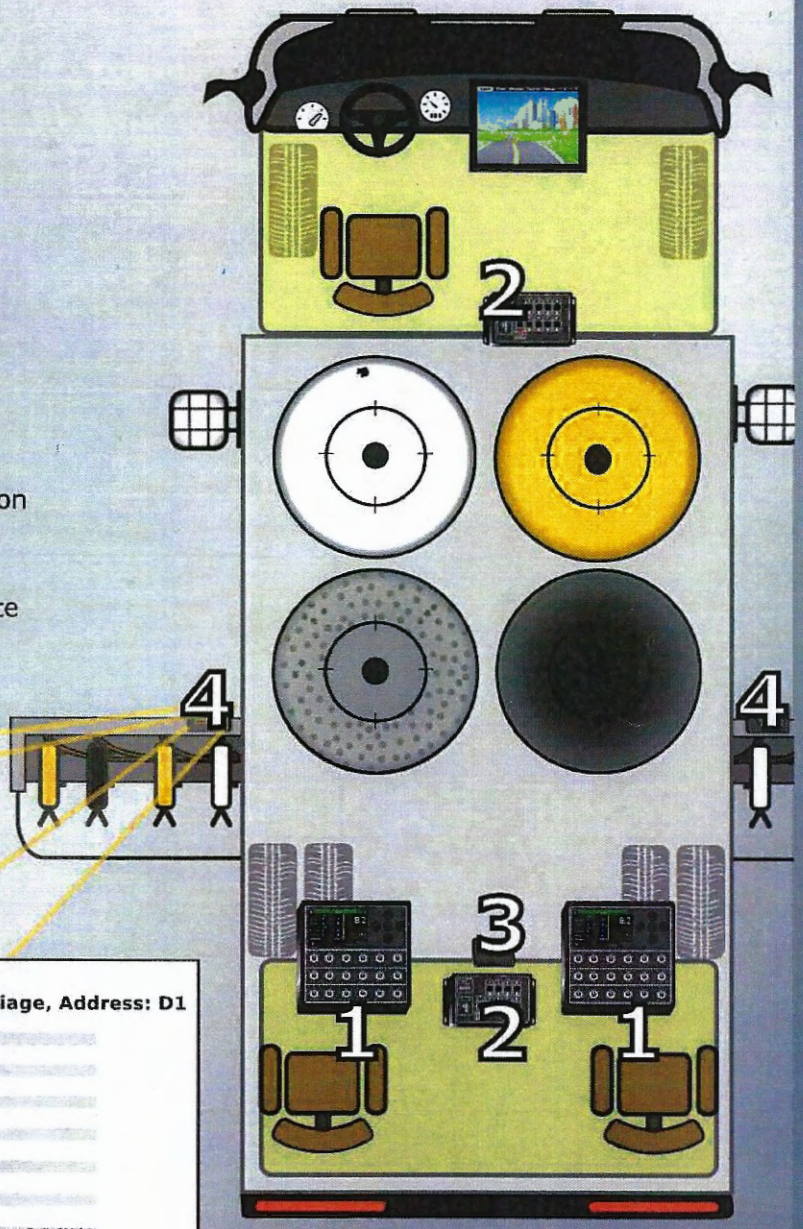
SKIP LINE

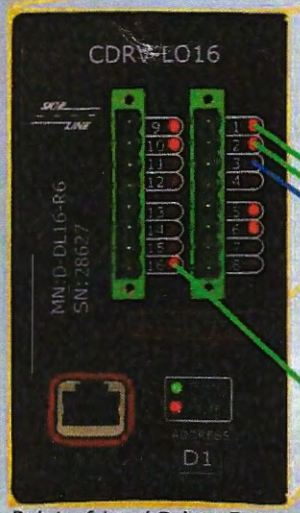
1. SC-12 Master (switchbox)
Provides operator stations with system control via toggle switch functions.

2. BUS-012
Clean communications and LED diagnostics

3. SC-12 Core Skipper / Core Hub
Calculates and implements the striping patterns and ensures the most accurate striping at any speed. Usually mounted in the console in the operator's area. Speed and pump sensors controlled here.

4. Point-of-Load Driver Boxes
These can be mounted in a sealed enclosure on or near the carriage or in the console in the operators area. Output indicators help with installation and diagnostics. LED lights indicate activated channels.





Point-of-Load Driver Boxes Come in various sizes

Wiring Sheet
CDRV-LO16 - C/L Carriage, Address: D1

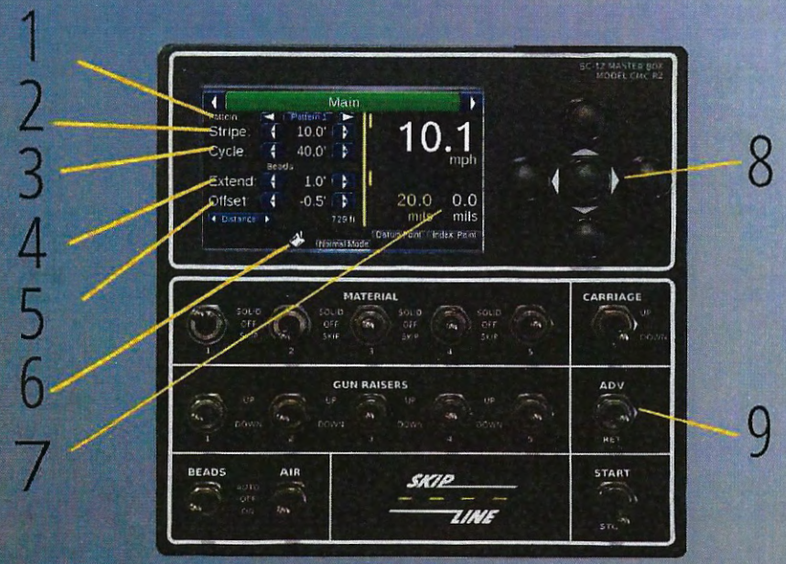
Channel	Type	Connection
1	LO	C/L Paint 1
2	LO	C/L Paint 2
3	LO	C/L Paint 3
4	LO	C/L Paint 4
5	LO	C/L Beads 1
6	LO	C/L Beads 2
7	LO	C/L Beads 3
8	LO	C/L Beads 4
9	LO	C/L Air 1
10	LO	C/L Air 2
11	LO	C/L Air 3
12	LO	C/L Air 4
13	LO	Beads 1 - Tank Pressure Relief Valve
14	LO	Beads 1 - Tank Pressure Valve
15	LO	C/L Carriage Up
16	LO	C/L Carriage Down

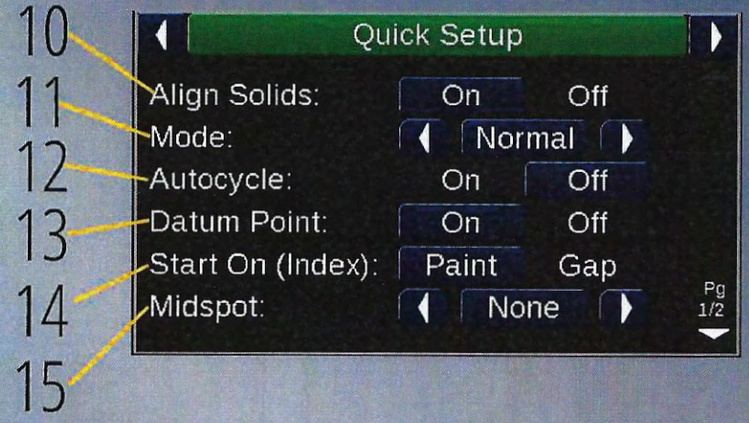
LED lights on Point-of-Load Driver Boxes help you diagnose issues with your box

For more detailed information see your manual.

Copyright© 2018 by Skip-Line, Inc.
Skip-Line® is a registered trademark of Skip-Line, Inc., for pavement marking controls and related products & services.

At a Glance: SC-12





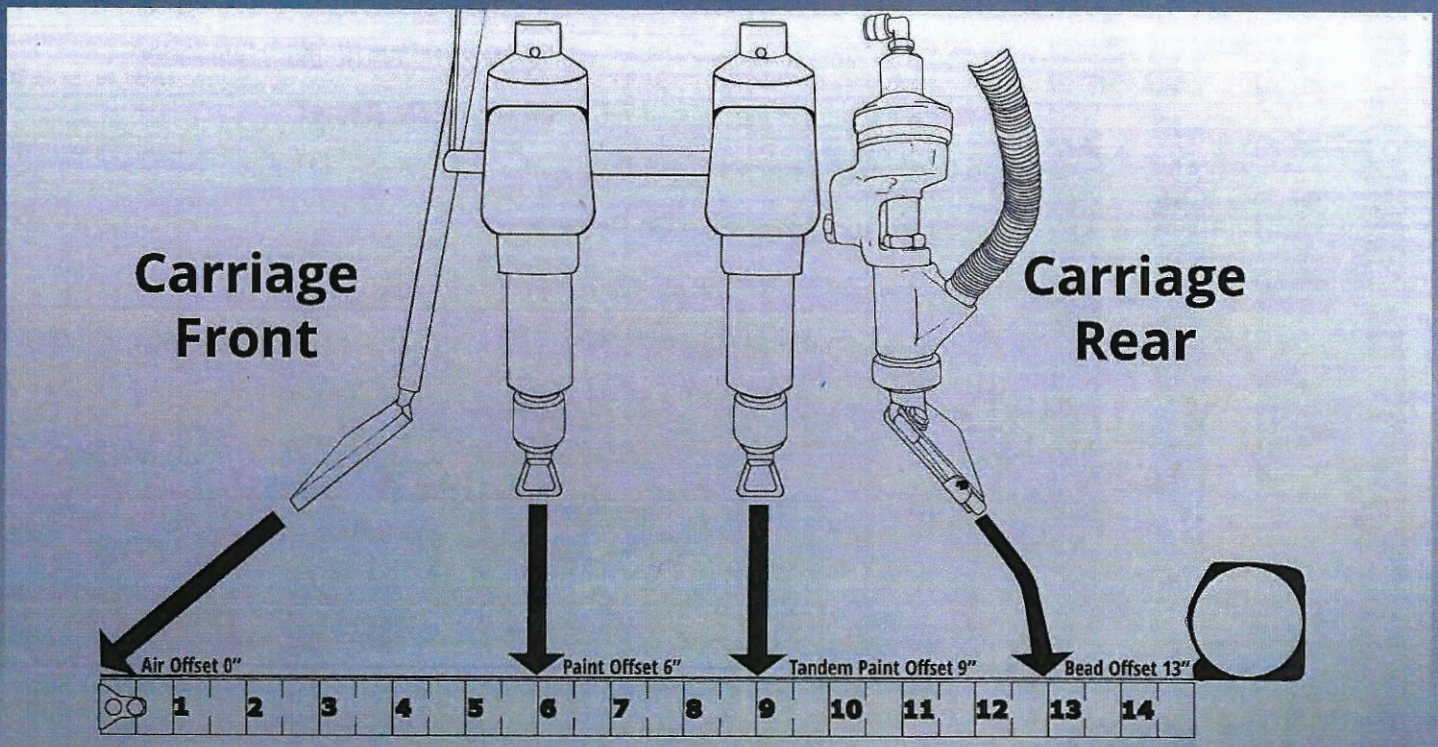
FUNCTIONS

1. Pattern Selector (Alt Cycle)
2. Length of the painted stripe
3. Distance from start of one stripe to the the start of the next. (Stripe + gap total)
4. Adds extra bead coverage to the end of the stripe length
5. Shifts the placement of the bead stripe. (Negative starts before paint)
6. Active Paint Operation: & Skip Guns On:
7. Speed, pattern preview, and rate indicators
8. Menu Navigation Buttons
9. Shifts pattern forward/backward for retrace
10. Delays or extends solid lines so they line up with the next skip
11. Enable special patterns or test without delays
12. Adjusts cycle length when using ADV/RET to match old markings
13. Delays the start of the paint a set distance for full bead registration on cycle start
14. Paint = Cycle starts with skip
    Gap=Cycle starts with gap
15. Paint blip between skips for reflective marker placement

FOR MORE DETAILED INFORMATION SEE YOUR MANUAL.

Copyright© 2018 by Skip-Line, Inc. Skip-Line® is a registered trademark of Skip-Line, Inc., for pavement marking controls and related products & services.

Gun Offsets



***Measure from where it hits the ground**

Example: Air Offset - 0, Paint Offset - 6", Tandem Paint Offset - 9", Bead Offset - 13"

Determining Offsets

-Start with the forward most applicator (air, paint, or bead gun) and mark where the material hits the ground. This is your starting point, or 0 offset.

-Measure from your 0 offset point to the rest of the applicators. Remember to measure from where it hits the ground!

-To enter offsets, go to Setup -> Gun Setup -> Air/Bead/Paint Gun Offset

For more detailed information see your manual.

Copyright© 2018 by Skip-Line, Inc.
Skip-Line® is a registered trademark of Skip-Line, Inc., for pavement marking controls and related products & services.

Stripe Length Correction



Desired Length: 10'

Stripe 1 is too long at the end. This is fixed with **Off Delays** (formerly Gun Factor).

Stripe 2 is too short at the beginning. This is fixed with **On Delays**.

Too Long: use a negative Off Delay.

Too Short: use a negative On Delay.

To figure out how many ms (miliseconds) you need to delay by:

Take 56.8 and divide it by your MPH, then multiply that by the distance the stripe is off *in inches*.

Notes:

-Double check your math to ensure accuracy.

-Remember, if the line is *too long*, you will use the *Off Delay*.

-Remember, if the line is *too short*, you will use the *On Delay*.

The Math

Formula:

$$\left(\frac{56.8}{\text{MPH}}\right) x \textit{ distance in inches} = \textit{time in ms}$$

Stripe 1, 6" too long, truck was striping at 10MPH:

$$\left(\frac{56.8}{10\text{mph}}\right) x\ 6 = 34.08ms$$

Insert 34ms as an **Off Delay**.
You are **removing** 6 inches worth of time at 10MPH.

Stripe 2, 2" too short, truck was striping at 10MPH:

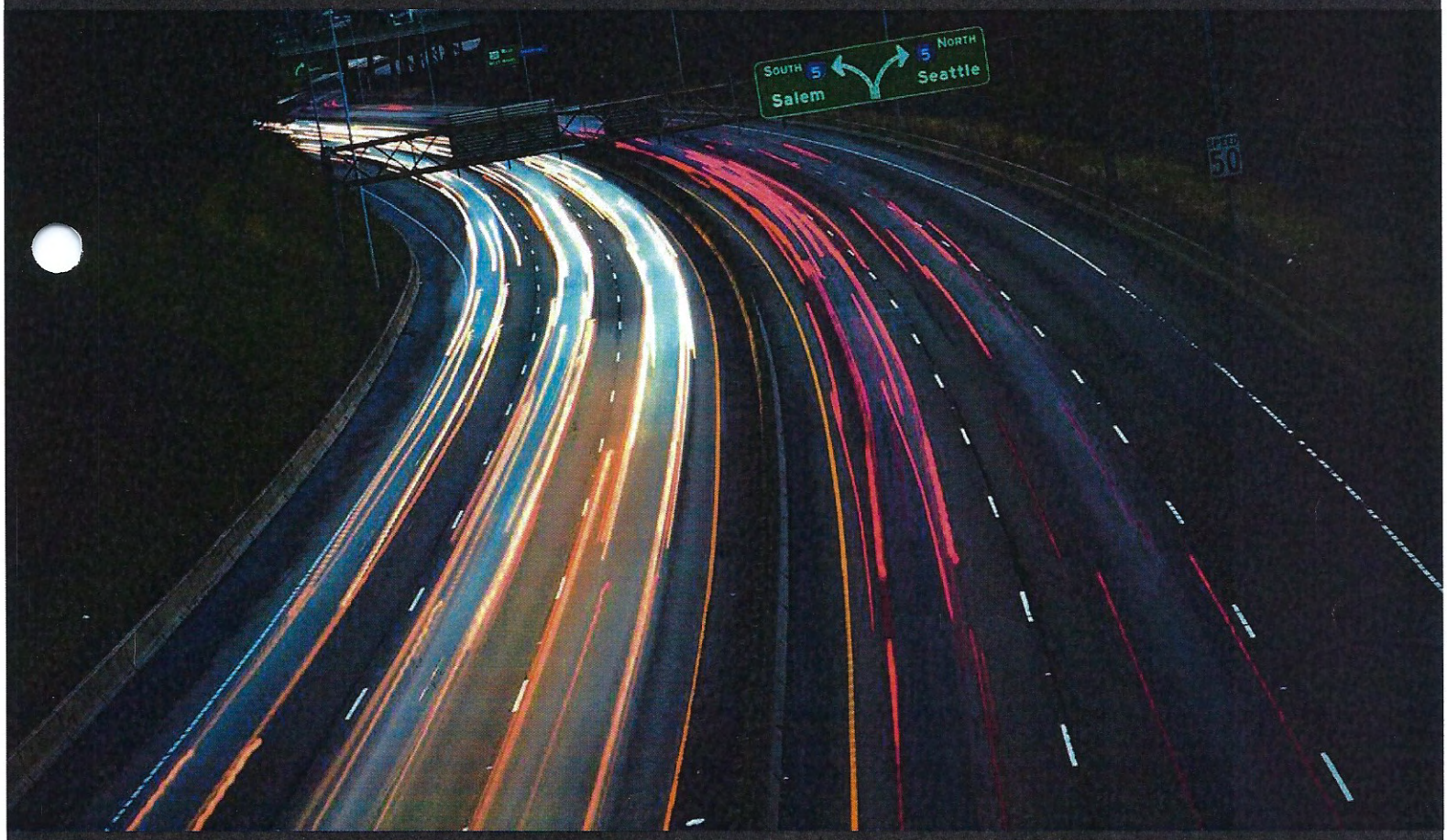
$$\left(\frac{56.8}{10\text{mph}}\right) x\ 2 = 11.36ms$$

Insert 11ms as an **On Delay**.
You are **adding** 2 inches worth of time at 10MPH.

FOR MORE DETAILED INFORMATION SEE YOUR MANUAL.

Copyright© 2018 by Skip-Line, Inc.
Skip-Line® is a registered trademark of Skip-Line, Inc., for pavement marking controls and related products & services.

SKIP LINE



SC-12 Road Marking Control System
Installation and Operation Manual

Skip-Line®

Road Marking & Monitoring Equipment

Leading the industry since 1972.

10210 South D Street La Grande, OR 97850

Phone: 541-963-0111 Fax: 541-963-7615

Email: support@skipline.com

Website: www.skipline.com

Stay up to date with the latest news from Skip-Line, including best practices, support issues, and product announcements by signing up for the ***Skip Time***™ newsletter at: www.skipline.com/skiptime

Last modified: 10/06/15

Skip-Line® is a registered trademark of Skip-Line, Inc., for pavement marking controls and related products and services.

After calibration of your system, use the following table to note your truck specific settings.

MENU	Value
Vehicle ID (Not a menu item)	
Footage Cal #	
Yellow Pump Cal #	
White Pump Cal #	
Left Air Offset	
Left Yellow Offset	
Left White Offset	
Left Bead Offset	
Right Air Offset	
Right Yellow Offset	
Right White Offset	
Right Bead Offset	

i. Warnings, Warranty, and Disclaimer

WARRANTY

Each unit of the SC-12 system is covered by a 30-day money-back guarantee. Buyer is responsible for determining suitability of this product for intended application prior to engaging in any contract that would rely on product functionality.

This product is also covered by a limited one year warranty. Products with defects in workmanship will be repaired or replaced at the sole discretion of Skip-Line, Inc. without charge for up to one year from date of invoice.

DISCLAIMER

All electronic equipment is subject to failure due to: Unanticipated use, non-compatibility of accessories, stress by mechanical vibration, electrical spikes, exposure to intermittent, poorly regulated, highly inductive, or noisy power sources, overload, temperature extremes, induced load-dump and welding currents, insulation chafing, improper wiring, poor cable routing, or stressed mounting. Indiscriminate high-pressure washing can cause moisture intrusion and corrosion.

All computerized systems can fail. Skip-Line, Inc. will not be held responsible or liable for any loss as a result of the use of this device, including but not limited to loss of time, money, opportunity, or personal injury. In no case shall Skip-Line, Inc. be responsible beyond the purchase price of this product.

IMPORTANT NOTE

Not all SC-12 units have exactly the same appearance, functionality, or graphical style. Some graphics contained in this manual may show patterns, functions, or features that are not installed on every unit and should not be relied upon for operational decisions. This system depends on the proper operation, calibration, and functionality of other devices in the Skip-Line product line. Full functionality may require purchase of further devices.

Contents of this manual are subject to change without notice.

Table of Contents

i. Warnings, Warranty, and Disclaimer....4

1.Overview....8

1.1 Unit Descriptions....9

1.2 Optional Units....10

2.Specifications....11

3.Installation....12

3.1 Preparing the installation....12

3.2 Physical Installation....12

4.Cabling....13

5.Menu System....15

5.1 General Navigation....15

5.1.1 Menu Bar Navigation....16

5.1.2 Action Screen Navigation....16

5.2 Main Screen....17

5.2.1 Main Screen Parameters....17

Pattern Selector....17

Stripe....18

Cycle....18

Bead Extend....18

Bead Offset....18

5.2.2 Pattern Preview....19

5.2.3 Rate Indicators....19

5.2.4 Feature Status Indicators....20

5.2.5 Status Indicators....21

5.2.6 Information System....22

5.3 Quick Setup....23

5.3.1 Mode....23

5.3.2 Bead Guns....23

5.3.3 AutoCycle....24

5.3.4 Midspot....24

5.3.5 Index....24

5.4 Counter Channel Menu....24

5.4.1 Advanced Counter Channels....26
5.5 Setup....27
5.5.1 System....27
General....27
Datum....28
Speed Range....28
Life Totals....29
5.5.2 Gun Setup....30
Gun Colors....30
Gun Widths....30
Gun Offsets....31
Gun Factors....31
5.5.3 Guided Calibrations....32
Distance....32
Pump....33
5.5.4 Extras....34
Marker Layout....35
Black Patterns....36
5.5.5 Help....37
Switch Test....37
GPS Status....38
Tutorials....38
About....39
5.6 Other Menus....39
Splash Screen....39
USB Menu....39
Side Configuration....40
6.Additional Features....41
6.1 Counter Channel Logging....41
6.1.1 Counter Channel Logging Operation....41
6.1.2 Spreadsheet Export....42
6.1.3 Paper-Tape Printing....44
6.2 Datum Point....46
6.2.1 The Bead Registration Concept....46
6.2.2 Datum Point Correction....47
6.3 Tandem Beads....49
6.4 In-Field Software Updates....49
7.Menu Messages....51
7.1 Message Icons....51

7.2 Message Descriptions.....52

8.Master Box Switches.....55

Appendix A: Glossary.....56

Appendix B: Making a Communications Cable.....58

1. Overview

The Skip-Line SC-12 Road Marking Vehicle Control System is a comprehensive, networked control system for road marking vehicles. In addition to controlling road marking application and glass bead guns, the SC-12 can control most aspects of the entire vehicle, including hydraulic and pneumatic pressures, temperature controls, material application rates, lights, actuators, and more.

Some features covered in this manual may or may not have been included in your system. See your system-specific documentation.

The SC-12 system is comprised of a network of core devices. At a minimum, the devices required for this core system are:

- Core Skipper
- Front Hub and Rear Hub
- At least one Master Control Box

Many optional devices are available also, and development on this system is on-going with new features added frequently. Currently, the following optional features are available:

- *Additional Master Control Boxes*
- *Video Guidance & Overlay*
- *Switch Panel Boxes*
- *SC-12 Glass Cockpit*
- *RPM Inputs*
- *Pulse Counter Inputs*
- *Proportional (Analog) Inputs*
- *Proportional (Analog) Outputs*
- *Thermocouple Input Box*
- *Bi-Directional Motor Outputs*
- *Camera Controls*
- *Light Controls*
- *Arrow & Variable Message Board Controls*

There are several items that require attention before the first use of the system. **Before connecting to road marking equipment, read all warnings in the preface of this manual. Ensure the system will be installed in a manner that will not expose it to parameters outside those described in the specifications**.

Before applying power for the first time, double check connections. Mis-wiring can cause damage.

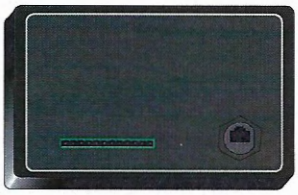
1.1 Unit Descriptions

SC-12 units work together to provide both operator interface and output control of the vehicle hardware. The following are descriptions for each of the basic units.

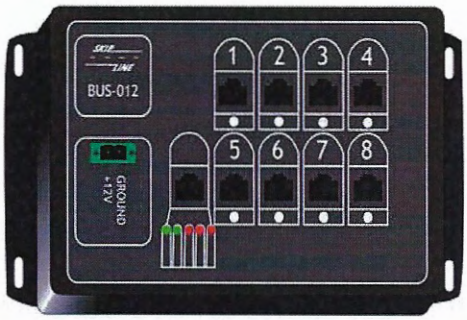


The **Master Control Box** provides the primary interface for the operators. It includes a full-color character LCD display menu along with toggle switches that together define the striping patterns and operation.

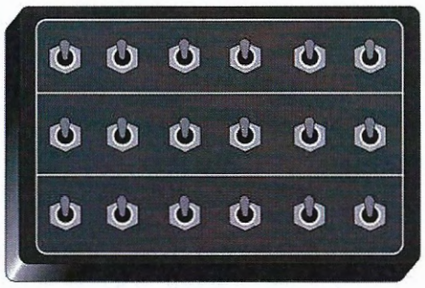
A truck must have one Master Control Box at minimum, but may have several depending on the configuration of the vehicle.



The **Core Skipper** is the central computer for skip patterns. Most system inputs and outputs also occur here. The Core Skipper can have up to 8 pulse input channels.



The **HUB** distributes both control signals and filtered, clean +12V power to devices on the system. Diagnostic LEDs assist in troubleshooting wiring and device problems. A system must have at least one front and one rear hub. If necessary, mid-hubs are available for system expansion or wiring convenience.



A **Switch Box** is an optional device that can be custom ordered to provide auxiliary functions (such as lights, actuators, etc.) and custom features to the system. If your system has a Switch Box, see the additional documentation provided with your order for further information.

1.2 Optional Units

The SC-12 system can be easily expanded, usually by simply adding a device to any unused port on a Hub. Your system may or may not have devices from the following list – if it does, further information is provided in separate reference documents.

- **SC-12 Glass Cockpit:** Provides a touchscreen interface to monitor various sensor inputs and control certain setup items. This device can also provide video guidance and cross hair generation for the vehicle driver.
- **CDRV-HI and CDRV-LO:** These driver boxes drive loads on the system. A CDRV-HI sources +12V, while a CDRV-LO provides grounded outputs to loads. An LED shows the activated state of the output at all times.
- **CANLG-OUT:** Sources a proportional (analog) 4-20mA output signal to proportional loads, such as valves or regulators.
- **CANLG-OPTO:** Provides digital signal, counter, or RPM inputs to the SC-12 system, which can be displayed on a Glass Cockpit.
- **CANLG-IN**: Provides inputs from any proportional (analog) 4-20mA sensor, such as temperature, pressure, or level, to the SC-12 system. This information can be displayed on a Glass Cockpit and used as part of a control system.
- **CANLG-TC:** Directly senses Type-J, ungrounded thermocouple sensors into the SC-12 system. This temperature information can be displayed on a Glass Cockpit and used as part of a thermostat control.

2. Specifications

Please observe the following operational and storage specifications for each of the basic SC-12 devices. Operation or storage outside of these specifications may reduce the life of the device and, in some cases, void the warranty.

	Minimum	Maximum
Operating Temperature	33°F	140°F
Storage Temperature	10°F	160°F
Humidity (non-condensing)	10 %RH	90 %RH
Voltage	10V	16V
Current	--	1A/device

Each hub device internally fuses each port to 1A, so no individual fuses are necessary. The hubs also clamp total current output (i.e., the sum of the current drawn from all ports) at 10A. A 10A to 15A fuse is recommended in line before the hub.

For optional SC-12 devices, see separate reference documentation.

3. Installation

Installation of the SC-12 system requires both physical installation of the boxes and communications cabling.

3.1 Preparing the installation

Check that the following are ready before getting started:

- Select mounting locations for each SC-12 component.
- Plan routes for communications cables from each box to closest hub box.
- Plan routes for +12V power to each of the hubs and driver output boxes.

Follow these precautions during installation:

- Do not connect power to the any of the hubs or other system devices until all other connections have been made.
- If a partial installation is made, some devices may be inoperable or may not operate as expected.

Cable lengths are important in order to maintain the specifications of the CAN communications bus used by the SC-12 system. Intermittent communications problems may arise if the following specifications are exceeded:

- Maximum length between a Hub and any device: 5 meters.
- Maximum length between Front Hub and Rear Hub: 20 meters.

Select mounting locations and cable routes so that the above cabling specifications can be met.

3.2 Physical Installation

Mounting mechanisms for most devices are one of the following:

- 1/4" bolt mount (typically used with Master Control boxes and Switch Boxes)
- Flange mount
- DIN rail mount.

Other custom mount requests can also be arranged at time of order.

Bolt mounts should use only 3/4" long 1/4-20 bolts, which are provided with the boxes. Deeper bolts may contact internal electronics and cause

permanent damage.

DIN rails use the industry standard EN 50022 – Top Hat Rail 35 × 15 type.

Once the mounting locations have been selected, physically mount the boxes to their mounting locations on the truck.

Make the appropriate connections to the Core Skipper box using the wiring diagram included with your system.

3.3 Cabling

Cabling should use 26AWG (or larger) Cat5 cable and RJ-45 connectors. The Hubs accept only standard RJ-45 plugs. Some of the devices have sealed RJ-45 jacks, available from Skip-Line, which will accept either standard or strain-relieved IP-67 rated plugs. See Appendix B for instructions on RJ-45 connector wiring.

Cable protection devices should be used to prevent vibration-induced chaffing from occurring against sharp edges. Avoid pinch points where the cable may be damaged from moving parts.

- Run cable between each of the devices and the Hub each device will connect to.
- Run a cable between the Rear Hub and Front Hub.
- Plug all the boxes into the nearest Hub. Any available port (except for UPLINK ports) can be used.
- Plug the Front Hub into the Rear Hub using a connection cable from the UPLINK on one Hub to the UPLINK port on the second Hub.

Double check each connection, and then supply the Hub(s) with +12V power. Make sure that each Hub lights up and does not show power faults or short circuits. If any fault lights occur, remove power from the system ***immediately*** and correct the faulty device.

Refer to the BUS-012 insert for more information on HUB wiring and diagnostic LED information.



Important Note!

Do not leave dangling cables connected to hubs. Improperly terminated cables can cause communications issues.

The SC-12 system is now ready to be configured.

4. Menu System

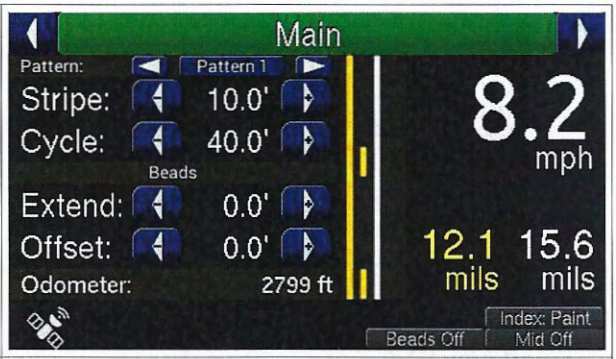
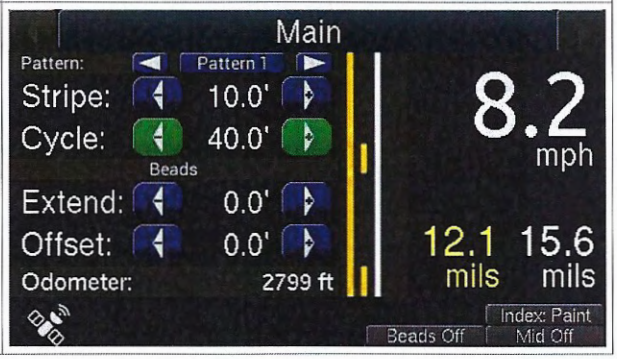
The Skip-Line color LCD menu system is simple and intuitive, yet more capable than older skip timer menu systems.

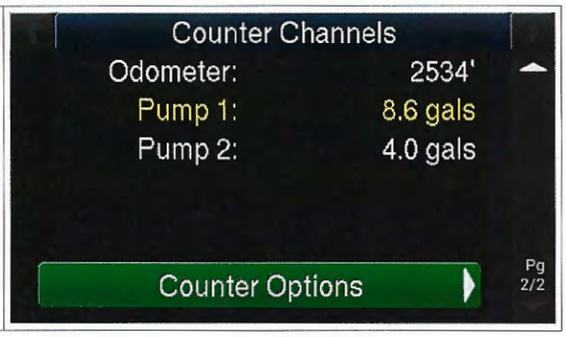
There are two navigation options – joystick and pushbutton. Either input type is equivalent, and will be referenced with the same functions throughout this section.

4.1 General Navigation

There are four navigational buttons (or directions, in the case of menus with the joystick navigation option), which behave differently between two different contexts – Menu Bar and Action Screen.

The "cursor" indicates the current navigation location.

In this screenshot, the Cursor is on the top-level menu "Main".	
In this screenshot, the Cursor is on the Action Screen parameter "Cycle".	

In this screenshot, the Cursor is on the command button "Counter Options".	

4.1.1 Menu Bar Navigation

The menu bar is visible on almost every screen, making it easy to know your current location within the menu. The upper-most menu bar is called the Top-Level Menu. Some menus have sub-menus, while others do not. Navigation buttons have the following behaviors when the cursor is in the menu bar:

: Navigate to the next menu to the right.

: Navigate to the previous menu to the left.

: Navigate up a menu level.

: Navigate down into a sub-menu, or into an action screen.

If a menu does not have a sub-menu, pressing down will enter an Action Screen. Pressing and holding returns the Cursor to the menu bar on all Action Screens.

4.1.2 Action Screen Navigation

Pressing from a menu enters the Action Screen associated with the menu. While the Cursor is in an Action Screen, the navigation buttons have the following behaviors:

: Increase the value of the currently selected parameter. If the Cursor is on a command button, that will "click" the command button.

: Decrease the value of the currently selected parameter.

: Navigate up. If the Cursor is on the uppermost parameter, navigating up will exit the current Action Screen. Pressing and holding this

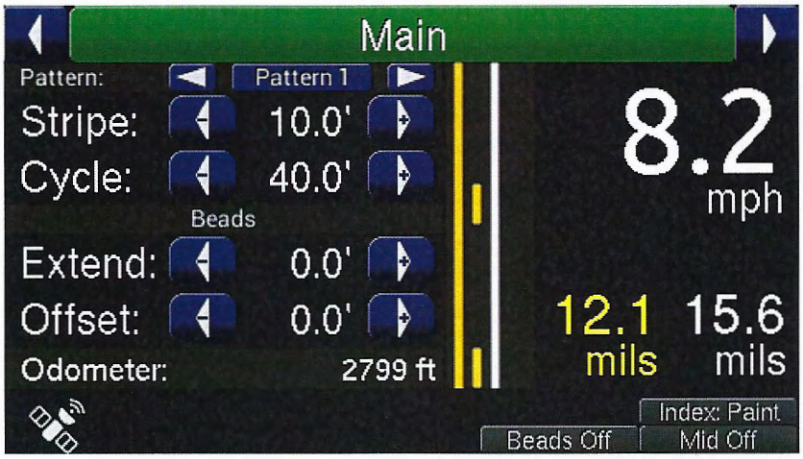
will also exit the current Action Screen, regardless of where the Cursor is.

: Navigate down to the next parameter on the current Action Screen.

Note: Most parameters are immediately affected when altered on an Action Screen. There is no need to do anything further to "save" the new value.

4.2 Main Screen

The main screen is the first of the top-level menus, which provide fast access to the most important day-to-day parameters of operation.



The Main Screen is the recommended screen to use during striping operations. It is organized into several sections.

4.2.1 Main Screen Parameters

There are four parameters that can be changed from the main screen.

Pattern Selector

The Pattern Selector parameter allows you to select between three (or more) saved patterns. When "Pattern 1" is selected, any changes to Stripe and Cycle will be memorized to Pattern 1. When "Pattern 2" is selected, the previously entered settings for Pattern 2 will be restored. This can be changed on-the-fly in the gap during striping operations, which will cause the pattern to change at the beginning of the next cycle.



Info

This feature was called "ALT CYCLE" and was controlled with a switch on older skip timers. The functionality described here is roughly the same.

Stripe

Stripe sets the length of the skip pattern on the road. This is calculated from two numbers: the distance calibration number, and the Gun Factor (see section 4.5.2, "Gun Factors" for more information on Gun Factor).

If your stripe length on the road does not match the entered Stripe length, correct this error with Gun Factor (see section 4.5.2, "Gun Factors" for more information). Do not change the stripe from the desired length as a corrective measure.

Cycle

Cycle is the distance from the start of one stripe to the start of the next stripe.

If the cycle is not correct, check your distance calibration number TODO or check the troubleshooting guide. Do not adjust this number as a corrective measure from the actual distance desired.

Bead Extend

To help ensure complete bead coverage, the Bead Extend adds this much bead coverage distance to the end of the stripe length.

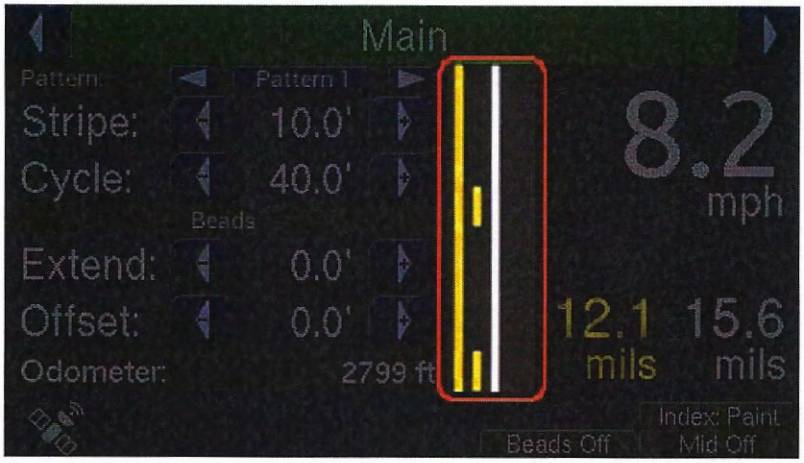
Bead Offset

Bead Offset shifts the entire length of the "bead stripe", to assist with bead coverage. This is particularly useful for dealing with shifting head and tail winds.

When using Bead Extend, Bead Offset is also used to center the additional length. For example, if 0.5' of bead coverage is desired on the beginning and end of the stripe, set Bead Extend to 1.0', and Bead Offset to -0.5'.

Then, during operations, only the Bead Offset will need to be shifted in order to adjust for truck speed and wind variables.

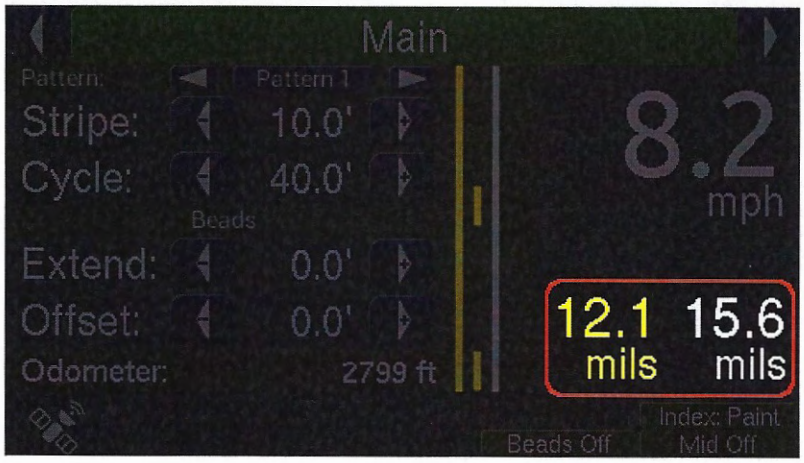
4.2.2 Pattern Preview



The innovative Pattern Preview screen provides a preview of the current pattern that will be emitted from guns. While not every pattern-altering feature can be accounted for, nor the actual positions of material guns on the carriage, it is a best guess of the skip timer as to the pattern that will be emitted from the guns when striping begins.

Gun colors are shown on the preview, which helps the operator see clearly which guns will be counting towards application rates.

4.2.3 Rate Indicators



Speed is shown in large, high contrast digits for easy operator viewing.

Average wet thickness calculations are shown just below the speed. These

rates are calculated over the current counter channel values. For accuracy, ensure the gun colors and widths are set correctly in the setup menu (see 4.5.2, "Gun Setup").

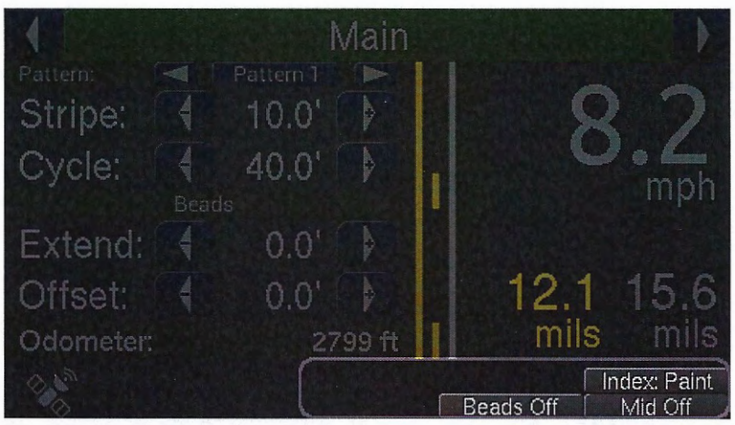
The odometer is also shown. This is the total distance traveled with the START switch on, regardless of material switch positions, since the last counter channel clear.



Info

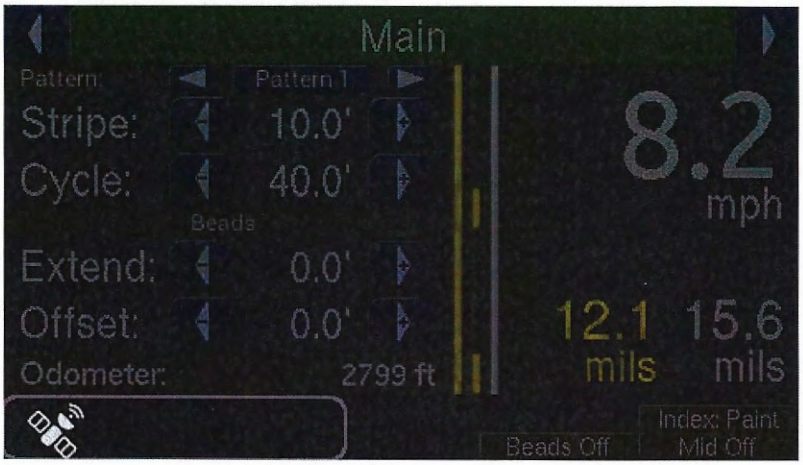
Note that wet thickness will not match dry thickness measurements, due to material shrinkage. Refer to your road marking material vendor for more information.

4.2.4 Feature Status Indicators



Many features can change the painted pattern. To help avoid confusion, when a setting causes a pattern change and is not indicated on the Pattern Preview, it is accounted for in the Feature Status Indicators. Refer to the manual section for each feature to understand these messages.

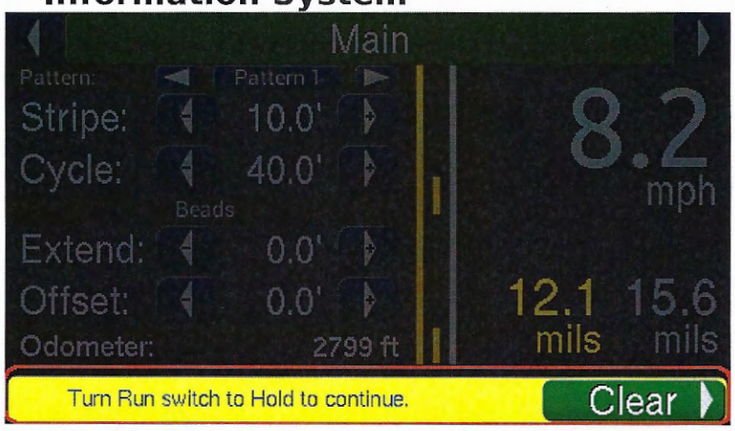
4.2.5 Status Indicators



There are several system status indicators that help show what is currently detected by or occurring on the skip timer.

Icon	Description
	**Start Switch On:** The start switch is on. Solid guns may be on, but skip guns are not.
	**Skip-Watch:** The start switch is on, and the paint guns are in the skip portion of the pattern (as opposed to the gap).
	**GPS:** The GPS icon indicates the status of the GPS. Animated signal bars indicate the GPS is searching for a satellite lock. No bars indicates a failure to associate (check antenna!).
	**USB Drive Attached:** A USB drive is attached to the skip timer. Typically, USB drives should not be left attached after the counter channel export process is complete.
	**USB Error:** A USB device is attached, but it is either not a USB drive or it is not compatible.

4.2.6 Information System



The menu provides a descriptive alert system to assist with understanding current activity, warnings, and critical errors that need attention. These messages can be cleared by scrolling the Cursor down to the "Clear" command button on the message. Most messages will disappear if the related error condition is no longer detected.

Each message level (info, warning, error) has a distinct audible chime. These let the operator know audibly when there is an issue.

The Information System messages cover the status indicator area. To view status and feature indicators again, clear the message.

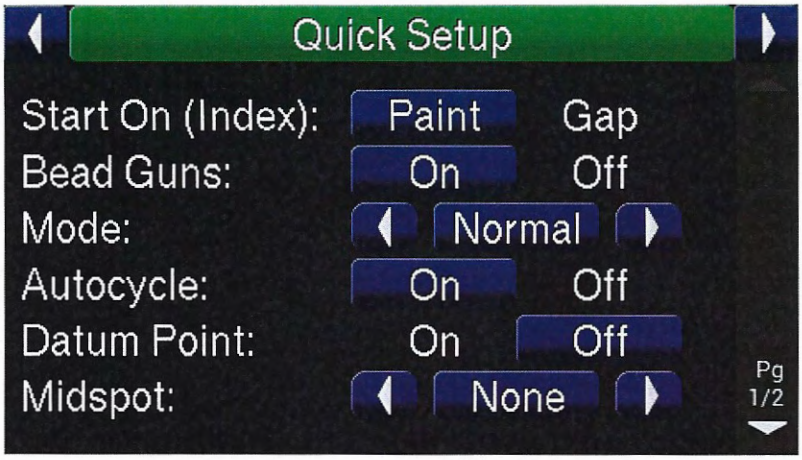
Information messages assist the operator in understanding certain behaviors or conditions that may be intentional, but could be confusing or interpreted as incorrect behavior due to setting configurations.

Warning and Error Messages will automatically disappear after the problem is no longer detected.

Information Messages will not reappear for the same event when cleared by the operator. However, Warning and Critical Error messages will reappear in two minutes after being cleared by the operator, but the problem is still detected by the system.

Refer to the section titled "Menu Messages" for more information.

4.3 Quick Setup



The Quick Setup menu provides quick access to enable or disable many features that may be used during day-to-day operations.

Some of the basic setup items are covered here, but your particular Quick Setup menu may not have all features mentioned here. For features that may appear on your particular skip timer system, refer to supplemental documentation.

4.3.1 Mode

The Mode determines how the skip timer will behave:

- **Normal**: Normal skip-timing behavior.
- **Test**: Guns will come on immediately. This allows operators to test guns, regardless of datum offsets or other settings.
- **Black**: Black patterns are enabled, per the configuration in the Setup menu.
- **Marker:** Marker layout patterns are enabled, per the configuration in the Setup menu.

Note that not all modes are available on all systems.

4.3.2 Bead Guns

The "Bead Guns" option enables and disables bead guns from engaging during striping operation.

4.3.3 AutoCycle

AutoCycle causes the cycle to change +/– 0.1'after the Advance/Retard switch has been pressed in the same direction three times. This assists with correcting the cycle to match previous markings during rework operations.

4.3.4 Midspot

Midspot adds a dot in the middle between the end of one stripe and the start of the next. Midspot can occur every cycle, or every other cycle with a "½" midspot setting. The "½ Odd" setting adds the midspot on odd cycles (1st, 3rd, etc.) while the "½ Even" settings adds the midspot on even cycles (2nd, 4th, etc.).

Midspot length is determined by the Dot Length parameter in the Marker Layout menu.

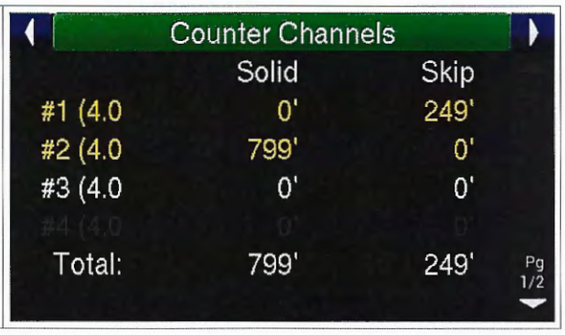
4.3.5 Index

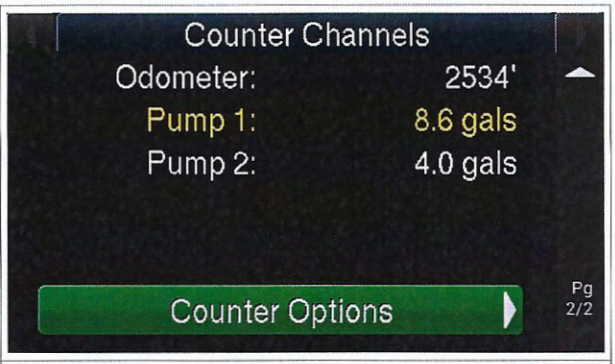
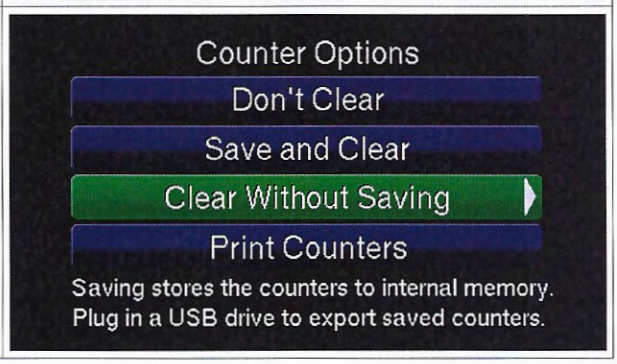
This setting allows the skip timer to start the pattern on either the stripe or the gap when the START switch is engaged.

4.4 Counter Channel Menu

The Counter Channel menu provides access to distance and volume usage counters.

Clearing the counter channels is common at the beginning of a new job.

Distance counters are separated between solid and skip distances. Gun colors are indicated by text color. (Black is a faded gray, for visibility). Sums for skip and solid appear at the bottom.	

Press to view more distance channels. Pump and Odometer channels can be found on the bottom-most page. For Counter Channel options, press to enter the Save and Clear menu.	
If your skip timer has the Counter Channel Logging feature, the "Save and Clear" option will appear. Select it to save the counter channels to internal memory. See section 5.1, "Counter Channel Logging" for more information.	
If a paper tape printer option was purchased, the skip timer will automatically detect this and present a "Print" button.	
Select "Clear" or "Clear Without Saving" to clear the counter channels. This option will not save the counter channels. This is useful to clear usage or distances from testing or setup, without adding clutter among meaningful data.	

For more information about Counter Channel Logging, see section 5.1, "Counter Channel Logging" for more information.

4.4.1 Advanced Counter Channels

In addition to one-to-one material gun to counter channel counting, rules can be created to count into alternate counter channels that more closely match the billing and reporting requirements in a given locale.

Standard counter channels and advanced counter channels both count at the same time, and should not be combined. For example, an advanced "Double Solid" counter counts distance traveled when Material #1 and Material #2 are turned on in solid. The standard #1 and #2 counter channels will each individually count distance as well. You cannot combine the standard #1 channel and the advanced "Double Solid" counter channels, since that would be double-counting.

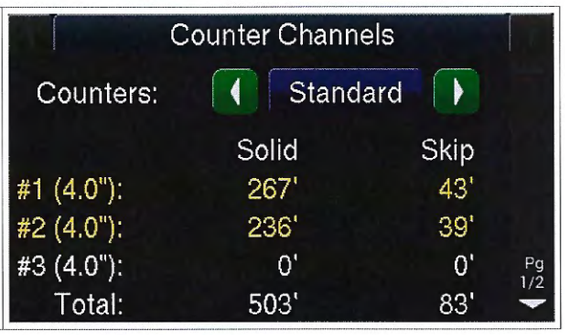
Some rule examples:

- When Gun 1 and Gun 2 are in solid, count into Double Solid.
- When Gun 1 or Gun 2 are in skip, but not both, count into Single Skip.
- When Gun 1 is solid and Gun 2 is skip, count into Skip-Solid.
- When the width of Gun 4 is 8", count into White 8".
- When Right Gun 1 and Right Gun 2 are both on, count into White 12".

When printing from the Counter Options screen, whichever style (Standard or Advanced) of counters are currently selected on the Counter Channels screen will be printed.

Rules may be custom ordered for your specific needs – please contact your preferred OEM or Skip-Line for availability and compatibility.

When Advanced Counters are available, you will see a "Standard/Advanced" option box at the top of the Counter Channels screen.
To switch between viewing Standard and Advanced counters, press ◀ or ▶.



When "Advanced" is selected, new counter channels will appear in the counter channel list.
See your ordering information for specific Advanced Counter Channel rules and how they function.

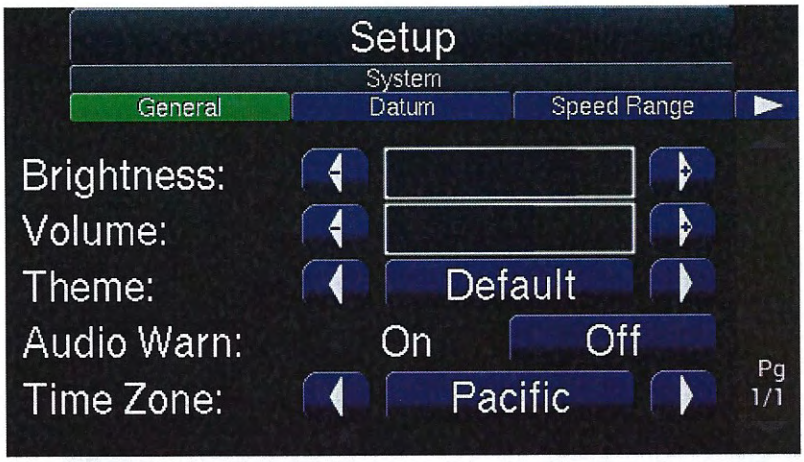


4.5 Setup

The Setup menu is split up into several sub-sections for fast and easy navigation of advanced system configurations.

4.5.1 System

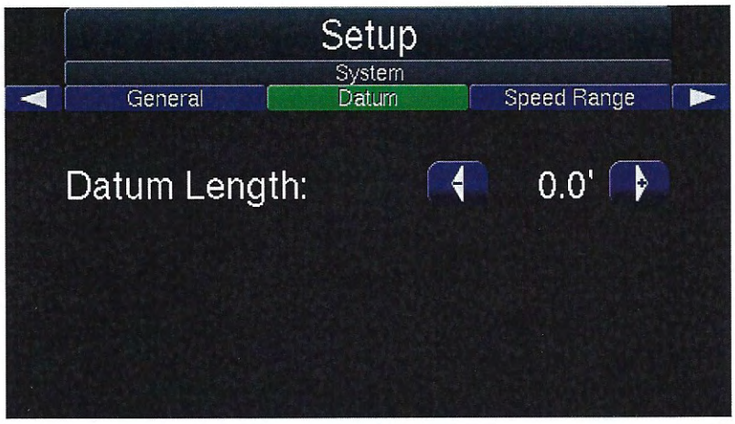
General



- Brightness: Screen brightness
- Volume: System volume, for the startup sounds, audio warnings, and tutorials.
- Theme: The color theme for the menus. Dimmer themes reduce eye strain at night, while more colorful themes are easier to see during the day.
- Audio Warnings: Turn on to enable an audible chime when information, warning, or error messages occur.
- Time Zone: If your system has the Counter Channel Logging feature, this option will be available. Select the time zone you wish to export stored data with.

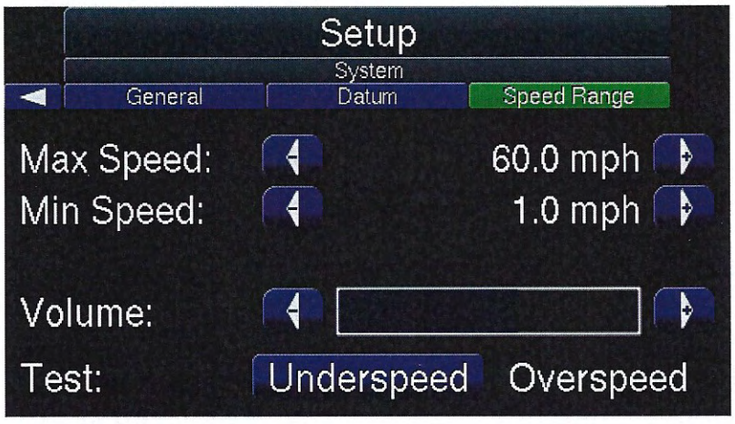
Note that other general items may be added to this list for various future system functions.

Datum



- Datum Length: The "delay" distance in front of the first gun, the point where the pattern will actually begin. Refer to section 5.2, "Datum Point" for more information.

Speed Range

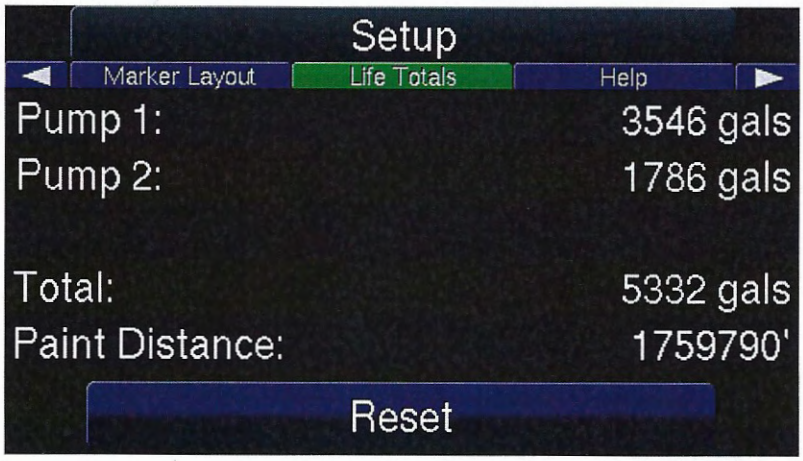


These alarms will trigger when the START switch is on.

- Max Speed: The maximum acceptable speed. If the speed rises above this value, the Overspeed alarm will be triggered.
- Min Speed: The minimum acceptable speed. If the speed falls below this value, the Underspeed alarm will be triggered.

- Volume: The volume of the speed alarm. If set to zero, the visible alarm flashing of the speed on the Main Screen will still occur.
- Test: When selected, the alarm volume is tested. Use ◀ and ▶ to sample the Overspeed and Underspeed alarms for familiarity.

Life Totals



Life totals provide a total number of painted distance and gallons pumped. This number survives counter channel resets. The primary purpose of Life Totals is to assist the operator in knowing when to service pumps and other equipment.

The Life Totals are often reset at the time of equipment maintenance or rebuilds. To reset the Life Totals, select "Reset".

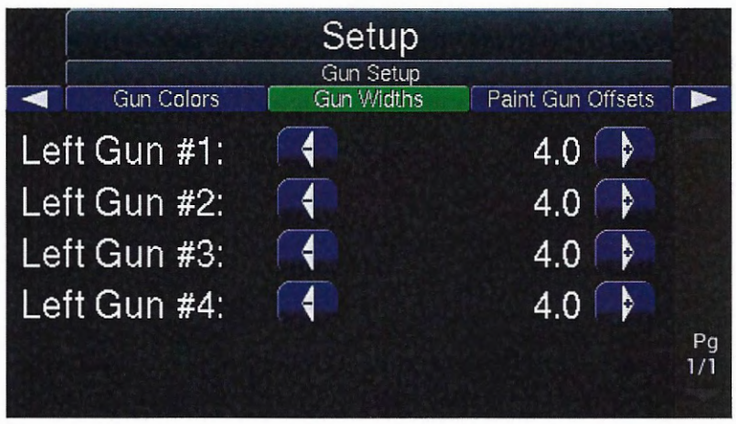
4.5.2 Gun Setup

Gun Colors



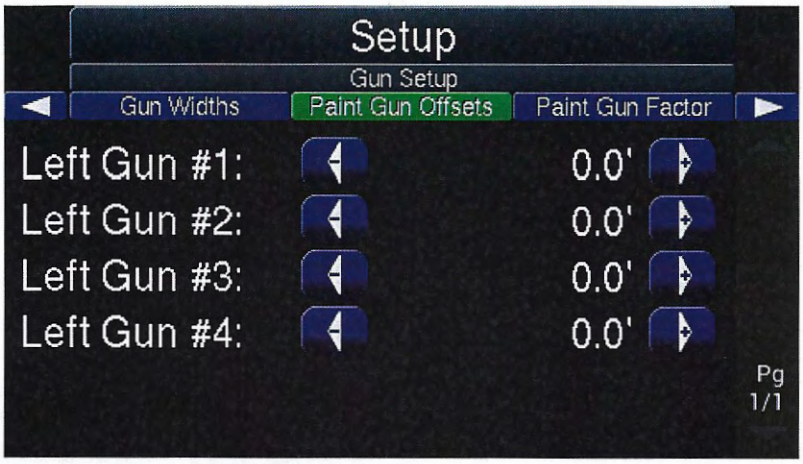
- Set the color for each gun. Note that proper color setting is important for accuracy in mil thickness calculations, pump control features, data logging, and report printouts.
- Scroll down using , and note that for systems with more than five material guns, you may need to scroll down to further pages.

Gun Widths



- Set the gun widths to match the actual application width of the material on the road.
- Note that setting proper gun widths is important for accuracy in mil thickness calculations, data logging, pump control features, and report printouts.

Gun Offsets



Set gun offsets for all items in the gun line, including Paint, Beads, Tandem Beads, or Blow Air. Only available guns will appear in the Gun Setup menu.

- Gun Offsets are the distance from the front-most gun rank to the current gun. The front-most gun rank should be set to 0.0'.
- Gun Offsets account for distance delays when marking the pattern. When the pattern starts, all guns will attempt to turn on at the same longitudinal position as the front gun on the road as they move past that position.
- IMPORTANT: Do not correct time factors with distance. Only distance factors should be corrected with distance, otherwise, the skip timer will not be as accurate in placing paint and bead materials on top of each other at different vehicle speeds.

Gun Factors

- Gun factors correct the mechanical response delay of the gun. Most material applicators experience a time delay between the time the electrical signal is applied from the skip timer, until the gun actually opens and material can flow.
- Most applicators take longer to turn off (pushing against high pressure) than to turn on (pushing with high pressure). This causes a 10.0' stripe, for example, to be longer, i.e. 10.5' to 11.0'.
- Gun factor accounts for this delay with TIME. With the gun offsets already set correctly, adjust the gun factor to correct the line length:
  - If the stripes on the road are too long, adjust the Gun Factor to be negative.
  - If the stripes on the road are too short, adjust the Gun Factor to be

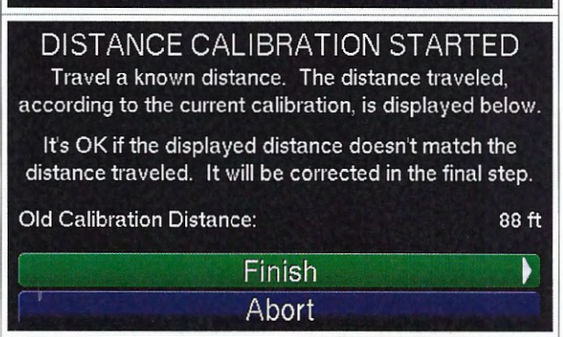
positive.

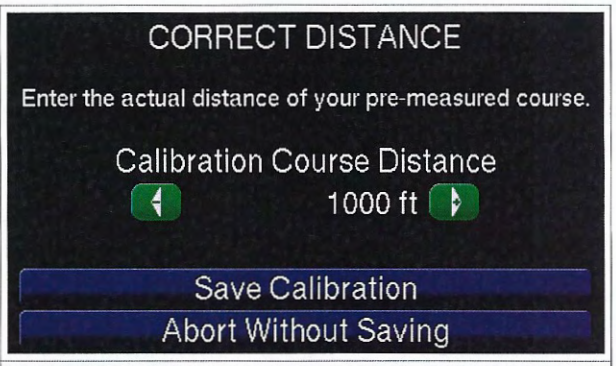
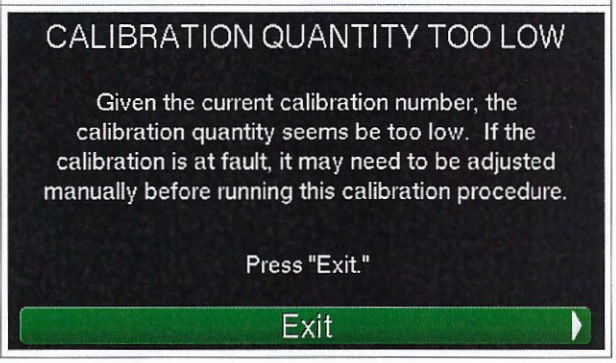
- IMPORTANT: Do not correct distance factors with time., Otherwise, the material guns will not accurately register material on top of each other at different vehicle speeds.

4.5.3 Guided Calibrations

The skip timer must be properly calibrated before use.

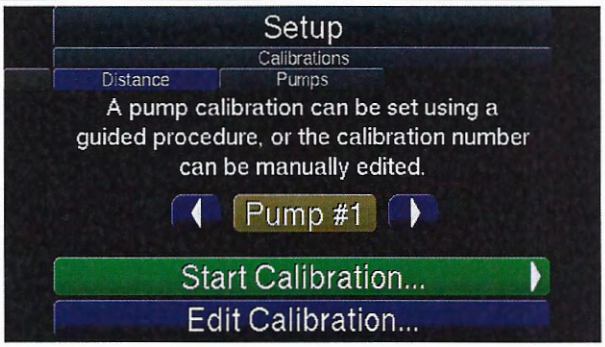
Distance

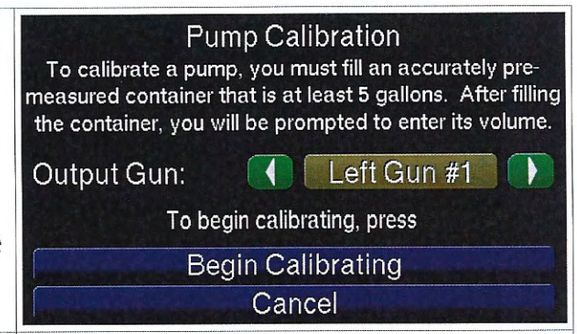
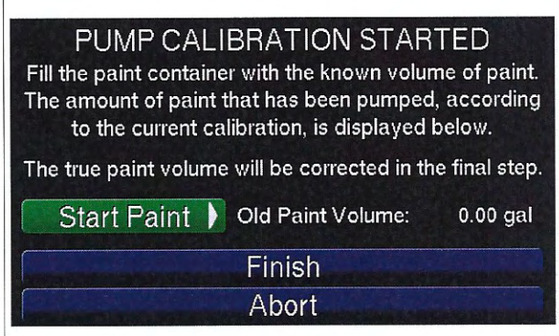
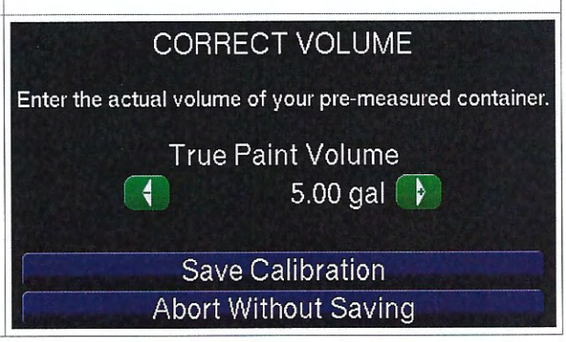
Select "Start Calibration..." to begin the guided calibration process. This is the recommended process for calibration. Alternately, select "Edit Calibration..." to view or directly modify the calibration number.	
Align the vehicle with the start of a calibration course. Then select "Begin Calibrating".	
Drive the distance of the course. Note that the "Old Calibration Distance" number is likely incorrect. It is useful to see to ensure that motion pulses are being received, but is not the actual distance traveled.	

Correct the distance measured, to the actual distance traveled. For example, if your course was 1000', and the measured distance was 932', you would change 932' to be 1000'. Save Calibration to complete this process.	
If there was an error, verify the motion sensor is installed correctly. The motion pulse source should provide between 2 pulses per foot and 20 pulses per foot.	

Pump

If the system was purchased without pump inputs (i.e. for material application that does not have a positive displacement pump), these menus may not be present.

Start by selecting a Pump to calibrate. The pump system color is indicated by the background color of the pump. Select "Start Calibration..." to begin the guided calibration process. This is the recommended process for calibration. Alternately, select "Edit Calibration..." to view or directly modify the cal number.	

Select a gun to use for the calibration. Only select a gun that is plumbed to the pump you are calibrating. Place a container with known volume under this gun. Lower pump pressure and disable any atomizers to minimize overspray.	
Once the pre-measured container is under the selected gun, press "Start Paint" to begin the calibration. The button will change to "Stop Paint". Once the container has been filled to its pre-measured capacity, press "Stop Paint". If not yet filled, use "Start Paint"/"Stop Paint" until paint level is at the correct height. Press "Finish" when done.	
Adjust the number displayed to match the volume of the pre-measured container.	

If an error occurs, verify the pump stroke sensor is installed and connected correctly.

4.5.4 Extras

Some features are not part of the standard package, and are organized under other menus when purchased with the system.

Marker Layout



Marker layout mode can be enabled on the Quick Setup menu (see 4.3.1, "Mode"). When enabled, the main screen Stripe parameter is ignored, and the marker layout patterns are engaged for the guns in Skip and Solid pattern positions. The Pattern Preview area will show the current marker layout settings per the pattern setup and the current pattern switch positions.

Create the desired pattern by setting the distance between markers in the Skip and Solid pattern sub-menus.

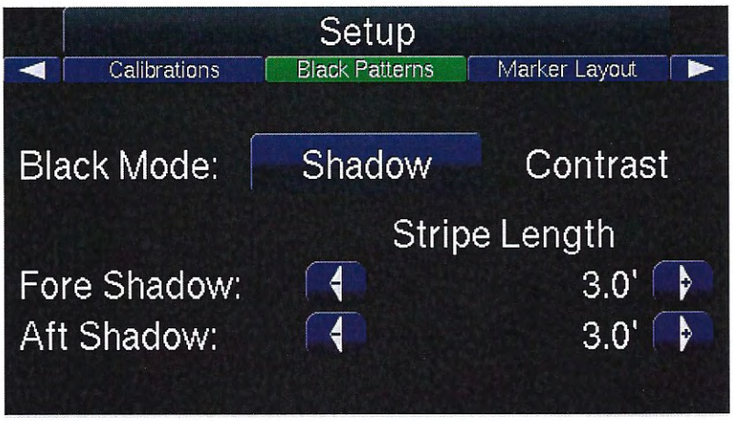
- Use and to scroll between function buttons and the marker positions.
- When highlighting a marker position, use or to increase or decrease the distance between the last marker and this marker.
- The pattern will end on the first 0.0' marker position after Indent.
- **Clear All**: Clears all marker positions. Only the first marker will be present.
- **Equidistant**: Allows you to set the distance of the Stripe or Cycle, and the number of dots desired in that distance. The dots will be separated equally across the entered distance.



Dot Length controls the length of the dot, in inches. Set it to a length sufficient for the paint gun to emit material at the desired vehicle speed.

Midspot length is also determined by the Dot Length parameter.

Black Patterns



Black patterns cause the special Black Gun to have specific behavior. On some skip timers, this is configurable. On others, the special Black Gun behavior is fixed to Gun #4. Physical mounting of the black material gun is important when using this special mode. Refer to the Pattern Preview area on the Main screen to see the expected pattern.

The Black Pattern setup is engaged when the “Black” mode is enabled on the Quick Setup menu (see 4.3.1, “Mode“).

There are two Black Pattern modes that can be selected in the setup:

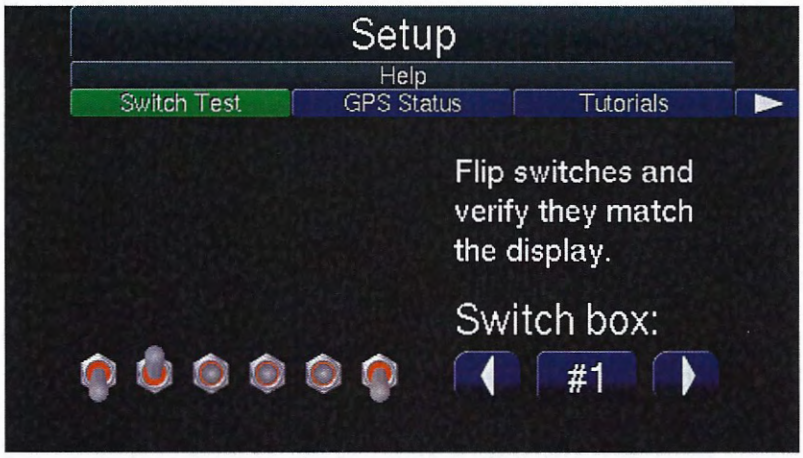
- **Shadow**: Shadow mode applies paint before and/or after the stripe.

When the black gun is in Skip, the fore shadow/aft shadow lengths will be applied as entered. When the black gun is in Solid, it will Gap Fill (i.e., black paint will be on for the entire gap between the end of the last stripe and the start of the next).
    - **Fore Shadow**: The length of black paint to be applied before the beginning of the stripe.
    - **Aft Shadow**: The length of black paint to be applied after the end of the stripe.
- **Contrast**: Contrast mode applies paint between two adjacent guns.
    - Refer to the Pattern Preview area on the Main Screen to see the expected patterns.

Note: Black paint is often desired to not overlap with other paint colors and beads. Proper Gun Factor and Gun Offsets values will ensure accurate cross-color positional registration between color gun, black gun, and bead guns.

4.5.5 Help

Switch Test



Switch failures are a common cause of difficult-to-identify operational issues. Use the Switch Test to detect malfunctioning switches.

To test the switches, flip each switch on the system. If the switches exhibit erratic behavior or do not switch cleanly on the on-screen graphic, contact Skip-Line for service.

To view the status of switches from other units on the skip timer system, which may or may not have a display (including custom switch boxes, remote push buttons, etc.), select a different number under the "Switch

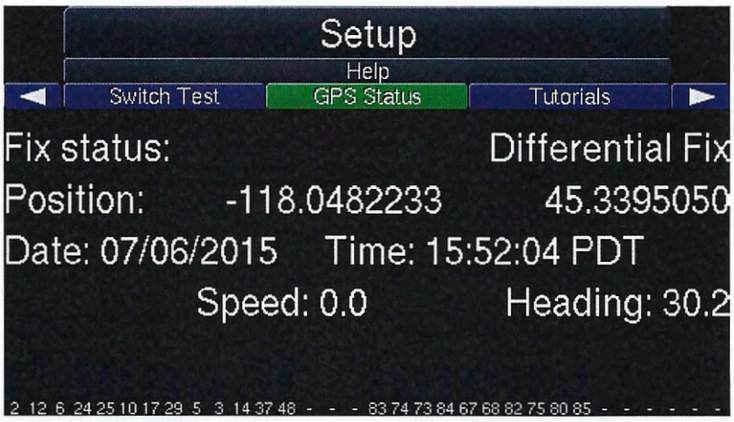
box:" label.

Important Note!

Switches will still function during this test!

Remove load power and/or disconnect any equipment that would cause a safety hazard or undesired effects if a switch engaged that equipment.

GPS Status



This screen provides GPS information.

- Fix Status: If No Fix, then GPS coordinates are not available.
- Position: GPS Coordinates of your current location.
- Date/Time: Current satellite date & time information, adjusted to time zone entered in the General Setup (see section 4.5.1, "General Setup").
- Speed and Heading indicate GPS derived speed and heading information.
- The bar graph across the bottom of the screen indicates the signal strength of each satellite in the GPS and GLONASS constellations.

Tutorials

The Tutorials section provides information about usage of your skip timer menus. Refer to these for operational assistance and in-field training.

About

The About screen provides information that is useful for troubleshooting your particular system when technical support is required. Refer to this page to find your particular system's revision number. This information, along with the model and serial numbers of your device, speeds troubleshooting efforts.

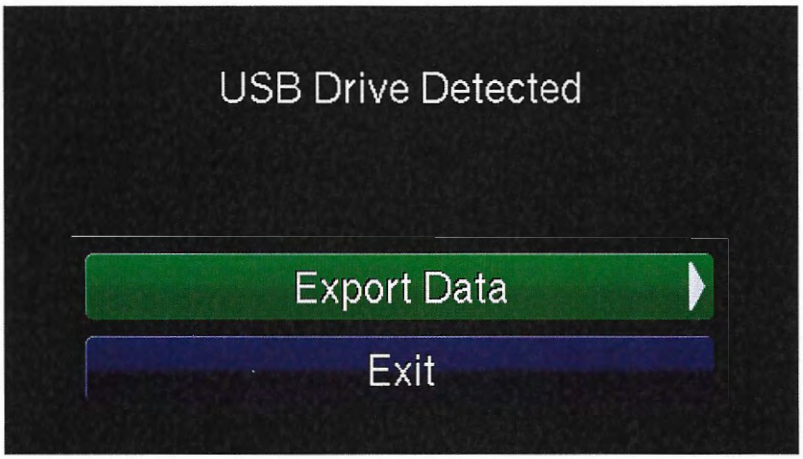
4.6 Other Menus

Other menus may arise at various time in operation, due to an event or external action that is detected by the system.

Splash Screen

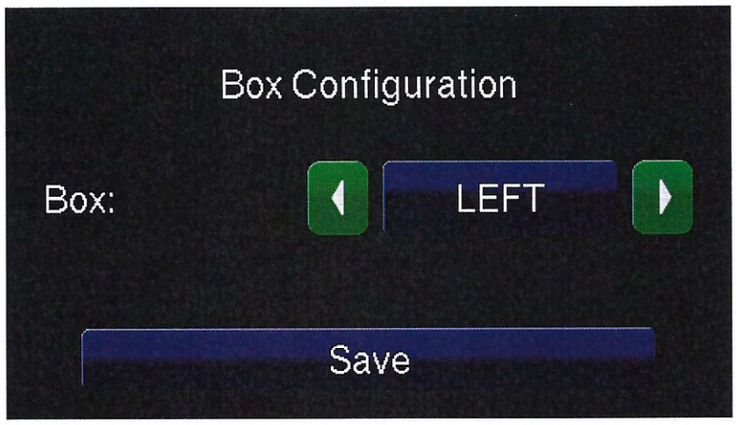
The Splash Screen appears as the device boots up. This screen appears for approximately three seconds, and if the system volume is on, will also play a startup sound.

USB Menu



The USB menu appears when a USB drive is inserted. It is primarily used to export Counter Channel data, although future USB functionality may be here as well. For more information, see the 5.1, "Counter Channel Logging".

Side Configuration



The Box Side Configuration menu allows a Master Box to be selected as the left or right master. This allows flexibility when using a box, as swapping left and right master boxes gives flexibility when a box fails or troubleshooting is required.

To enter this menu, press and hold ▶ when powering up the system. The menu will appear after the splash screen.

Select the box configuration desired, then press “Save”. The box will restart now and the new configuration will be in use.

5. Additional Features

5.1 Counter Channel Logging



The Counter Channel Logging feature records the counter channels when they are cleared. The typical use case is for the operator to:

- Clear counter channels before a job (especially any counters due to equipment testing, etc.).
- Perform the road marking job.
- Save and Clear the counter channels at the end of the job.
- At the end of the day/week/etc., the operator or supervisor plugs a USB drive into the skip timer's USB port to export the logged records to a spreadsheet.

5.1.1 Counter Channel Logging Operation

When the counter channels are cleared using the "Save and Clear" option in the "Counter Options" menu, the distance and volume counters for each gun and pump are stored to internal memory.

GPS information is only recorded at the start and end of operations between counter channel clears:

- The start GPS date/time and coordinates are recorded the first time the START switch is engaged after clearing counter channels.
- The end GPS date/time and coordinates are recorded the last time the START switch was moved to the STOP position before clearing counter channels.



Info

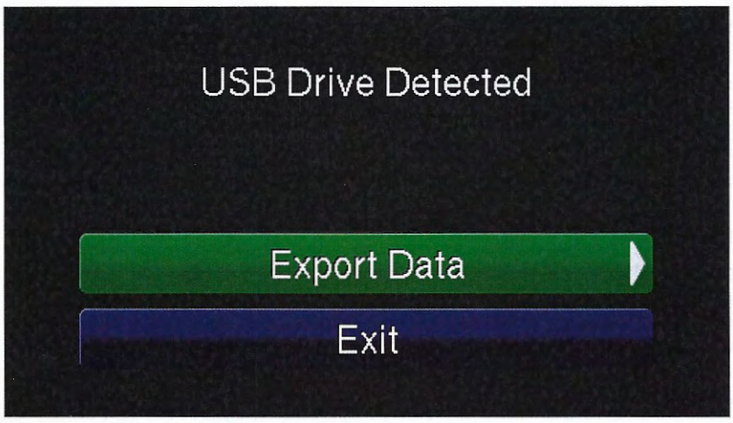
To ensure accurate GPS coordinate association with the records, wait a few minutes after power up to ensure the GPS has sufficient time to acquire satellite lock.

Verify GPS satellite signal acquisition using the "Setup" → "Help" → "GPS Status" screen.

For more advanced data logging, with full GPS path and mapping, please contact your preferred OEM for information about our full-specification data logger options.

5.1.2 Spreadsheet Export

Although the internal memory can hold over a thousand counter channel records, it is recommended that the data is periodically exported as part of regular reporting procedures. To export the data, insert a USB drive into the USB port on the back of your skip timer. The following menu will appear.



Select "Export Data". This will export the data to a spreadsheet on the USB drive, and erase the internal memory.

The largest supported USB drive size is 32GB. The USB flash drive must be formatted as FAT32. Most retail USB drives are shipped from the factory this way. If your particular drive does not appear to work, try this assistance from USB flash vendor SanDisk at http://goo.gl/r1KpOh.

The exported spreadsheet can be opened using any spreadsheet software, such as Microsoft Excel, Google Sheets, or OpenOffice Calc. The title of the exported file will be "Striping Report <Start Date> to <End Date>.xls". Some spreadsheet programs may ask you to import this file – if so, select

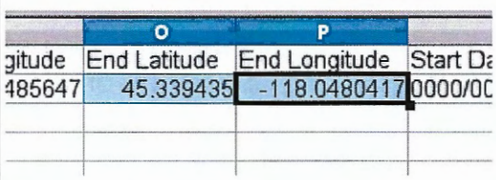
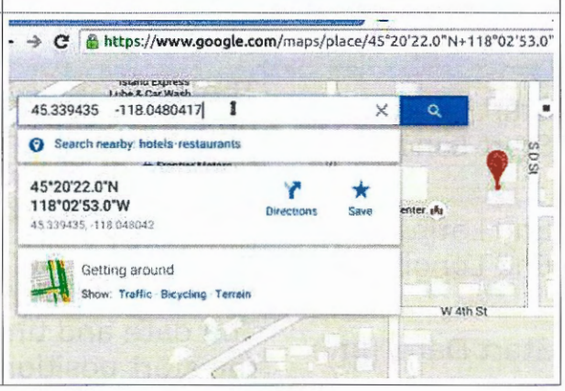
"Comma" for the delimiter.

The columns exported are explained in the table below.

Column Title	Description
Odometer	Total distance traveled with START switch on.
Left Gun # Skip Left Gun # Solid	Distance of Skip and Solid guns. Number of guns depends on the system.
Pump #	Total volume usage of the particular pump. Pump count depends on the system. Pump 1 is Yellow, Pump 2 is White, and Pump 3 is Black.
Yellow App Rate White App Rate Black App Rate	Average application rate over the surface area painted, per color system.
Start Latitude Start Longitude	The start GPS coordinates of the job, recorded at the time the START switch was first moved to the start position after clearing the counter channels.
End Latitude End Longitude	The end GPS coordinates of the job, recorded at the time the START switch was last moved to the stop position before Clearing and Saving the counter channels.
Start Date/Time	The date and time the START switch was first moved to the start position after clearing the counter channels.
End Date/Time	The date and time the START switch was last moved to the stop position before Clearing and Saving the counter channels.

Other columns may appear when the Advanced Counter Channel feature is enabled. Refer to your ordering information for specific advanced counter channel rules and functionality.

To geolocate a job indicated in the spreadsheet using Google Maps:

After inserting the USB drive and opening it in your file browser, click on the file to open it with your spreadsheet software.	
Highlight the spreadsheet cells that contain the GPS latitude/longitude pair you wish to find. Copy the text by right-clicking on the highlighted cells, and selecting "Copy".	
Open your browser of choice (Chrome or Firefox are recommended), and navigate to http://maps.google.com. Paste the GPS coordinates into the search field and press the Enter key. A "pin" icon will appear to indicate the location on the map.	

5.1.3 Paper-Tape Printing

Skip-Line provides an optional paper-tape printer. It prints current counter channel information.

Select "Print" from the "Counter Options" menu to print. The following is an printout example, showing the information contained in a standard printout.

```
--------------------------------
        Current Activity
--------------------------------
JOB_____________________________
CREW____________________________
HWY_____________________________
MILEPOST________________________

Start Switch On Dist:
                          1880 ft

        SOLID FT          SKIP FT
Gun 1 (Yellow 4.00")
            1254              626
Gun 2 (Yellow 4.00")
             915                0
Yellow Subtotal:
            2169              626
Yellow Usage:              9.4 gal
Yellow App Rate:         16.1 mils*
Yellow Cal Number:          0.2560

        SOLID FT          SKIP FT
Gun 3 (White 4.00")
            1751                0
White Subtotal:
            1751                0
White Usage:               5.3 gal
White App Rate:          15.2 mils*
White Cal Number:           0.2537

FOOTAGE TOTALS:
        SOLID FT          SKIP FT
            3920              626
FOOTAGE CAL NUMBER:
                          0.09780

* Mil calculation based on
  line widths shown

All report items based on
calibration numbers.

Verify calibration frequently
to ensure correct reports.

--------------------------------
```

5.2 Datum Point

Datum point allows the skip timer to create a point in front of the guns that is the target point for material.

This can be advantageous or even necessary in several situations:

- When bead coverage is critical when paint first turns on.
- For single-operator setups, where the operator is also the driver and/or cannot see the guns.
- For high precision applications, so the vehicle can align with the target from the front of the vehicle, allowing the vehicle to reach a reasonable application speed before material is emitted from the guns.

5.2.1 The Bead Registration Concept

Beads are gravity fed and are relatively slow to reach the pavement (around 100 to 500 milliseconds depending on bead gun type and installation variables). In comparison, high pressure paint reaches the road nearly instantaneously in around five milliseconds.

Therefore, a properly operating skip timer will need to turn on the bead guns before the paint guns. At 15MPH, a bead gun with 250ms total time delay turned on electrically at the same time as a paint gun will have the beads arrive on the ground ~5.5 feet AFTER the paint reaches the pavement. This is obviously unacceptable in most situations.

This difference **should only be corrected with time**, and not with distance. If 5.5' is entered as a bead distance offset, and the vehicle subsequently is operating at 10MPH, the beads will arrive 2.3' before the paint. This is obviously not the intended result either.

By correcting the combination of bead gun mechanical delay time plus bead drop time with a time factor, the vehicle speed is no longer part of the equation, and bead registration will be much more reliable at varying vehicle speeds. Typically at this point, the only remaining variable* is wind speed, which can be corrected for using the Bead Offset parameter on the main screen during striping operations.

* Some bead gun styles may also be affected by variations in pneumatic air pressure systems.

5.2.2 Datum Point Correction

When striping first starts, there is no time for the skip timer to turn on the bead guns before the paint guns to ensure proper registration. This means that the first few feet of markings are not covered with beads.

By enabling Datum Point and setting the Datum Offset to some distance in front of the guns, this provides the skip timer with enough time to accurately account for required paint and bead timings.

It is recommended to attach a flag or identifier to the vehicle at the desired datum point. Then, measure from the datum point to the front material gun, as shown in the illustration below:

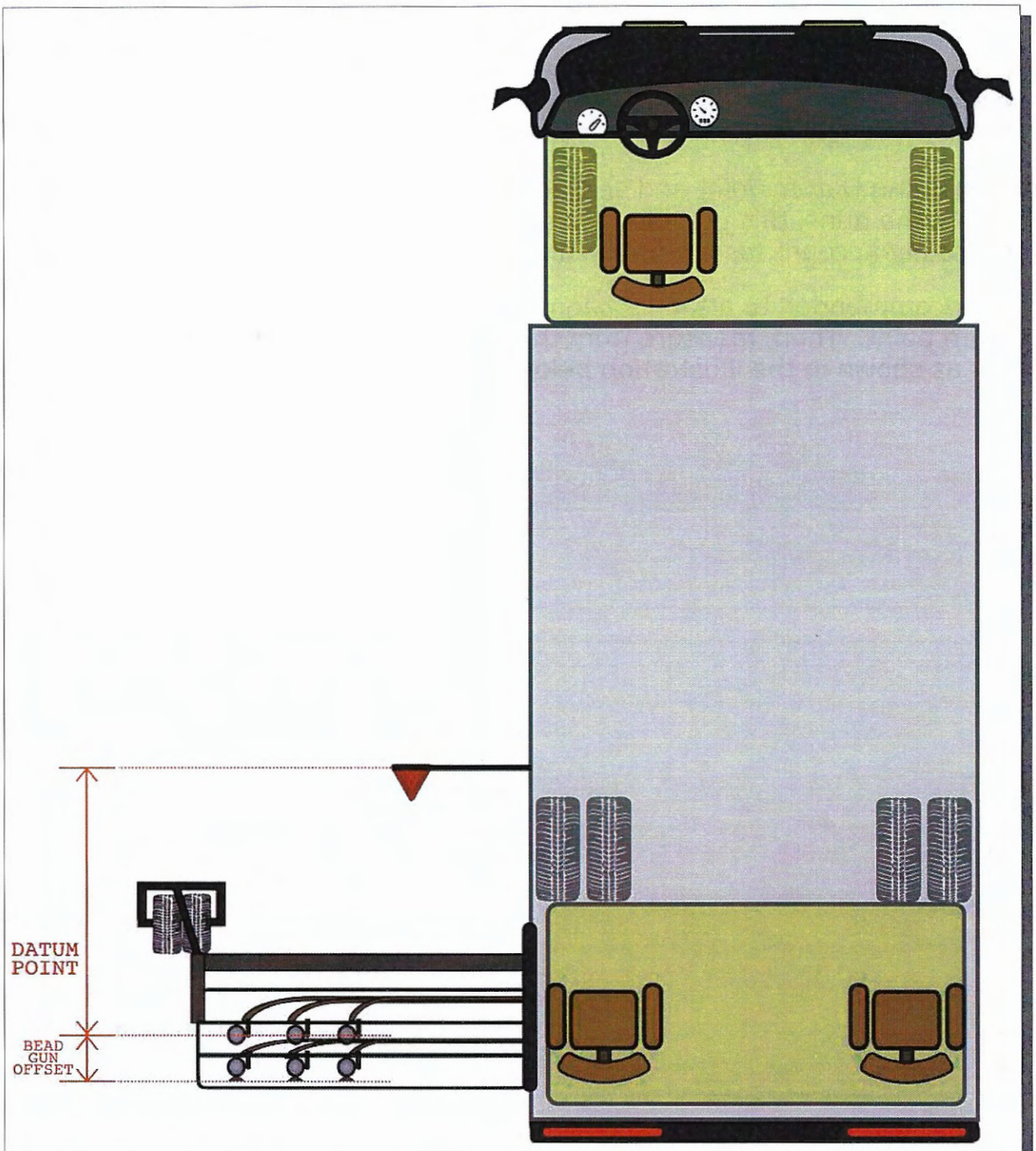


Illustration 1: Indicates Datum Length distance, and Bead Offset distance. Only the measured distance labeled Datum Point should be entered in the Datum Length box, which reaches from the marker to the first gun rank. Bead gun offsets are separate and also need to be entered for accurate operation.

Enter the measured Datum Length distance (see 4.5.1, “Datum”) and then

enable Datum Point usage in the Quick Setup menu to engage this feature.

5.3 Tandem Beads

Tandem beads (also called "double-drop" bead systems) allow two different types of bead materials to be applied from two aligned bead guns in the same pass, including standard bead mixes, premium bead mixes, high-friction grit, high retroreflectivity materials (3M Element), or curing agents (Potter's VisiLok).

This function can be provided either using a toggle switch, or through the Quick Setup menu.

The Quick Setup function that enables this feature is labeled **Tandem Beads** and has the options of **Tandem/Front/Rear.** This function selects between both bead guns (double-drop), the front gun, or the rear gun (respectively) to be active during striping operations.

5.4 In-Field Software Updates

Software updates can be applied to Skip-Line skip timers in the field using a file, delivered via email or web download, placed on a USB flash drive.

This provides a quick and easy way to provide new features, functionality, or bug fixes remotely without vehicle down time.

There may be one or more files. Follow this procedure to accomplish the update on the skip timer:

1. From a PC, download all email attachments or Internet links to files.
2. Place all files in a folder called "updates" on the root of the USB drive from a computer.
3. Close all file explorer windows. Properly eject the USB drive.
4. With the skip timer system powered off, insert the USB drive.
5. Power on the skip timer. The skip timer should detect the USB drive, find the files, and commence with the update.
6. Once the update is complete, remove USB drive and power cycle the device.
7. Verify the new functionality is in place.

The new software should now be installed on the skip timer system. Note that updates for other devices (with the exception of CVO-312 devices) will have received their updates through the communications network at the same time.



USB Update Note

Update files are created on a serial number basis. Attempting installation of an update file created for a different serial number will fail.

Make sure your OEM and/or Skip-Line has the correct serial numbers prior to requesting an update.

6. Menu Messages

There are many information, warning, and error messages that can appear on the SC-12. Review the following sections for information about what these messages mean, and what (if any) corrective actions should be taken.

6.1 Message Icons

There are three importance levels of messages.

Icon	Importance	Description
	*Information*	Informational messages typically do not mean that anything is necessarily wrong, but provide additional information that will help the operator understand what is happening. • If cleared, the information will not reappear for the same instance.
	*Warning*	Warning messages indicate that at some level, something is not functioning as expected. It may not cause the system to fail completely, but may limit functionality until the error is corrected. • If the message is cleared, the warning will reappear in two minutes if the error still exists.

	*Critical Error*	Critical messages indicate the system may not be able to function without correcting the error. • If the message is cleared, the critical error message will reappear in two minutes if the problem still exists.

6.2 Message Descriptions

Icon	Message Text	Description
	*Core Skipper is initializing...*	This appears on startup to indicate that the system is not quite ready for operations yet. It will disappear once the system is ready.
	*Gun #X Disabled - Change color from 'None' to fix.*	Guns can be disabled by setting the color to "None". If the color is set to none, but the switch is not in the "OFF" position, this message reminds the operator of the gun's current status. • If the gun is intended to be used, change the gun color from "None" to the correct color in the Gun Setup menu. • If the gun is not intended to be in use, move the pattern switch to OFF.
	*Attached USB device has an error.*	The system has detected a USB device is plugged in, but can't determine what kind of device it is. • Remove the device from the USB port. • If the device was a USB flash drive, it is not compatible – try a different USB drive.

	*Attached USB device is not a flash drive.*	The system has detected a USB device is plugged in, but that device is not a flash drive. • Only USB flash drives are compatible with this USB port – unplug any other devices. • If the device was a USB flash drive, it is not compatible – try a different USB drive.
	*Output #X is shorted.*	A short circuit has been detected on an output pin. Remove the short circuit, and clear the error to resume use of this pin.
	*Turn Run switch to Hold to continue.*	On systems with a "RUN-HOLD" switch, the switch must be in the HOLD position before operations can begin after system power-on. This prevents inadvertently engaging material at power-on.
	*Turn off Start switch to continue.*	On systems with a "START-STOP" switch, the switch must be in the STOP position before operations can begin after system power-on. This prevents inadvertently engaging material at power-on.
	*Flash image mismatch: update image via USB.*	Images and audio files for the program do not match the main program installed on the system. • Insert a USB drive with the correct update file. • Contact Skip-Line for support.
	*Flash memory unreadable.*	The flash memory that contains graphics, audio files, and logged counter channel records is not communicating. • Contact Skip-Line for support.

	*Duplicate switch detected. Fix and cycle power.*	A switch with the same function is connected via the CAN expansion port, or devices with incompatible programs are both on the same system. • Remove other devices from the CAN bus. • A full system power cycle is required to clear this error. • Contact Skip-Line for support.
	*No communication with Core Skipper.*	The SC-12 master boxes must be able to communicate with the Core Skipper device in order to operate, since the Core Skipper is the central computer for the system. • Check for communications issues, including cables • Check connectors for corrosion, dirt, or damage. • Contact Skip-Line or your OEM.
	*The memory in the Core Skipper isn't responding.*	A memory circuit has failed internally. Contact Skip-Line for service.
	*Switch communication error. Check cables.*	The SC-12 master box has had an internal failure. Contact Skip-Line for service.

7. Master Box Switches

Functions used during normal striping operations are most often assigned to toggle switches on a master box. This provides functionality that is easy to access quickly, has tactile feedback, and simplifies operation.

Switch functionality is described in an appendix insert that you should have received with this manual. If you did not receive a Switch appendix, please contact your OEM or Skip-Line.

Some switches may not work in all striping modes or under certain settings. Refer to each switch definition for conditions that may alter switch behavior.

If you suspect that a switch is malfunctioning due to damage or wear, use the Switch Test menu to verify the switch status.



Important Note!

SC-12 systems are custom built to order. Your unit may have fewer or additional switches and possibly with slightly different labels than those listed.



Glass Cockpit Note

An SC-12 Glass Cockpit has automated calibration routines and other functionality that can override Master Box controls.

Ensure that while testing and troubleshooting switch behavior, the Glass Cockpit is not in calibration mode and does not have functionality activated that would impede the Master Box behavior.

Refer to the Glass Cockpit manual for more information.

Appendix A: Glossary

Hub

A hub provides clean, filtered power and communications to the other units in the SC-12 system. It also shows diagnostics for each port, as well as general fault conditions.

Core Skipper

This is the same as the "Slave Box" on Legacy devices. This unit makes centralized command decisions for the entire system.

Master Box

This is a switch box with a display. It allows the operator to control the striping pattern and other striping actions. Most Master Boxes are dedicated to control specific carriage outputs on either the right or left side of the truck.

Switch Box

This is a simple switch box that has toggle switches to be controlled from a different section of the truck than normal. Example: a Cab Box could allow a driver to open or close a door with the switch. These can also contain LEDs to turn on under certain conditions as warning lights.

Speedometer

A small box with a large digit LCD display that shows the speed of the vehicle. It can also display counter channels and material usage information.

Menu Button

The push button on Master box labeled "MENU". This switch cycles between menu screens on the display.

Stripe

The "skip" length, i.e. the length of the paint on the road for a skip.

Cycle

The cycle is the distance from the start of one skip to the start of the next skip.

Gap

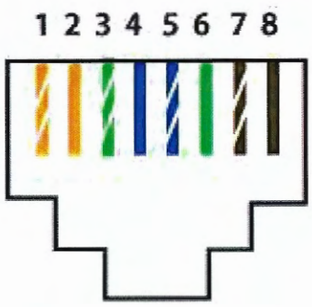
This is the portion of the Cycle between skips where paint is not applied.

Appendix B: Making a Communications Cable

Communications cables for the SC-12 system follow the EIA/TIA 568-B cable wiring standard. These are commonly referred to as Cat5, RJ45, or simply as a network patch cable.

A communications cable should be constructed using the following pin assignments on both ends of the cable.

Pin 1 - white / orange stripe
Pin 2 - orange
Pin 3 - white / green stripe
Pin 4 - blue
Pin 5 - white / blue stripe
Pin 6 - green
Pin 7 - white / brown stripe
Pin 8 – brown



TIA/EIA 568-B

These cables can also be purchased pre-assembled from your local computer store or big box retailer in varying lengths.

A sealed waterproof RJ-45 connector with strain relief is available from your OEM or Skip-Line.

Wiring Sheet For: 19803

Generated on 11/16/2018 at 3:35 PM

Core Skipper Inputs

Channel	Type	Connection
A	NC	Not Connected
B	PWR	Ground
C	OPTO	Yellow Pump Stroke Sensor
D	OPTO	White Pump Stroke Sensor
E	PWR	Sensor Ground
F	PWR	Sensor +5V (350mA)
G	OPTO	Motion Sensor Input
H	NC	Epoxy White Recirc Select
I	NC	Not Connected
J	PWR	Ground
K	NC	Not Connected
L	OPTO	Transmission Reverse (+12V)

COPTO-HI8-2, Address: A1

Channel	Type	Connection
1	OPTO	C/L Work Light Switch (+12V)
2	OPTO	E/L Work Light Switch (+12V)
3	OPTO	C/L Turn Signal Switch (+12V)
4	OPTO	E/L Turn Signal Switch (+12V)
5	OPTO	
6	OPTO	
7	OPTO	C/L Purge Air Switch (+12V)
8	OPTO	E/L Purge Air Switch (+12V)

CDRV-LO16 C/L Carriage, Address: D1

Channel	Type	Connection
1	LO	C/L Paint #1
2	LO	C/L Paint #2
3	LO	C/L Paint #3
4	LO	
5	LO	C/L Beads #1
6	LO	C/L Beads #2
7	LO	C/L Beads #3
8	LO	
9	LO	C/L Rear Beads #1
10	LO	C/L Rear Beads #2
11	LO	C/L Rear Beads #3
12	LO	
13	LO	C/L Purge Air
14	LO	
15	LO	C/L Work Light
16	LO	C/L Turn Signal

CDRV-LO16 E/L Carriage, Address: D2

Channel	Type	Connection
1	LO	E/L Paint #1
2	LO	E/L Paint #2
3	LO	
4	LO	
5	LO	E/L Beads #1
6	LO	E/L Beads #2
7	LO	
8	LO	
9	LO	E/L Rear Beads #1
10	LO	E/L Rear Beads #2
11	LO	
12	LO	
13	LO	E/L Purge Air
14	LO	
15	LO	E/L Work Light
16	LO	E/L Turn Signal

CDRV-LO16 Air/Circ, Address: D3

Channel	Type	Connection
1	LO	Yellow Paint/Circ Valve
2	LO	
3	LO	White Paint/Circ Valve
4	LO	Yellow Material Single Speed
5	LO	
6	LO	White Material Single Speed
7	LO	
8	LO	
9	LO	C/L Blow Air #1
10	LO	C/L Blow Air #2
11	LO	C/L Blow Air #3
12	LO	
13	LO	E/L Blow Air #1
14	LO	E/L Blow Air #2
15	LO	
16	LO	

CDRV-LO8 - Carriages, Address: D4

Channel	Type	Connection
1	LO	C/L Carriage Up
2	LO	C/L Carriage Down
3	LO	E/L Carriage Up
4	LO	E/L Carriage Down
5	LO	
6	LO	
7	LO	
8	LO	

CDRV-HB8 C/L Gun Actuators, Address: D5

Channel	Type	Connection
1+	HB	C/L Gun 1 Actuator +
1-	HB	C/L Gun 1 Actuator -
2+	HB	C/L Gun 2 Actuator +
2-	HB	C/L Gun 2 Actuator -
3+	HB	C/L Gun 3 Actuator +
3-	HB	C/L Gun 3 Actuator -
4+	HB	
4-	HB	

CDRV-HB8 E/L Gun Actuators, Address: D6

Channel	Type	Connection
1+	HB	E/L Gun 1 Actuator +
1-	HB	E/L Gun 1 Actuator -
2+	HB	E/L Gun 2 Actuator +
2-	HB	E/L Gun 2 Actuator -
3+	HB	
3-	HB	
4+	HB	
4-	HB	

Feature List

Feature	Description
Air On Controls All Guns	This option makes it so that the air on switch makes all air guns come on instead of the ones in skip/solid.
Auto Reverse Carriage Lift	This option automatically lifts the carriages when the truck is in reverse.
Epoxy White Recirc Select	Adds selectable white recirc switch using a core skipper opto input. Selected options: **Input H**
Lifetime Totals	This option counts lifetime pump usage, to help determine when pumps need maintenance.
Main Screen Alt Switches	Adds alt switch functionality to the main screen display.
Metric Units	This option adds metric units display to masters and possibly makes the default metric.
NumAltPatterns	3
OEM	Selected options: **Mark Rite Lines**
Pump Control	This option turns on a pump's "on"/"single-speed" output if any gun of that color is painting.
Pump Stroke Counting Disabled When Guns Off	Disables pump stroke counts when no gun of the corresponding paint color is painting.
Quick Setup Items	The options selected for the quick setup menu. Selected options: **Auto-Cycle Toggle**, **Datum Delay Toggle**, **Index Mode Toggle**, **Midspot Mode Toggle**
Smart Speedo	This option adds a smart speedo to the system. It displays pattern preview information from both the left and right sides and allows for changing truck-wide settings.

In-Field Software Updates

The SC-12 can be updated in the field using program update files, delivered via email or web download, placed on a USB flash drive.

This provides a quick and easy way to provide new features, functionality, or bug fixes remotely without vehicle down time.

There may be one or more files. Follow this procedure to accomplish the update on the skip timer:

1. From a PC, download all email attachments or Internet links to files.
2. Place all files in a folder called "updates" on the root of the USB drive from a computer.
3. Close all file explorer windows. Properly eject the USB drive.
4. With the skip timer system powered off, insert the USB drive into the USB port on the rear of the Master Box.
5. Power on the entire SC-12 system. The Master Box should detect the USB drive, find the files, and commence with the update.
   - ✔ MAKE SURE that vehicle power is stable and not removed during the update process!
6. Once the Master Box reports that the update is complete, remove USB drive and power cycle the system.
7. Verify the new functionality is in place.

NOTE: If one of the update files includes "extflash.bin", the USB update must be done on all master boxes on the vehicle. This file often contains large audio/graphics for the system, and is too large to transmit from one master box to another over the network. Updates for other devices (with the exception of CVO-312 devices) will have received their updates through the communications network.

The new software should now be installed on the skip timer system.



USB Update Note

Update files are created on a serial number basis. Attempting installation of an update file created for a different serial number will fail.

Make sure your OEM and/or Skip-Line has the correct serial numbers prior to requesting an update.