

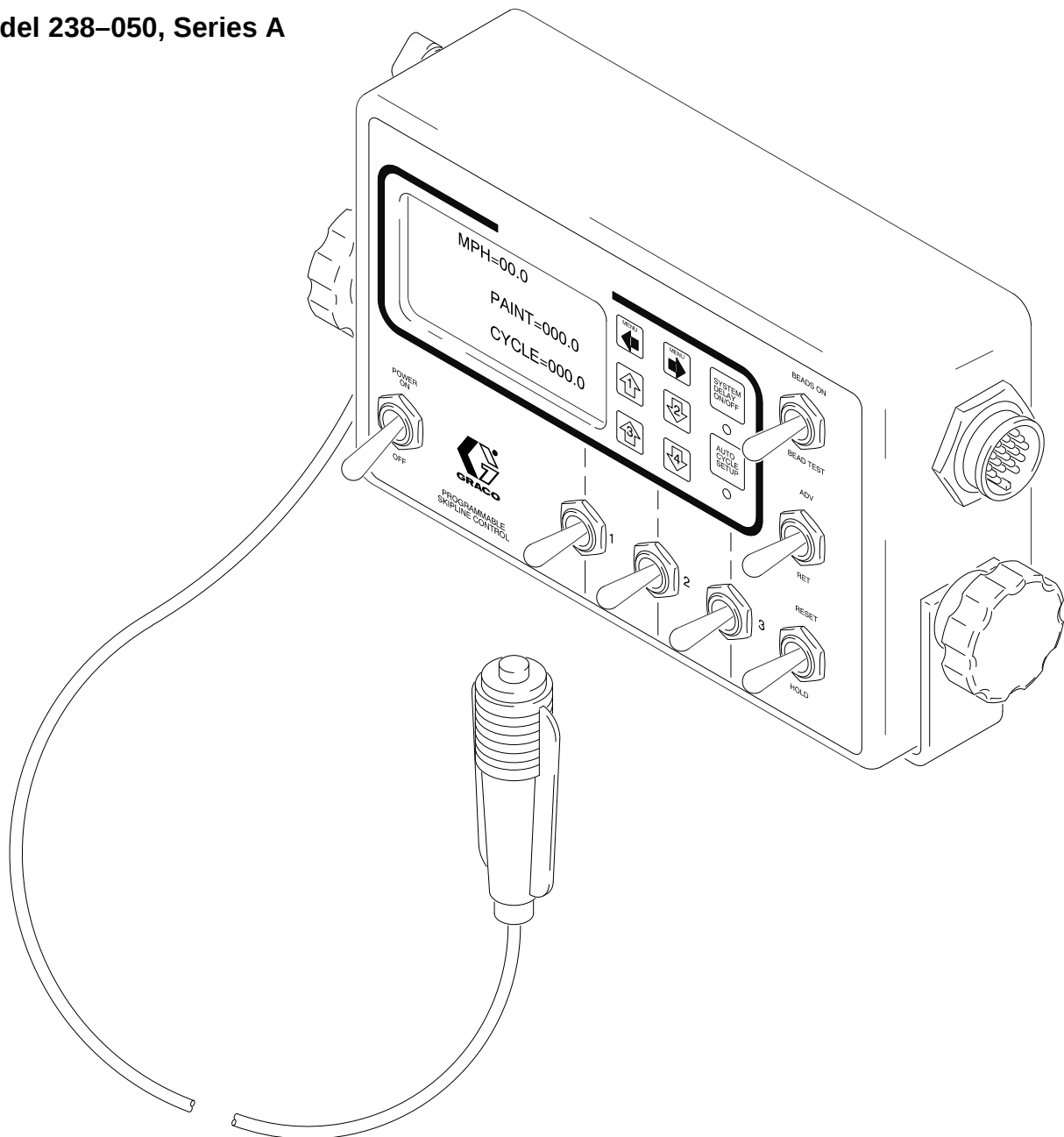


This manual contains important
warnings and information.
READ AND KEEP FOR REFERENCE.

INSTRUCTIONS

Programmable Skipline Controller

Model 238-050, Series A



06572

GRACO INC. P.O. BOX 1441 MINNEAPOLIS, MN 55440-1441

©COPYRIGHT 1996, GRACO INC.

Graco Inc. is registered to I.S. EN ISO 9001

Table of Contents

Warnings	2	Service	18
Installation	4	Technical Data	20
Operation	6	Graco Phone Number	20
Troubleshooting Chart	17	Warranty	20

Symbols

Warning Symbol



This symbol alerts you to the possibility of serious injury or death if you do not follow the instructions.

Caution Symbol



This symbol alerts you to the possibility of damage to or destruction of equipment if you do not follow the instructions.

! WARNING



INSTRUCTIONS

EQUIPMENT MISUSE HAZARD

Equipment misuse can cause the equipment to rupture or malfunction and result in serious injury.

- This equipment is for professional use only.
- Read all instruction manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are not sure, call your distributor.
- Do not alter or modify this equipment.
- Check equipment daily. Repair or replace worn or damaged parts immediately.
- Comply with all applicable local, state, and national fire, electrical, and safety regulations.
- Wear ear protection when operating this equipment.

[illegible]

Installation

Mount Programmable Skipline Control

Place the Control in a position that is comfortable and easy to use. If you decide to mount the control, mount the 0.50" (13mm) wide mounting bracket to a solid location.

WARNING

To reduce the risk of serious injury, mount the Skipline Controller where it is easily visible and will not interfere with your view of the road. It should take no longer to look at the controller than it does to look at the rear-view mirror.

Connect the Control Cable

Clean all connections of dirt, burrs, moisture, etc. before connecting them to the system.

Proper grounding is essential to maintaining a safe system.

Component Identification and Function

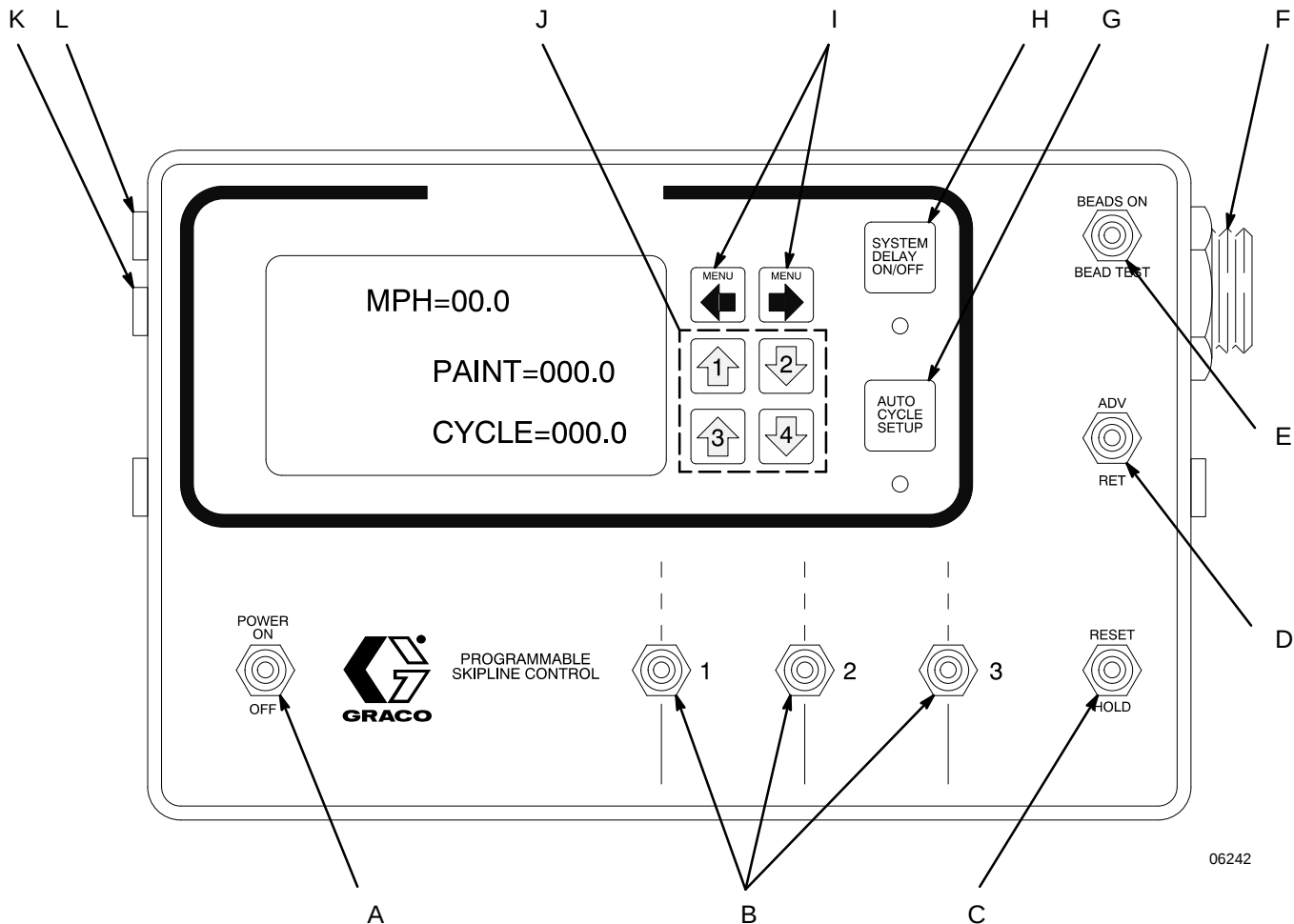


Fig. 1

Component Identification and Function

	Switch / Indicator	Explanation
A	POWER ON/OFF switch	ON enables battery DC power to the Skipline Control. OFF removes power from the Control and grounds the engine spark-plug. Engine can not be started when this switch is in the OFF position. NOTE: This switch is also used to perform an emergency shutdown of the entire system.
B	Paint gun switches 1, 2 and 3	Enables/disables paint guns 1, 2 and 3. Up – dashed line. Center – off. Down – continuous line. NOTE: These switches will not reset the Internal Cycle Counter
C	RESET/HOLD switch	HOLD disables paint guns 1, 2 and 3 and resets the internal cycle counter. RESET resets the internal cycle counter but does not affect continuous line activity. If switch is held in RESET, a new cycle will not begin until the switch is released.
D	ADV/RET switch	Used in conjunction with the arrow switches to adjust the paint line position to match a previously painted line. ADV allows the dash line to be moved forward. RET allows the dash line to be moved closer. The ADV/RET switch adjusts the position by 1/10' every time it is toggled.
E	BEADS ON/ BEADS TEST	Enables/disables bead gun BEADS ON (up) – beads start to flow when paint guns start to paint. Center – off. BEADS TEST (down) – continuous bead flow.
F	I/O cable port	The control cable connects here and at the striping system. The cable also brings in 12 VDC from the striping system. See Fig. 13.
G	AUTO CYCLE SETUP	Used to calculate the cycle distance of a previously painted skip line. Calculated values are automatically placed in the paint and cycle length menu. See the Auto Cycle Setup example on page 11.
H	SYSTEM DELAY ON/OFF	OFF (unlit) – the paint guns and RESET/HOLD respond immediately. ON (lit) – the paint gun switches 1, 2 and 3; and RESET/HOLD switch are delayed by the preset system delay distance.
I	MENU arrow switches	Used to switch between menus, adjusting values and resetting values.
J	Arrow switches 1, 2, 3 and 4	Used in conjunction with the Skipline Controller's menus to adjust on-screen values.
K	Remote mph display plug-in	Provides mph output to REMOTE MPH DISPLAY
L	Remote control switch plug-in	Provides two remote functions for the paint gun switches 1, 2 and 3: 1. Skip line – acts as a cycle reset when tapped and a cycle hold when held down. Has no effect on solid line painting. 2. Solid line – turns paint guns on when held down and off when released.

Operation

GENERAL

⚠ WARNING

To avoid serious injury, make sure that the Skipline Controller is turned OFF whenever you service any part of the Road-Lazer system or leave the Road-Lazer unattended.

⚠ CAUTION

In order to prevent pooling and wasting supplies, always make sure that the guns are turned OFF when the vehicle is not moving.

- When idle for 30 seconds, all menus return to first menu (MPH, PAINT, CYCLE).
- All adjusted values remain in memory during power down.

- UP/DOWN: Numbers change 10 times faster when button is pressed for more than 2 seconds.
- Standard numbers are adjustable to 1/10 foot. Metric numbers are adjustable to 1/100 meter.

NOTE: The controller must be calibrated in the units that you desire to use.

- LCD display has an adjustable contrast. See Fig. 7.
- Paint and cycle length are adjustable from 0.0 to 999.9 feet. or 0.0 to 99.99 meter.
- Footage counters read out to 999,999.
- BEAD ON and PAINT ON delays are adjustable from 0.00 to 0.99 seconds.
- Pump output constant is adjustable from 0.0000 to 0.9999 gallons (liters)/stroke.

FIRST MENU

The First Menu is used to set the paint length of a skip line and the frequency of that length. The paint and cycle value can be adjusted while painting.

1. Set paint length with arrows 1 and 2.
2. Set cycle length with arrows 3 and 4.

NOTE: The *P* in the upper right-hand corner of the menu indicates the status of the paint cycle. The *P* flashes while painting, and disappears during the skip portion of a cycle.

MPH=00.0 * P *

PAINT=000.0

CYCLE=000.0

↑ 1 ↓ 2

↑ 3 ↓ 4

06343

Fig. 2

COUNTER GUN1/GUN2/GUN3 RESET MENU

The Counter Menu measures the actual paint distance from each paint gun. This menu also measures the gallons (liters) of paint sprayed by guns 1, 2, and 3. The average flow rate is calculated in the row at the bottom of the screen.

NOTE: The DOUBLE column indicates when Gun 1 and Gun 2 are on at the same time.

1. Press arrow 1 to reset gun 1 column totals.
2. Press arrow 2 to reset gun 2 column totals.
3. Press arrow 3 to reset gun 3 column totals.
4. Press arrow 4 to cancel the previous reset if necessary.

COUNTER	GUN 1	GUN 2	GUN 3
SKIP	00000	00000	00000
SOLID	00000	00000	00000
DOUBLE	00000	FEET	
	PUMP 1+2	PUMP3	
TOTAL	000	GAL.	000
AV. RATE	000	FT/GALLON	

↑ 1 ↓ 2

↑ 3 ↓ 4

PRESS 1, 2, OR 3 TO RESET
PRESS 4 TO CANCEL CHANGE

06344

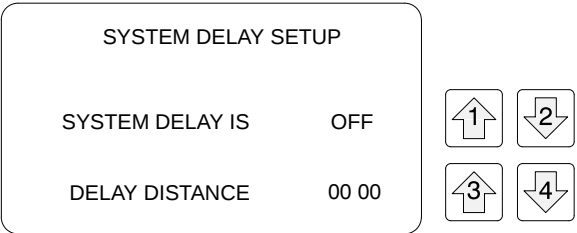
Fig. 3

Operation

SYSTEM DELAY SETUP MENU

The System Delay Setup Menu is used to make the striping job a one-person operation by allowing the driver to use the mechanical sight guide as a reference point for firing the guns. See the System Delay Example on page 11.

1. Press arrow 3 to increase the delay distance.
2. Press arrow 4 to decrease the delay distance.



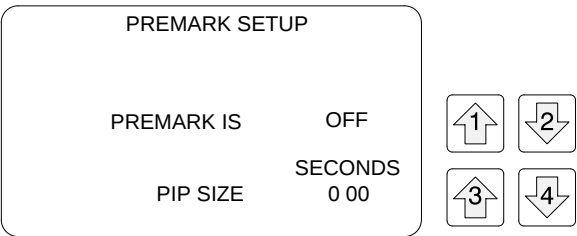
06345

Fig. 4

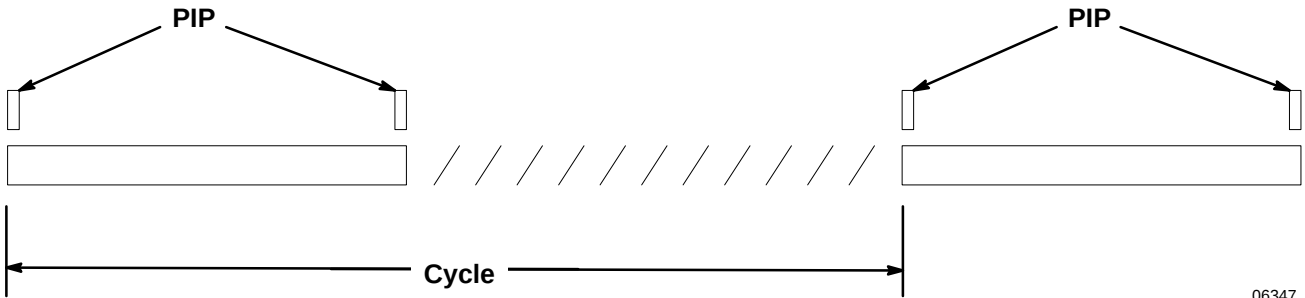
PREMARK MENU

The Premark Menu is used to apply a small paint marker (PIP) and then again at a specified length for roadway tape applications. The Premark Menu works in conjunction with the Skip Cycle. See Fig. 5.

1. Press arrow 1 to enable PIP application.
2. Press arrow 2 to disable PIP application.
3. Press arrow 3 to increase length.
4. Press arrow 4 to decrease length.



06346



06347

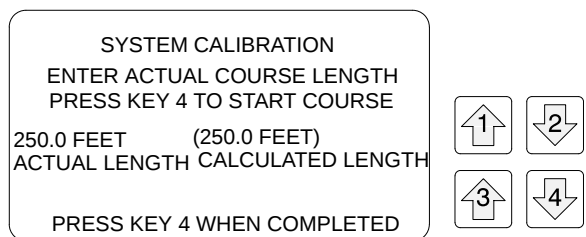
Fig. 5

Operation

SYSTEM CALIBRATION MENU

The System Calibration Menu is used to calibrate the system against a measured distance. See the System Calibration Procedure on page 12.

1. Use arrows 1 and 2 to enter the length of the measured course.
2. Press arrow 4 at the beginning of the measured course.
3. Press arrow 4 at the end of the measured course.



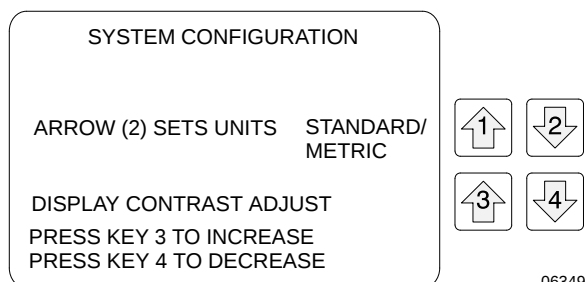
06348

Fig. 6

SYSTEM CONFIGURATION MENU

The Contrast & Units Menu is used to adjust the contrast of the display and to select the unit of measurement and display, either standard or metric.

1. Press arrow 1 to select standard units for measurement and display.
2. Press arrow 2 to select metric units for measurement and display.
3. Press arrow 3 to increase display contrast.
4. Press arrow 4 to decrease display contrast.



06349

Fig. 7

Operation

SKIP CYCLE START SETUP MENU

The Skip Cycle Start Setup Menu is used to start the cycle with either paint or a space. See Fig. 8. This menu is also used to set the pump output constants for pumps 1 and 2. Order Part No. 238–954 Gallon Meter Kit to use this feature.

NOTE: The Pump Calibration Constant is preset for use with the Road-Lazer.

SKIP CYCLE START SETUP
AND PUMP CALIBRATION

START WITH

PUMP CAL. CONSTANT

PAINT/SPACE

000

1

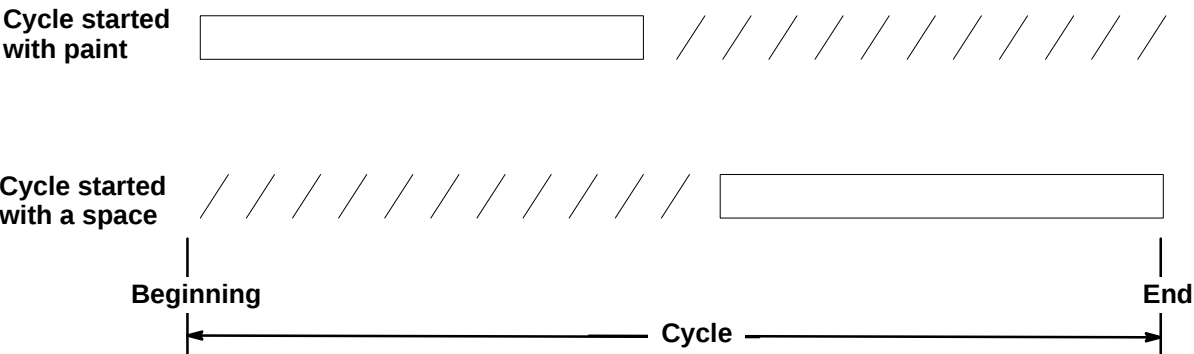
2

3

4

06350

1. Press arrow 1 to begin a cycle with paint.
2. Press arrow 2 to begin a cycle with a space.
3. Press arrow 3 to increase the pump output constant.
4. Press arrow 4 to decrease the pump output constant.



06351

Fig. 8

AUDIBLE SPEED INDICATOR™

The Speed Alarm Menu allows you to set the speed range (mph) that you would like to work within. The controller will beep rapidly when you exceed the upper limit, and slowly when you fall below the lower limit.

1. Press arrow 1 to increase the HIGH alarm limit.
2. Press arrow 2 to decrease the HIGH alarm limit.
3. Press arrow 3 to increase the LOW alarm limit.
4. Press arrow 4 to decrease the LOW alarm limit.

SPEED ALARM SETUP

ALARM HIGH LIMIT

ALARM LOW LIMIT

10.0

5.0

1

2

3

4

06352

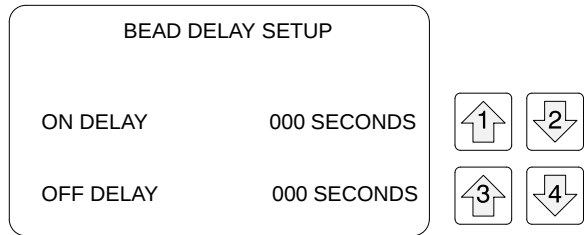
Fig. 9

Operation

BEAD ON/OFF DELAY MENU

The Bead Delay Display Menu is used to compensate for any difference between the distance of the paint and bead stripes, and for the time it takes to turn the guns on and off. The Bead Delay is used to match the bead pattern with the paint line to prevent wasting beads.

1. Press arrow 1 to increase delay time before bead gun turns on.
2. Press arrow 2 to decrease delay time before bead gun turns on.
3. Press arrow 3 to increase delay time before bead gun turns off.
4. Press arrow 4 to decrease delay time before bead gun turns off.



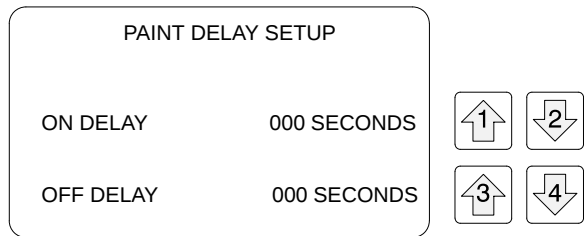
06353

Fig. 10

PAINT ON/OFF DELAY MENU

The Paint Delay Display Menu is used to compensate for the time it takes for the guns to turn on and off. The Paint Delay is used to match the actual distance painted with the distance displayed on the controller.

1. Press arrow 1 to increase delay time before paint guns turn on.
2. Press arrow 2 to decrease delay time before paint guns turn on.
3. Press arrow 3 to increase delay time before paint guns turn off.
4. Press arrow 4 to decrease delay time before paint guns turn off.



06354

Fig. 11

Operation

System Delay Example

The start and stop of the guns in either solid lines or skiplines may be delayed by a specified distance. The One Operator System Delay™ is designed to make the striping job a one person operation by eliminating the need to look back at the guns to trigger them at the correct time. With the System Delay set, all gun activity is controlled using the mechanical pointer reference point on the road ahead of the vehicle.

1. Perform **Aligning Front Mechanical Guidance System** procedure in system Manual 308–611.
2. Enable the System Delay Setup Menu.
3. Sight the mechanical pointer with start of paint stripe (A).
4. Measure delay distance from start of paint stripe to gun. Measure from (A) to (B).

NOTE: This distance can either be measured by hand, or with the Auto-Cycle feature. To use the Auto-Cycle to determine the distance, Press the Auto-Cycle Setup button and toggle ADV when the mechanical sight guide is lined up with point B. Drive forward, and stop when the guns (B) line up with the beginning of the painting area (A). The controller will now display the distance between the two points. Remember this number, and return to the System Delay Setup Menu.

5. Press arrow 1 to enable the system delay.
6. Enter measured delay distance:
 - a. Press arrow 3 to increase distance.
 - b. Press arrow 4 to decrease distance.

The guns will now travel the entered distance before firing. Do not turn the guns off until the final skipline has been painted.

NOTE: When manually placing skiplines with the RESET switch, and the system delay on, the delay distance must be 10' shorter than the cycle distance.

NOTE: Once a skip gun has started painting, it will finish the skipline even if the gun is turned off. Do not turn the guns off until the last skip has been painted.

Auto Cycle Setup™

NOTE: This procedure may be done with the paint guns turned on or off.

1. Perform the **Aligning Front Mechanical Guidance System** procedure in Road Lazer system Manual 308–611.
2. Press the Auto Cycle Setup button.
3. Sight front mechanical pointer at the beginning of the previously painted skipline. Press ADV..
4. Drive to the start of the next skipline. Press ADV. The new values are now placed in the Paint and Cycle Length Menu.

NOTE: When switching the skipline from one gun to the other, the cycle length will be maintained if the RESET/HOLD switch is not toggled.

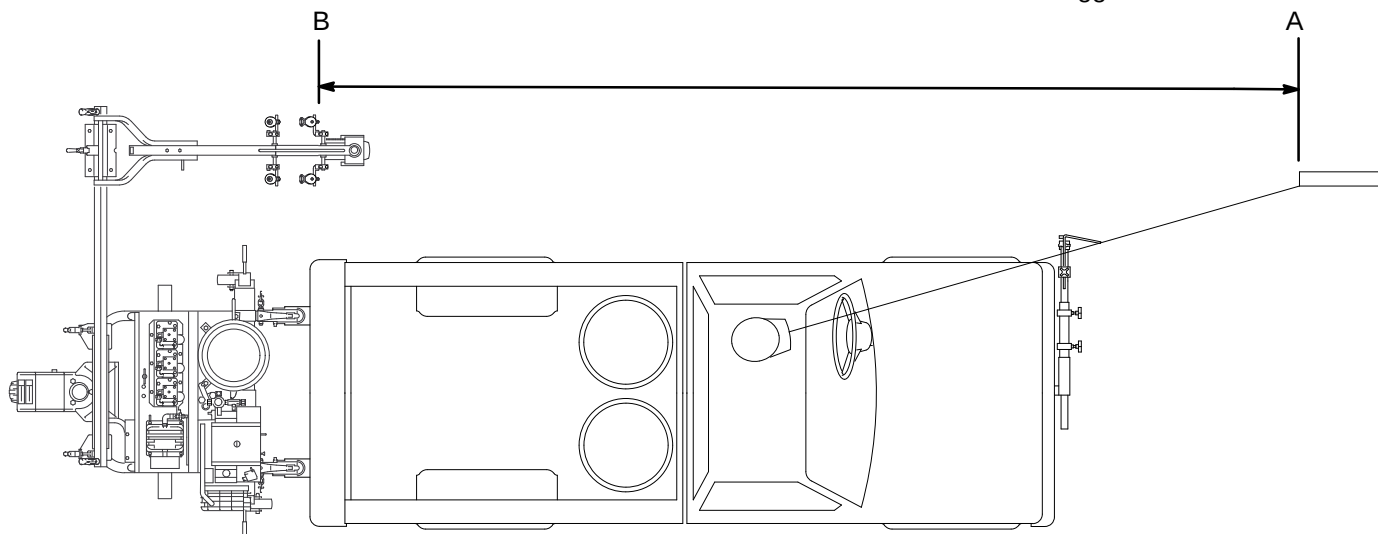


Fig. 12

06247

Operation

System Calibration Procedure

NOTE: Although the Road Lazer is calibrated prior to shipping, the sensor will need to be recalibrated periodically due to wheel wear, and also whenever the gun-arm wheel is replaced.

NOTE: Before recalibrating, ensure that the gun-arm wheel is inflated to 40 psi.

1. Measure and tape off an exact distance of up to 1000 ft. For more accurate calibration, use the longest distance possible.

NOTE: Any error made in this measurement causes future skiplines to be painted incorrectly.

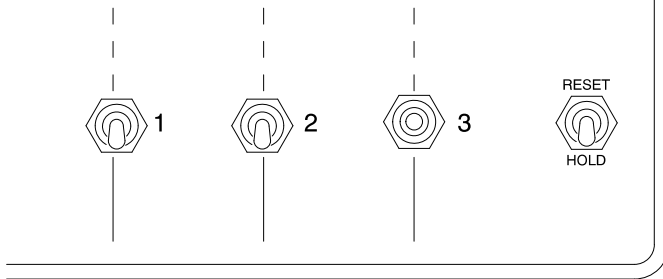
2. Access the System Calibration Menu.

3. Using arrows 1 and 2, enter the length of the measured course.
4. Tow the Road-Lazer to the beginning of the measured course. Line-up the gun-arm wheel exactly on the first mark.
5. Press arrow 4.
6. Tow the Road-Lazer in a straight line to the mark at the end of the measured course. Stop with the gun-arm wheel exactly on the second mark.
7. Press arrow 4.
8. The system is now calibrated.

Operation

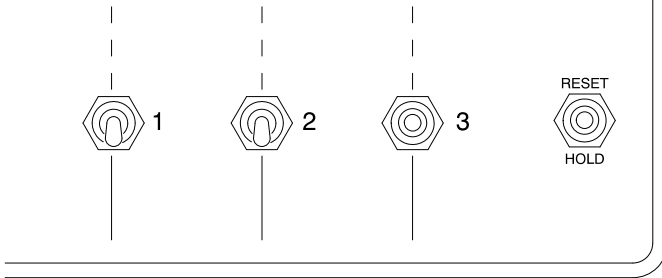
Painting Two Solid Lines With the One-Operator System Delay™ on

1. Set guns 1 and 2 in the solid position and the RESET/HOLD switch in the hold position.



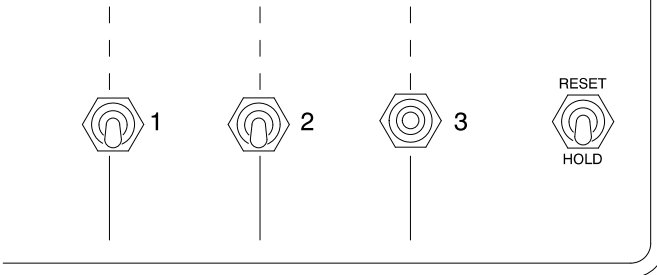
06405

2. Align the mechanical reference point with the beginning of the area to be painted (A).
3. Toggle the RESET/HOLD button to center. This enables the selected guns to begin painting.



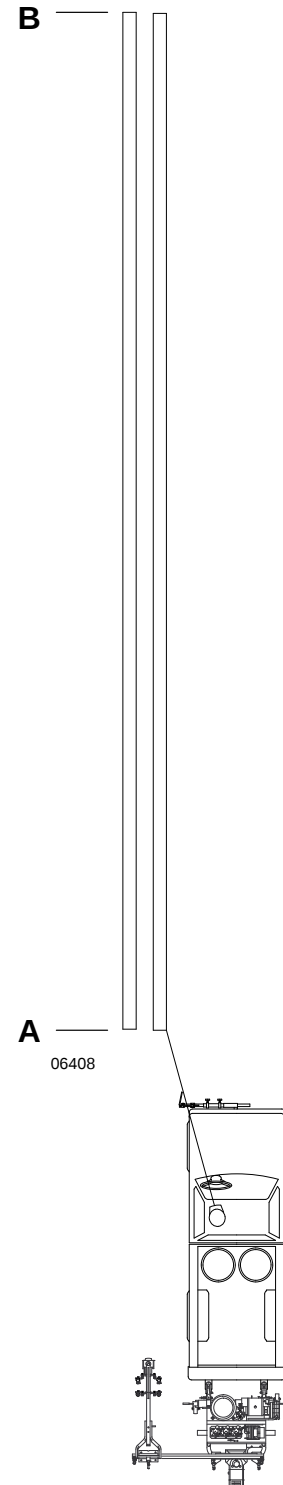
06405

4. When the reference point reaches the end of the desired course toggle the RESET/HOLD switch to hold. Continue driving until the guns stop firing.



06405

NOTE: For painting single lines, toggle either gun 1 or 2 to Solid, and the unused gun to center.

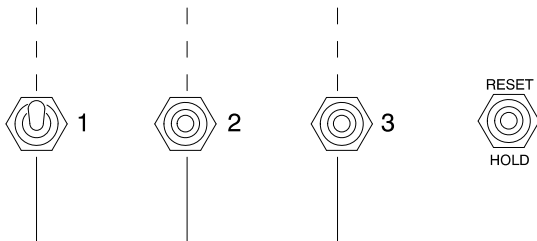


06247

Operation

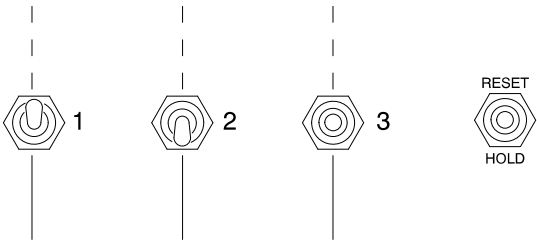
Skipline Applications With Known Cycle and Paint Lengths With the One-Operator System Delay™ on

1. Load the cycle and paint length of the skipline to be painted using the First Menu. See page 6.
2. Align the mechanical reference pointer with point A.
3. Set Gun 1 to Skip, and toggle the HOLD/RELEASE switch to center



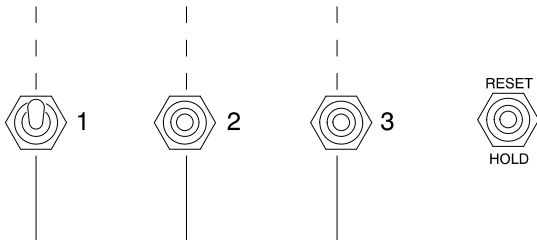
06405

4. When the reference point reaches point B, set gun 2 to solid



06405

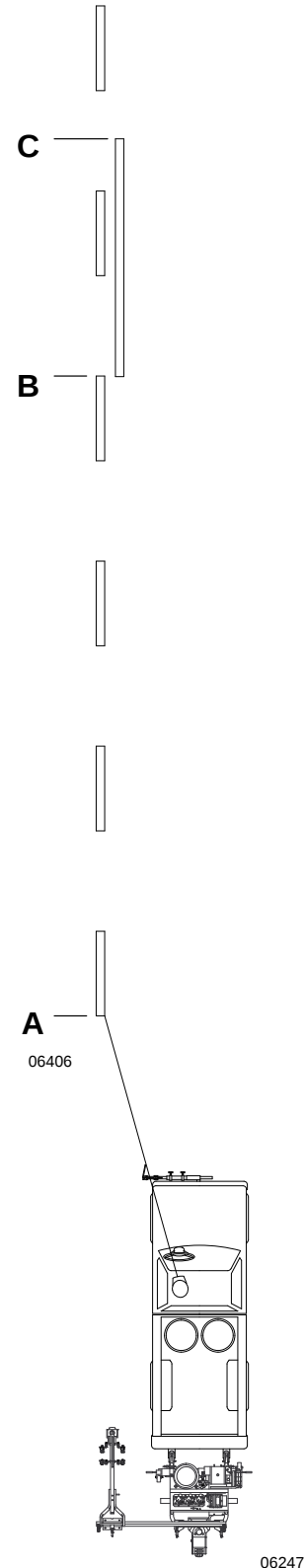
5. When the reference point reaches point C, return gun 2 to center



06405

NOTE: When you are finished skip line painting, the last skip must start painting before the guns are turned off.

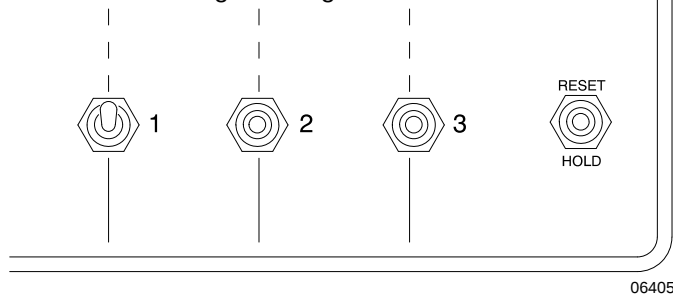
NOTE: If a gun is turned off while painting a skip, it will not stop painting until the skip is completed.



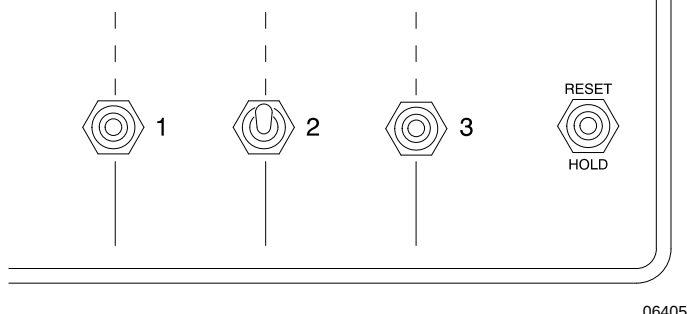
Operation

Skipline Applications Using the Auto-Cycle Setup With the One-Operator System Delay™ on

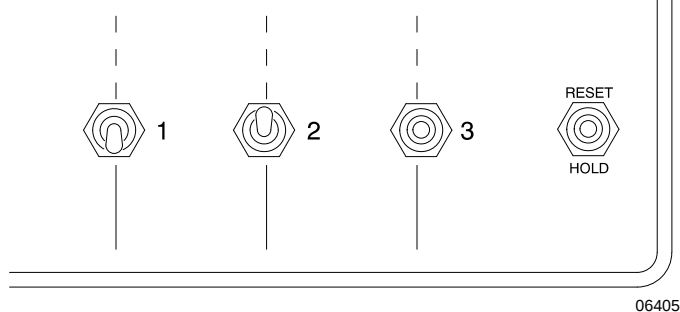
1. Stop the vehicle with the mechanical reference point at point A.
2. Push the Auto-Cycle Setup button and toggle the ADV/RET switch to ADV.
3. Drive forward until the mechanical reference point lines up with point B and toggle the ADV/RET switch to ADV again. The cycle length is now stored in the controller.
4. Back-up until the mechanical reference point is lined up with point A. Set gun 1 to Skip and the HOLD/RESET switch to center. Begin driving forward



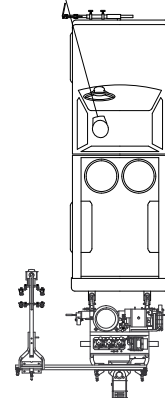
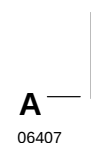
5. When the guns travel past point C, turn gun 1 to center and gun 2 to skip.



6. When the mechanical reference point is lined up with point D, turn gun 1 to solid.



NOTE: This operation can also be performed “on the fly” while you are painting. This eliminates the need to back-up and restart the course once the skip length has been entered. See the procedure on page 16.

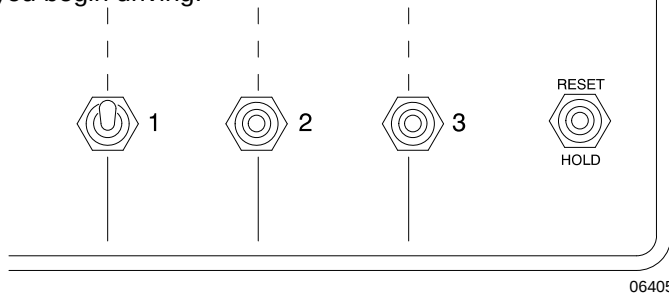


Operation

Skipline Applications Using the Auto-Cycle Setup “On the Fly” With the One-Operator System Delay™ on

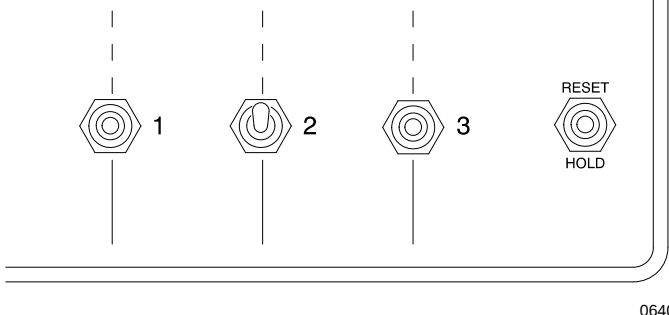
1. Stop the vehicle with the mechanical reference point at point A.

2. At point A, set gun 1 to skip, the RESET/HOLD switch to center, and toggle the ADV switch simultaneously as you begin driving.

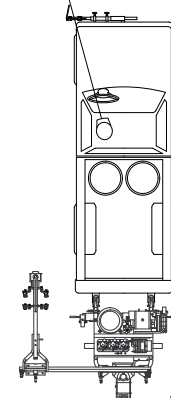
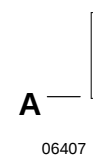
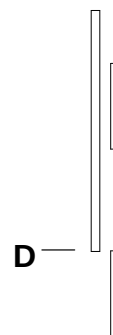
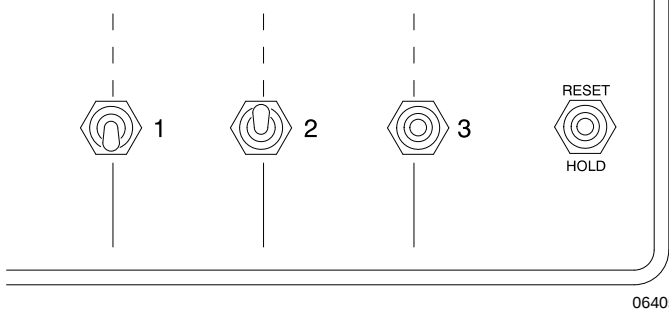


3. Drive forward until the mechanical reference point lines up with point B and toggle the ADV/RET switch to ADV again. The cycle length is now stored in the controller. Continue driving forward.

4. When the guns go past point C, turn gun 1 to center and gun 2 to skip.



5. When the mechanical reference point is lined up with point D, turn gun 1 to solid.



Troubleshooting

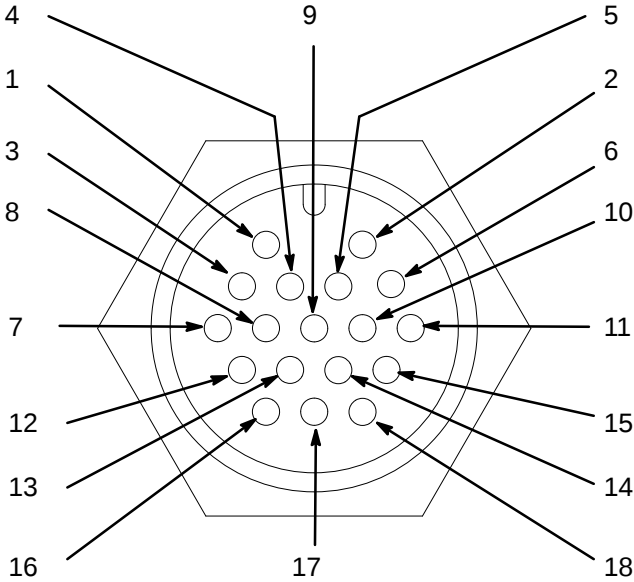
Problem	Cause	Solution
Control will not turn on.	12 VDC power supply low, or disconnected.	Connect the I/O cable. Charge the Road-Lazer battery. Check battery connections.
Guns will not spray.	Various causes.	Toggle RESET on the controller. Check the paint supply. Check the gun ball valves. See manual 308–613. Check the Road-Lazer and engine fuses. See manual 308–611 and separate engine manual.
MPH readout reads zero, or inconsistent reading.	Improper sensor alignment.	Sensor should be .05" from the timing plate, and centered.
Glass beads miss a portion of a stripe when turned on.	Paint and bead gun delays not set properly.	Adjust Paint and Bead Gun Delay values. See page 10.
Glass beads stay on longer than the paint guns, wasting beads.	Bead Off Delay is too high.	Lower the Bead Off Delay value
Skipline is longer than the actual programmed distance.	The gun solenoids are taking longer to turn off than to turn on.	Increase the value of the Paint Gun On delay. See page 10.
Guns will not stop spraying.	The system delay is set to ON while the vehicle is stopped. Gun needle, and seat are worn out.	Turn the skipline controller's main power switch OFF. Replace. See manual 308–613.

NOTE: If your Skipline Controller does require service, do not attempt to repair it yourself. Contact your Graco distributor to have the entire unit replaced.

Service

Control Cable Diagram

Contact No.	Description	Action
1	12 VDC	Input
2	Sensor, distance	Input
3	Sensor, safety, guns	Input
4	Sensor, pump (1)	Input
5	Sensor, pump (2)	Input
6	Paint gun (1)	Output
7	Paint gun (2)	Output
8	Paint gun (3)	Output
9	Bead gun (1)	Output
10	Bead gun (2)	Output
11	Bead gun (3)	Output
12	Engine shutdown (ground)	Output
13	Ground	
14	Ground	
15	Ground	
16	Sensor, pump (3)	Input
17	Ground	
18	Ground	

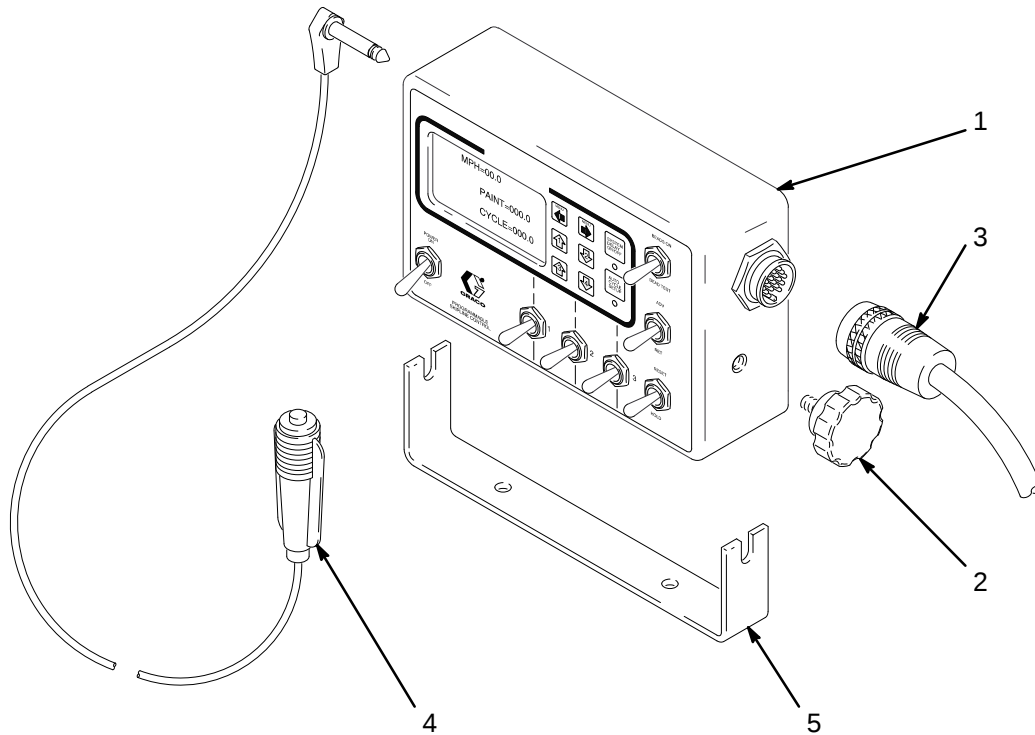


Part No. 113-312

06355

Fig. 13

Parts



06573

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
1	238-050	SKIPLINE CONTROLLER Includes Ref. No. 2	1	3	113-312	CABLE, control	1
2		. KNOB. mounting	2	4	113-617	SWITCH, remote	1
				5	191-864	BRACKET, mounting	1

Manual Change Summary

This manual has been revised from Rev. A to Rev. B to include an updated Parts List and Drawing.

Technical Data

Electrical requirements

Control	12 Vdc
Sender input	12 Vdc
Ground	Negative
Gun output switching to ground	2A max
Reverse polarity & noise spikes	Protected
Operating speed range	up to 20 mph (450 pulses/sec)
Operating temperature	32–130°F
Weight	3
Dimensions	7.25" x 4.50" x 2.25" (184 mm x 114 mm x 57 mm)

Graco Phone Number

TO PLACE AN ORDER, contact your Graco distributor, or call this number to identify the distributor nearest you: **1-800-367-4023 Toll Free**

The Graco Warranty and Disclaimers

WARRANTY

Graco warrants all equipment manufactured by it and bearing its name to be free from defects in material and workmanship on the date of sale by an authorized Graco distributor to the original purchaser for use. As purchaser's sole remedy for breach of this warranty, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment proven defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for, any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility with Graco equipment of structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claim. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor and transportation.

DISCLAIMERS AND LIMITATIONS

The terms of this warranty constitute purchaser's sole and exclusive remedy and are in lieu of any other warranties (express or implied), **including warranty of merchantability or warranty of fitness for a particular purpose**, and of any non-contractual liabilities, including product liabilities, based on negligence or strict liability. Every form of liability for direct, special or consequential damages or loss is expressly excluded and denied. In no case shall Graco's liability exceed the amount of the purchase price. Any action for breach of warranty must be brought within two (2) years of the date of sale.

EQUIPMENT NOT COVERED BY GRACO WARRANTY

Graco makes no warranty, and disclaims all implied **warranties of merchantability and fitness for a particular purpose**, with respect to accessories, equipment, materials, or components sold but not manufactured by Graco. These items sold, but not manufactured by Graco (such as electric motor, switches, hose, etc.) are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

All information, illustrations, and specifications in this document are based on the latest product information available at the time of publication. The right is reserved to make changes at any time without notice.

Sales Offices: Atlanta, Chicago, Detroit, Los Angeles
Foreign Offices: Belgium, Canada, England, Korea, Switzerland, France, Germany, Hong Kong, Japan

GRACO INC. P.O. BOX 1441 MINNEAPOLIS, MN 55440-1441

PRINTED IN U.S.A. 308-616 May 1996, Revised July 1996