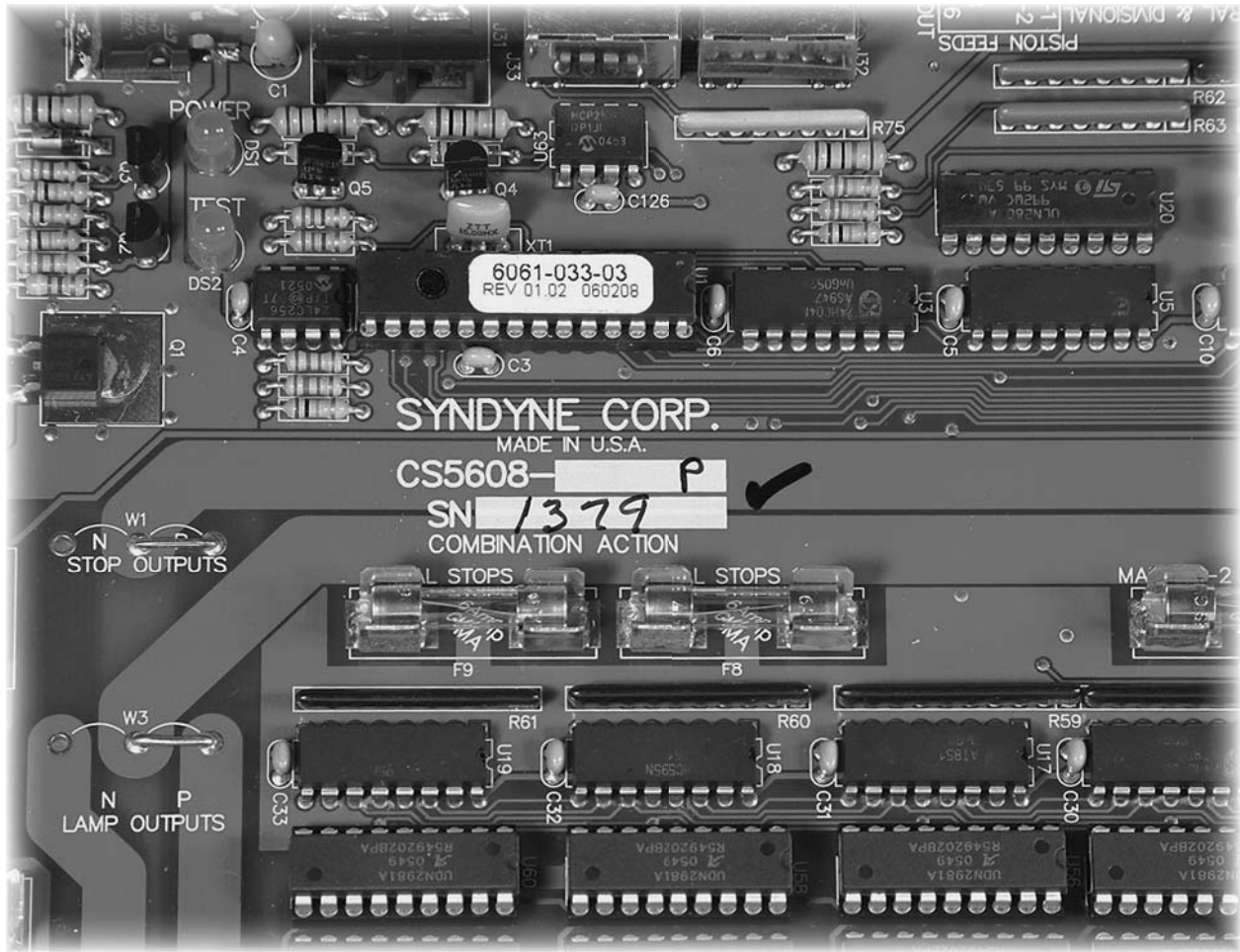


# CS5608 COMBINATION ACTION MANUAL



THIS MANUAL COVERS THE INSTALLATION AND PROGRAMMING OF A FULLY FEATURED CS5608 COMBINATION ACTION SYSTEM

Control System Installed By \_\_\_\_\_ Date Installed \_\_\_\_\_  
 Installer Telephone \_\_\_\_\_ Fax \_\_\_\_\_ Email \_\_\_\_\_

Control System Maintained By \_\_\_\_\_  
 Maintenance Telephone \_\_\_\_\_ Email \_\_\_\_\_ Fax \_\_\_\_\_

SYNDYNE CORPORATION

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# SYSTEM OVERVIEW

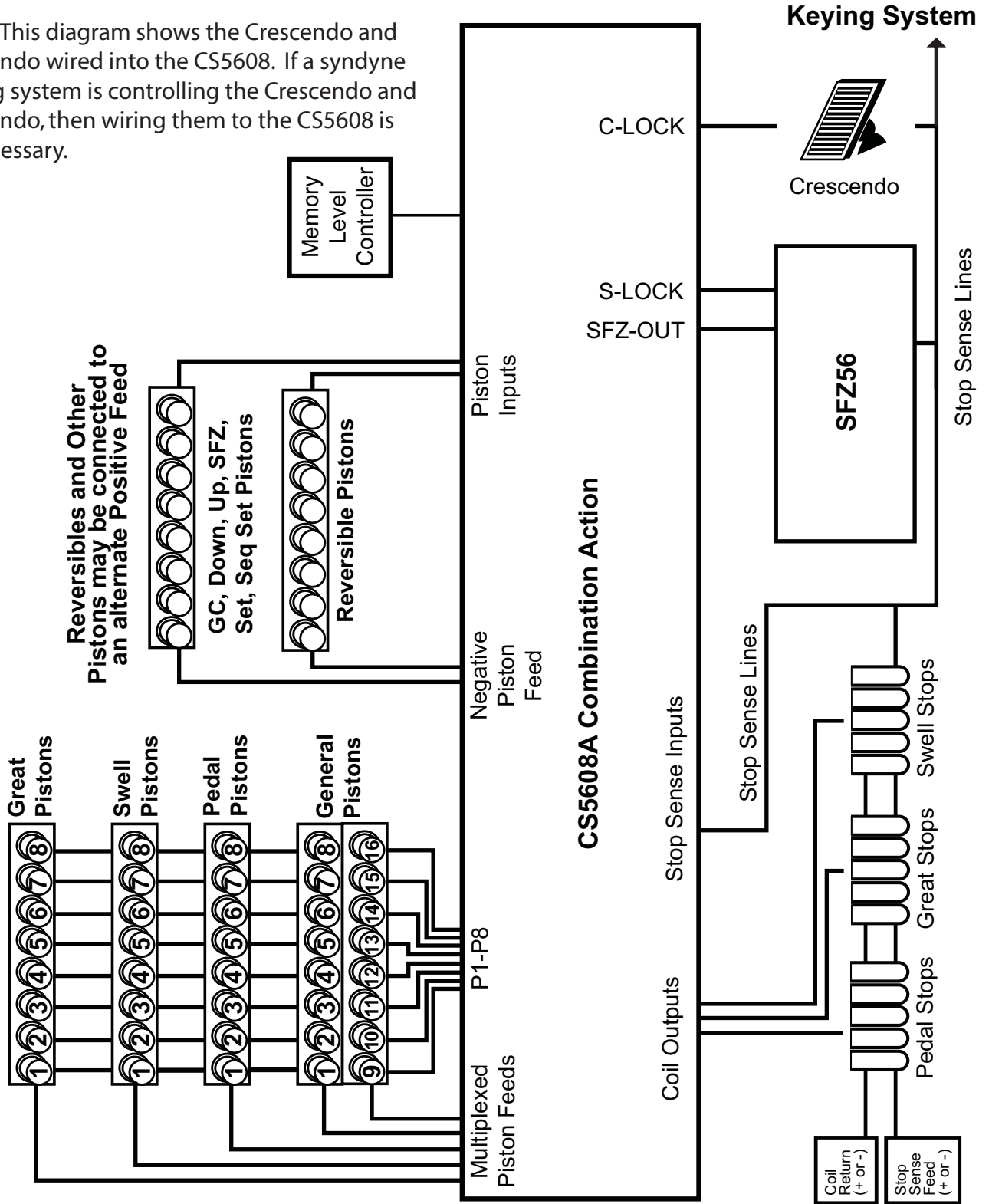
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# SYSTEM DIAGRAM

Note: This diagram shows the Crescendo and Sforzando wired into the CS5608. If a syndyne keying system is controlling the Crescendo and Sforzando, then wiring them to the CS5608 is unnecessary.

The General and Divisional Pistons are multiplexed. If a non Multiplexed application is necessary, an LS5610I can be used with the CS5608A



# WARRANTY

---

The Seller, Syndyne Corporation, does hereby warrant that Syndyne Organ Products manufactured by it are free of defects in materials or workmanship. This warranty shall extend to the original purchaser only and cover Products as follows:

## 5 Year Warranty

Written notice of all claimed defect(s) must be given within thirty (30) days after such defect is first discovered. The seller's obligation under this warranty is limited to, at its option, repairing or replacing the Syndyne Products or any defective component part that is proved to be other than as herein warranted. Transportation charges covering defective material under warranty shall be at the buyer's expense.

This warranty shall not extend to any Syndyne Product or component part which has been subject to misuse, improper installation, maintenance or application, nor does it extend to any part which has been repaired or altered outside the seller's plant, unless authorized in writing by the seller.

This warranty is expressly in lieu of any other expressed or implied warranties, including any implied warranty of merchantability or fitness for a particular purpose, and of any other obligation on the part of the seller. In no event will the seller be liable for incidental or consequential damages.

# UNPACKING AND HANDLING

---

## STATIC WARNING

The Syndyne LS5600K System contains electrical components that are susceptible to damage by static discharge. To avoid damage, use antistatic handling materials and make sure you are well grounded at all times. It is recommended that all electrical components be kept in their original packaging until installed.

## BENDING OR ROUGH HANDLING

Use care when handling the products. Dropping or other rough handling can result in the products becoming damaged. Electrical components may also break if excessive bending occurs.

## BOARD IDENTIFICATION

For Identification Purposes each component is labeled with a part number, a serial number, and a name/description.

This shows a sample of a board identification

Part Number:  
Serial Number:  
Description:





# CS5608 SYSTEM COMPONENTS

## CS5608 COMBINATION ACTION BOARD

### FEATURES

- 5 year warranty
- 4 different models: Moving Stop, Blind, Syndyne Lighted, and European Lighted (This Instruction Manual covers Moving Stop Model Only)
- Firmware is not custom and is on-sight upgradeable for future enhancements
- No battery back-ups
- Installer configurable
- 56 Stops, 20 stops/manual and 16 in the pedal
- 2 reversibles/manual and 4 reversibles in the pedal
- Settable output pulse time from 0.1 – 0.6 seconds
- Associate Pedal Reversible in pairs
- Up to 64 levels of memory
- 16 general pistons plus 8 pistons/division
- General Piston Sequencer
- 2 Inputs allow option for Pedal Stops to be Settable on Manual 1 or Manual 2
- Negative or Positive Outputs
- Negative/Positive Stop Feed (installer configured with jumpers)
- Negative/Positive Piston Feed (installer configured with jumpers)
- Built-in Fuse Protection
- 12-24VDC operation

### DESIGN INTENT

The CS5608 is a complete “Setter” style Combination Action within a single circuit board and is suitable for small to moderate size two manual organs. The CS5608 can be used with existing organ keying systems or as a companion to the Syndyne CS5600 Keying System. A Sforzando can be added to the moving version with the addition of an FSZ56 board.

### MECHANICAL

Length	16-1/4”
Width	6-1/2”
Height	1-1/4”

### MOUNTING

¼” high standoffs for #6 screws are built into the circuit board for mounting purposes.

### ELECTRICAL

A standard regulated DC power supply between 12-24 volts is required. Current draw with all outputs off is approximately 0.1Amps. Each output is capable of switching 0.240Amps continuously or 0.500Amps for 0.6 seconds.

### CONNECTIONS

Connectors and Terminal Blocks are provided for all connections. See Section 3 “System Wiring” for wiring instructions.

### OUTPUTS

All outputs are fused and have a fly-back diode to suppress reverse voltage spikes that are generated when an energized magnet is released. The output pulse time (Moving version only) is settable from 0.1 - 0.6 Seconds in 0.05 Second increments. See page 3-4 in Section 3 “System Wiring” for wiring instructions.

### STOP SENSE INPUTS

The 56 stop inputs, 20/Manual and 16/Pedal, will operate from either a negative or positive feed. The Stop Sense polarity is selected by moving the STOP FEED jumper to the appropriate polarity. See page 3-4 in Section 3 “System Wiring” for wiring instructions.

### REVERSIBLE STOPS

Eight reversible piston inputs are available as reversible controls for the last two stops in each manual and the last four stops in the pedal. These piston inputs will operate from either a negative or positive feed. The piston feed polarity is selected by moving the PISTON FEED jumper to the appropriate polarity.

### ASSOCIATE PEDAL REVERSIBLES SWITCH

This feature, when enabled, associates pedal reversible stops in pairs. Pedal stops 13 and 14 makeup one pair and pedal stops 15 and 16 makeup the other pair. If both paired stops are on and one of the pair is turned off then the other stop will go off with it. For instance if pedal stops 15 and 16 are on and Pedal Reversible-16 piston is pressed both stops will be turned off.

## SET, CANCEL, UP, DOWN AND SFORZANDO PISTON INPUTS

---

The Set, Cancel, Sequence – Up, Sequence - Down and the eight reversible piston inputs will operate from either a negative or positive feed. The piston feed polarity is selected by moving the PISTON FEED jumper to the appropriate polarity. See page 3-5 in Section 3 “System Wiring” for wiring instructions.

## STOP POLLING

---

Stop Polling is the technique of monitoring stops and only moving the stops as necessary.

## SFORZANDO

---

A Sforzando can be added to the CS5608 - Moving version by adding an SFZ56 Sforzando board. See page 2-10 in this section for details on the SFZ56 board. The Sforzando piston input, Sforzando lockout input and Sforzando output are provided to operate with the SFZ56 board. The Sforzando lockout disables the Set piston (Moving version only). See page 3-7 in Section 3 “System Wiring” for wiring instructions.

## CRESCENDO LOCKOUT

---

A Crescendo Lockout (Moving version only) input is available for systems requiring this feature. The Crescendo lockout disables the Set piston. See page 3-5 in Section 3 “System Wiring” for wiring instructions.

## GENERAL AND DIVISIONAL PISTON INPUTS

---

The General and Divisional pistons are multiplexed through the eight piston inputs (P1-P8) and five feeds, Manual-1, Manual-2, Pedal, Generals 1-8 and Generals 9-16. A piston interface board (LS5610I) can be added to convert the piston inputs to non-multiplexed. See page 3-6 in Section 3 “System Wiring” for wiring instructions.

## MEMORY LEVEL

---

A maximum of 64 memory levels are available. Each CS5608 comes with a standard 12 level rotary memory selector; other rotary and digital memory level selectors are available. A Memory Lockout (prevents memory levels for being set) input is available for memory level selectors with this capability. See page 3-8 in Section 3 “System Wiring” for wiring instructions.

## PEDAL TO MANUAL-1 AND PEDAL TO MANUAL-2 PISTON COUPLER

---

The Pedal to Manual-1/2 inputs allows the pedal stops to be set on a manual's divisional pistons. These piston couplers can be enabled all of the time by setting the PD/MAN-1, PD/MAN-2 switches On or can be controlled from two stop inputs. The PD/MAN-1, PD/MAN-2 stop inputs will operate from either a negative or positive feed. The Stop Sense polarity is selected by moving the STOP FEED jumper to the appropriate polarity. See page 3-9 in Section 3 “System Wiring” for wiring instructions.

## GENERAL CANCEL AT POWER-UP SWITCH

---

When this feature is enabled a General Cancel when first powered up will occur. See Section 4 “System Programming” for programming instructions.

## LAST GENERAL PISTON SWITCH

---

The Last General Piston switch works in conjunction with the general piston sequencer. It communicates to the sequencer how many general pistons are available. If the sequencer is used it is important to not skip any piston inputs and to wire the first general piston to input-P1. See Section 4 “System Programming” for programming instructions.

## SEQUENCE MEMORY LEVELS SWITCH

---

The Sequence Memory Levels switch works in conjunction with the general piston sequencer. It configures the sequencer to sequence up/down through memory levels too. See Section 4 “System Programming” for programming instructions.

## SEQUENCE MODE SWITCH

---

The Sequence Mode switch configures the sequencer for European mode or American mode. In European mode the sequencer will sequence up/down through the general pistons. In American mode (this mode is currently not available) the sequencer will sequence up/down through a captured sequence. The sequence is captured through the use of the Set Sequence piston input. See Section 4 “System Programming” for programming instructions.

## LS12MS ROTARY MEMORY LEVEL CONTROLLERS

### FEATURES

- One of a family of memory control modules to be used with Syndyne Combination Actions
- Comes standard with black knob and engraved brass plate
- White, Black and several other colored engraved plates are available as special order.

### DESIGN INTENT

You may select from a number of memory modules for front panel control of memory levels. The LS12MS is one of these memory modules.

### CIRCUIT BOARD DIMENSIONAL

Height: 2 3/4"

Width: 2 3/4"

Depth: 1/2" behind a 3/4" name board.

### ENGRAVED PLATE DIMENSIONAL

Height: 2"

Width: 1 3/4"

Depth: The knob sticks out approximately 3/4" in front of the engraved plate.

### MECHANICAL

**Mounting:** The circuit board is mounted to the organ with four screws into the back of the name (stop) board. An engraved plate mounts to the front of the name (stop) board with four small brass screws.

**Connections:** Connects to the combination action system by means of a plug-in connector for ease of installation.

**Front Plate:** Brass, white, black, and several other colors of engraved plates are available.

### ELECTRICAL:

**Power Supply:** Receives power from the combination action system

**Programming:** No programming necessary

### CAPABILITIES:

**Memories:** There are twelve positions available on the front panel rotary switch. If you need to limit the number of memory levels to less than twelve, a stop in the switch can be rotated to a different position and a custom engraved plate can be provided.

## LS64MS ROTARY MEMORY LEVEL CONTROLLERS

### FEATURES

- One of a family of memory control modules to be used with Syndyne Combination Actions
- Includes knobs and engraved brass plate
- White, Black and several other colored engraved plates are available as special order

### DESIGN INTENT:

You may select from a number of memory modules for front panel control of memory levels. The LS64MS is one of these memory modules.

### CIRCUIT BOARD DIMENSIONAL:

Height: 2 3/4"

Width: 5 3/4"

Depth: 1/2" behind a 3/4" name board.

### ENGRAVED PLATE DIMENSIONAL:

Height: 2"

Width: 4 7/16"

Depth: The knobs stick out approximately 3/4" in front of the engraved plate.

### MECHANICAL:

**Mounting:** The two circuit boards are mounted to the organ with eight screws into the back of the name (stop) board. The engraved plate mounts to the front of the name (stop) board with four small brass screws.

**Connections:** Connects to the combination action system by means of plug-in connectors for ease of installation.

**Front Plate:** Brass, white, black and several other colors of engraved plates are available.

### ELECTRICAL:

**Power Supply:** Receives power from the combination action system.

**Programming:** No programming is necessary.

### CAPABILITIES:

**Memories:** There are 64 positions available on two front panel rotary switches. If you need to limit the number of memory levels to less than 64, a stop in either switch can be rotated to a different position and a special engraved plate can be ordered.

# LSEMS ELECTRONIC MEMORY LEVEL CONTROLLERS

## FEATURES

---

- Large 0.4" Red LED display
- Available as an 8, 12, 32, 64 & 128 Memory Level Controller
- 8 different configurable memory partitions with up to 5 key locks
- Brushed brass plate with black lettering
- Available without brass plate and off board Up and Down buttons

## DESIGN INTENT

---

The LS\_\_EMS Memory Level Controller is designed to work in conjunction with Syndyne Combination Actions and to mount through most name boards.

## MECHANICAL

---

### Printed Circuit Board

Height 2 ½"

Width 3"

Depth 1 ½"

### Brass Mounting Plate

Height 3"

Width 3 ½"

## ELECTRICAL

---

A regulated DC power supply between 12-24 volts is required to power the board. Current draw is approximately 0.100Amps

## CONNECTIONS

---

Connectors or Terminal Blocks are provided for all connections

## MOUNTING WITH THE BRASS PLATE:

---

Cut a hole in the desired location that measures 2 9/16" high and 3 1/16" wide. Caution, the mounting screws may breakout into cutout if cutout is oversized. Feed connecting wires out through the hole and connect to the memory level controller. Position the memory level controller in the hole and fasten securely using the four decorative brass screws. The memory level controller is suspended from the brass mounting plate.

## MOUNTING WITHOUT THE BRASS PLATE:

---

Cut a hole in the desired location for the lens that measures 1 3/16" high and 1 3/4" wide and secure the lens with RTV or double-sided tape in the cut-out. Mount memory level Up and Down pistons in the desired locations and connect to the UP DOWN and COM pins on the memory level controller. Make all other necessary connections to the memory level controller and then scroll to the highest memory level. Hint: the memory level will wrap to the highest level by scrolling down from the lowest memory level. Position the memory level controller so that the LED display is properly visible through the lens then fasten it securely through the mounting spacers on the PCB using four #6 screws. Note it may be necessary to recess (route into name board) the memory level controller so that it can be viewed from a wider angle.

# LS4REV REVERSIBLE CONTROLLER

## FEATURES

- 4 piston inputs and 8 corresponding outputs (2 outputs/piston)
- Each can be individually configured as either a latching piston or a reversible stop controller
- Latching pistons can be configured to Step in pairs
- Reversible stops can be configured to Associate in pairs
- Negative and/or Positive Stop Sense are selectable
- 8 discrete transistor outputs can drive up to a 1/2Amp load each, are fly-back protected and can be ordered in either Negative or Positive polarity

## SYSTEM DESIGN INTENT

An excellent option for when you need a latching reversible piston or you just want to add a few reversible stops. There are 4 piston inputs and 8 corresponding outputs (2 outputs/piston) that can be individually configured as either a latching piston or a reversible stop controller. Latching pistons can be configured to Step in pairs and reversible stops can be configured to associate in pairs. Negative and/or Positive Stop Sense and piston feed are selectable. The 8 discrete transistor outputs can drive up to a 1/2Amp load each, are fly-back protected and can be ordered in either a Negative or Positive polarity.

## DIMENSIONAL

Length: 4"

Width: 5 7/8"

Height: 1 1/4"

## MECHANICAL:

Mounting: Four built-in standoffs for screw mounting.

Connections: A large terminal block is provided to connect power to the board and plug-in connectors are provided for input and output connections.

## ELECTRICAL

Power Supply: Operates on typical regulated organ power between 12-28VDC.

## CAPABILITIES

- Reversible Stop Mode: Each of the piston inputs operates its respective stop output independently. When a piston is pressed the stop is toggled to the alternate state, On to Off or Off to On. The stop outputs are momentarily pulsed for a settable duration.
- Associate Operation: This function only works on reversible stop pairs (1 & 2, 3 & 4). When enabled if both paired stops are on and one of the pair is turned off then the other stop will go off with it. For instance if Stop-1 and Stop-2 are on and piston-2 is pressed both stops will be turned off.
- Latching Reversible Mode: Each of the piston inputs operates its respective output independently. The first time a piston is pressed its corresponding outputs will be turned on. These outputs will remain latched on until the piston is pressed again at which time the corresponding outputs will be turned off.
- Step Operation: This function only works on latching pistons pairs (1 & 2, 3 & 4). When enabled only one of the stepped pistons can be on at a time. For instance if piston-1 is on and piston-2 is pressed the outputs for piston-1 will turn off and the outputs for piston-2 will turn on.
- General Cancel: When this piston (GC) is pressed all latched outputs and stops that are on will be turned off.
- Output Pulse Time: The output pulse time is settable from 0.1Sec to 0.6Sec. in 0.05Sec increments. Hold down the GC piston and apply power to the organ to enter this mode. To exit this mode turn off the organ, wait until power has fully decayed (approximately 1 minute), and turn the organ back on; normal operation will resume. Once entering the Pulse Time Set mode the stop outputs will toggle On/Off with every piston push. Every time the GC piston is pressed the pulse time will increment by 0.05Sec.. Once the desired pulse time has been achieved simply exit this mode by turning off the organ for 1 minute the pulse time will automatically be remembered.

## LS5610I PISTON INTERFACE BOARD

### FEATURES

- Supports either a negative or a positive piston feed
- Non-multiplexed piston inputs use a single piston feed to connect to standard piston wiring.
- Multiplexed piston outputs as required by the LS5608 Combination Action System

### SYSTEM DESIGN INTENT

The LS5610I was designed as a companion board for the LS5608 when there is a need to retain a single piston feed or it is impractical to multiplex the divisional and general pistons. All of the LS5608 pistons can be routed through this board.

### DIMENSIONAL

Length: 10 1/2"

Width: 3 3/4"

Height: 3/4"

### MECHANICAL

Mounting: 5 built-in standoffs for screw mounting.

### CONNECTIONS

All connections via plug-in connectors on the board for ease of installation.

### ELECTRICAL

Power Supply: Operates on standard regulated organ power.

Piston Inputs: Inputs will operate from either positive or negative stop sense connections. No multiplexing of pistons required.

Piston Outputs: Exact connections to the LS5608 are provided. All multiplexing and voltage conversions are performed within the LS5610I. See page 3-7 in Section 3 "System Wiring" for wiring instructions.

## SFZ56 SFORZANDO CONTROLLER

### FEATURES

- 56 DIP switch programmable Stops Outputs
- Built-in Fuse protection for DC circuitry
- Outputs fused at 4Amps
- Available with either Negative or Positive Stop Senses
- Power Indicator
- Test Indicator
- Sforzando LED indicator output connector
- 12-24VDC operation
- 4-24VDC input operation

### DESIGN INTENT

The SFZ56 board provides a blind sforzando that including up to 56 stops. The SFZ56 is designed to be used with Syndyne's Combination Actions (but might be suitable for other systems too) when a sforzando is not available in the keying system. It is possible to expand the number of stops beyond 56 by adding additional SFZ56 boards.

### MECHANICAL

Length 12"

Width 2-1/4"

Height 1-1/4"

### MOUNTING

1/4" PCB standoffs are provided for screw mounting using a #6 screw.

### ELECTRICAL

Power Supply: A standard regulated DC power supply between 12-24 volts is required to power the board. SFZ Input current at 15VDC is approximately 0.0015Amps. Current draw with all outputs off is approximately 0.050Amps.

Stop Lines: The Sforzando stop lines are fused at 4Amps Each Stop Sense output is capable of switching 0.600Amps at a maximum voltage of 28VDC.

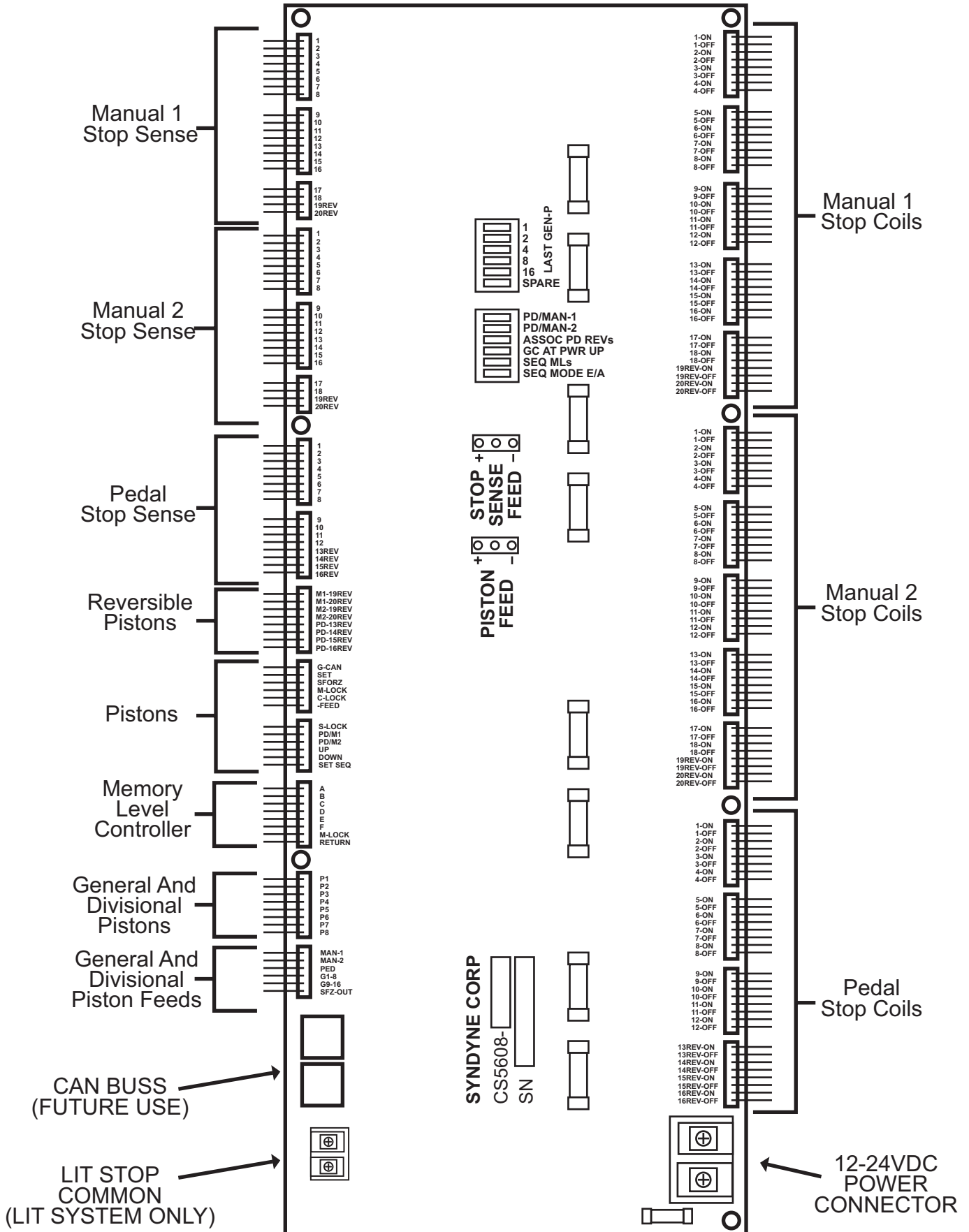
### CONNECTIONS

Connectors or Terminal Blocks are provided for all connections. See page 3-7 in Section 3 "System Wiring" for wiring instructions.

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# Cs5608 BOARD PIN LAYOUT





# OVERVIEW

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This section explains the wiring done within the console. Syndyne strongly recommends reading Section 1: "System Overview," completely and the operation of each board be understood before proceeding with this section. After mounting the boards in suitable locations route power and feeds then wire the inputs and outputs per design requirements. Compliance with local codes and NEC (National Electric Code) guidelines in determining wire sizes is strongly recommended. Additional consideration maybe necessary to eliminate excessive voltage drops in wiring. See Appendix A "Soldering Tips" for soldering techniques.

## POWER

- Only clean regulated 12-24VDC power supplies should be used.
- If it is permissible with local codes we recommend not connecting any negative terminals to earth ground; this is to minimize the risk of damage due to a direct lightning strike.
- Daisy chaining of power connections is not recommended. Each board's power and chest returns should be routed individually to a common buss.
- **Due to risk of accidental shorting wires should never be routed beneath boards.**

## FUSING

The use of fuses to protect all electrical circuits from accidental shorting and compliance with local NEC (National Electric Code) guide lines is highly recommended.

## BOARD LAYOUT SUGGESTIONS

Syndyne system boards can be mounted in many different locations, with different spacings and layouts. Syndyne offers wiring solutions that prewire boards to customer specifications. The majority of these installations follow similar specifications. The syndyne wiring team studied these similarities to offer suggestions on board layout. Syndyne suggests that all boards be spaced at least 1/2" on edges without connectors and at least 2" for edges with connectors. This will leave sufficient room for wiring to exist between boards. It also provides enough room in the event that additional wires must be added after original wiring has been completed. Providing enough room prevents mistakes such as routing wires underneath boards.

# WIRING STOPS AND SETTING STOP FEED

The CS5608 System is capable of driving 56 stops in 3 divisions. There are 20 stops in each of two manuals and 16 stops in the pedal. The last two Inputs in each manual and the last four inputs in the pedal can be used to accommodate reversible stops. If more stops are needed in any division, the Syndyne CS2464 Combination Action system must be used instead of the CS5608.

## WIRING STOP SENSE

Wire the stop sense lines from your stop controls directly into the stop sense inputs on the CS5608. Begin by wiring the stop sense output of the first stop to Pin "1" of the desired Division on the CS5608. Wire the stop sense output of the second stop in that division to Pin "2". Continue this process until the last stop in that division is wired. A picture depicting the Stop Sense inputs is included in figure 3.1 "StopSenseInputs."

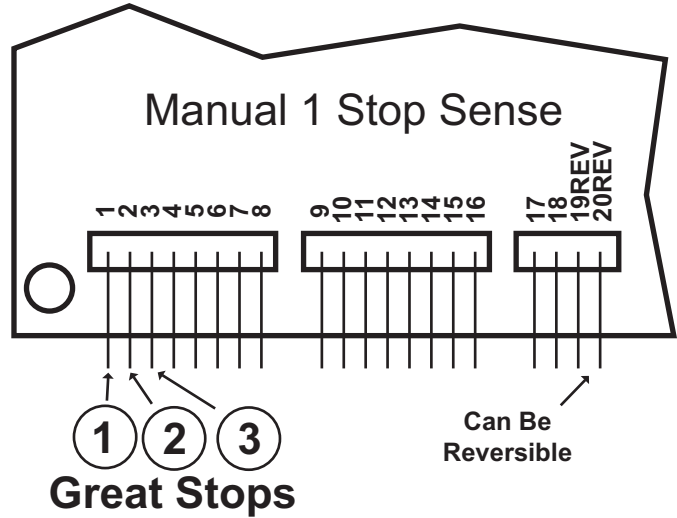


FIGURE 3.1 "STOPSENSEINPUTS"

## REVERSIBLE STOPS

Inputs 19 and 20 in each manual and inputs 13, 14, 15, and 16 in the pedal are capable of being activated by a reversible piston. If reversible stops are desired, and not all Input Pins are used, skip the upper Inputs and wire the reversibles to the appropriate pins.

## WIRING STOP COILS

Wire the On and Off Coils from the stops directly to the stop coil outputs on the CS5608. Begin by wiring the On coil of the first stop to the "1-ON" Pin and the Off coil of the first stop to the "1-OFF" Pin in the desired division. Wire the On and Off coils of the second stop in that division to Pin "2-ON" and "2-OFF." Continue this process until the last stop in that division is wired. Be sure the stop wired to the Manual 1 Stop Coil "1-ON" and "1-OFF" Pins is the same stop wired to the Manual 1 Stop Sense "1" Pin. A picture of the Manual 1 Stop Coil Outputs is included in Figure 3.2 "StopCoilOutputs"

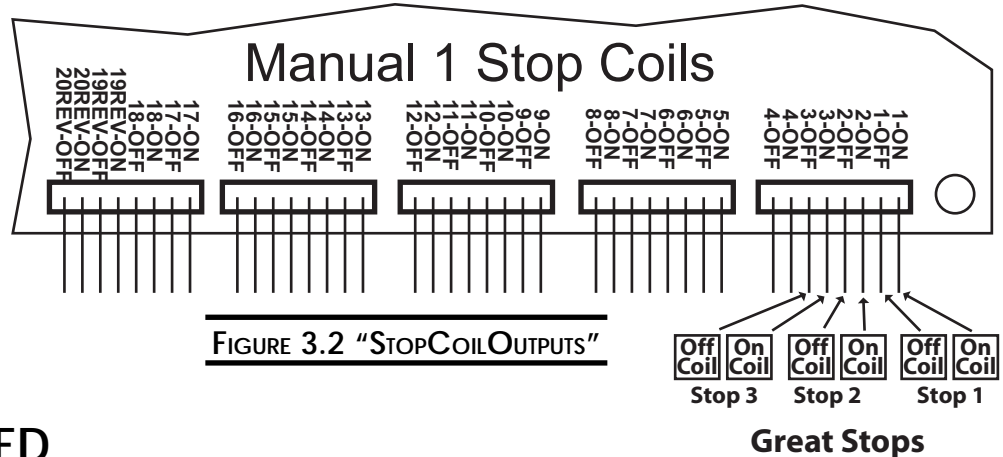


FIGURE 3.2 "STOPCOILOUTPUTS"

## SETTING STOP FEED

Set the stop sense jumper to the correct polarity. If the jumper is covering the middle pin and the pin on the side marked "+", the stop sense will be positive. If the jumper is covering the middle pin and the pin on the side marked "-", the stop sense will be negative. Figure 3.3 "StopSensePolarity" shows both settings.

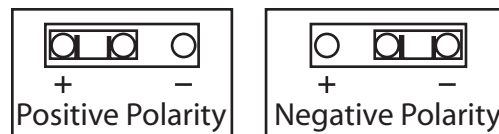


FIGURE 3.3 "STOPSENSEPOLARITY"

# WIRING PISTONS AND SETTING PISTON FEED

## SYNDYNE PISTONS

Syndyne Lit Pistons have five different terminals. They have two lamp terminals, one feed terminal, and two contact terminals. Unlit syndyne pistons do not include the two lamp terminals. Syndyne Pistons have two levels of contact. The first level is activated when the piston is lightly pressed, and the second level is activated when the piston is pressed all the way down. If only one contact is needed, it is recommended that the second contact be used. Figure 3.4 "SyndynePiston" contains a diagram of a syndyne lit piston.

Bottom of Syndyne Lit Piston

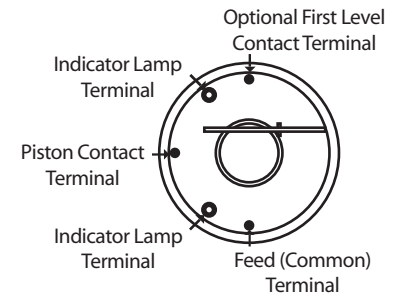


FIGURE 3.4 "SYNDYNEPISTON"

## WIRING GC, SET, AND SPECIAL PISTONS

Wire the piston contact terminal to the respective terminal on the CS5608 Board. The available special pistons are shown in figure 3.5 "PistonContacts." The "G-CAN" Pin is for the general cancel piston, "SET" is for the set piston, "SFORZ" is for the sforzando piston, "M-LOCK" is for the memory lock, and the "C-LOCK" is for the crescendo lock. The "S-LOCK" Pin is for the sforzando lock. The "PD/M1" Pin and "PD/M2" Pin are for a stop or switch that will allow pedal stops to be set on Manual 1 or 2 divisional pistons, see page 3-9 in this section for more information. The "UP" Pin is for the up (next) piston used in piston sequencing, "DOWN" is for the down (previous) piston used in piston sequencing, and "SET SEQ" is for the set sequence piston used in piston sequencing. Wire the piston feed to a power source with the correct polarity. The two "-FEED" terminal on the CS5608 is only used for negative common. When positive is needed, wire directly to the positive side of the CS5608 main power terminal or to positive side of the power supply with proper fusing.

GC, Set, and Special Pistons

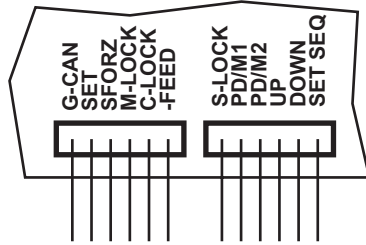


FIGURE 3.5 "PISTONCONTACTS"

## SETTING PISTON FEED (COMMON)

Set the polarity of the piston feed (common) by placing the jumper as shown in figure 3.6 "PistonFeedPolarity." **When using an LS56101 Piston Interface Board the CS5608 must be set for negative piston feed.**

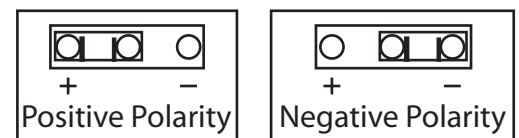


FIGURE 3.6 "PISTONFEEDPOLARITY"

## Reversible Piston Inputs

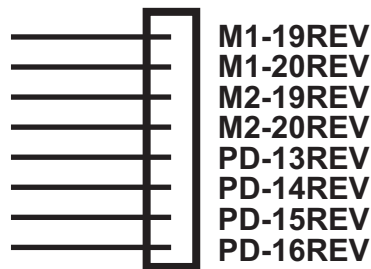


FIGURE 3.7 "PISTONFEEDPOLARITY"

## WIRING REVERSIBLE PISTONS

The CS5608 has 2 reversible pistons in each manual and 4 reversible pistons in the pedal. The piston wired to the "M1-19REV" Pin will reverse the stop connected to the Manual 1 "19REV" Pin. The piston wired to the "M1-20REV" Pin will reverse the stop connected to the Manual 1 "20REV" Pin. The piston wired to the "M2-19REV" Pin will reverse the stop connected to the Manual 2 "19REV" Pin. If a stop connected to the reversible Pins is a normal stop and not intended to be reversible, do not connect a piston to the corresponding reversible piston input.

# WIRING GENERAL AND DIVISIONAL PISTONS

When using an LS5608 the general and divisional pistons are Multiplexed. For more information on Multiplexing see Appendix B "Multiplexing." Wire the feed from Manual 1 to the "MAN 1" Pin. Wire the feed from Manual 2 to the "MAN 2" Pin. Wire the feed from the Pedal to the "PED" Pin. Wire the feed from Generals 1-8 to the "G1-8" Pin. Wire the feed from Generals 9-16 to the "G9-16" Pin. Wire the multiplexed outputs from the first pin in each group to the "P1" Pin. Wire the multiplexed outputs from the second piston in each group to the "P2" Pin. Figure 3.8 "Multiplexed Pistons" below shows the pins on which to wire the multiplexed feeds and outputs. When using the LS5600K Keying system and the CS5608, the feed from general pistons 1-8 is also connected to the "GEN-1" Pin on the LS5600K and the feed from general pistons 9-16 is also connected to the "GEN-2" Pin on the LS5600K Board. Multiplexed outputs are connected to LS5600K Pins "P1" thru "P8" just as they are on the CS5608 Board. When using the LS5600K System in conjunction with an CS5608 Combination Action, the general pistons are wired to both the LS5608 and the LS5600K in order to set transposer levels and MIDI Patch Changes to general pistons. If these two features are not needed, then there is no need to wire the general pistons to the LS5600K Board.

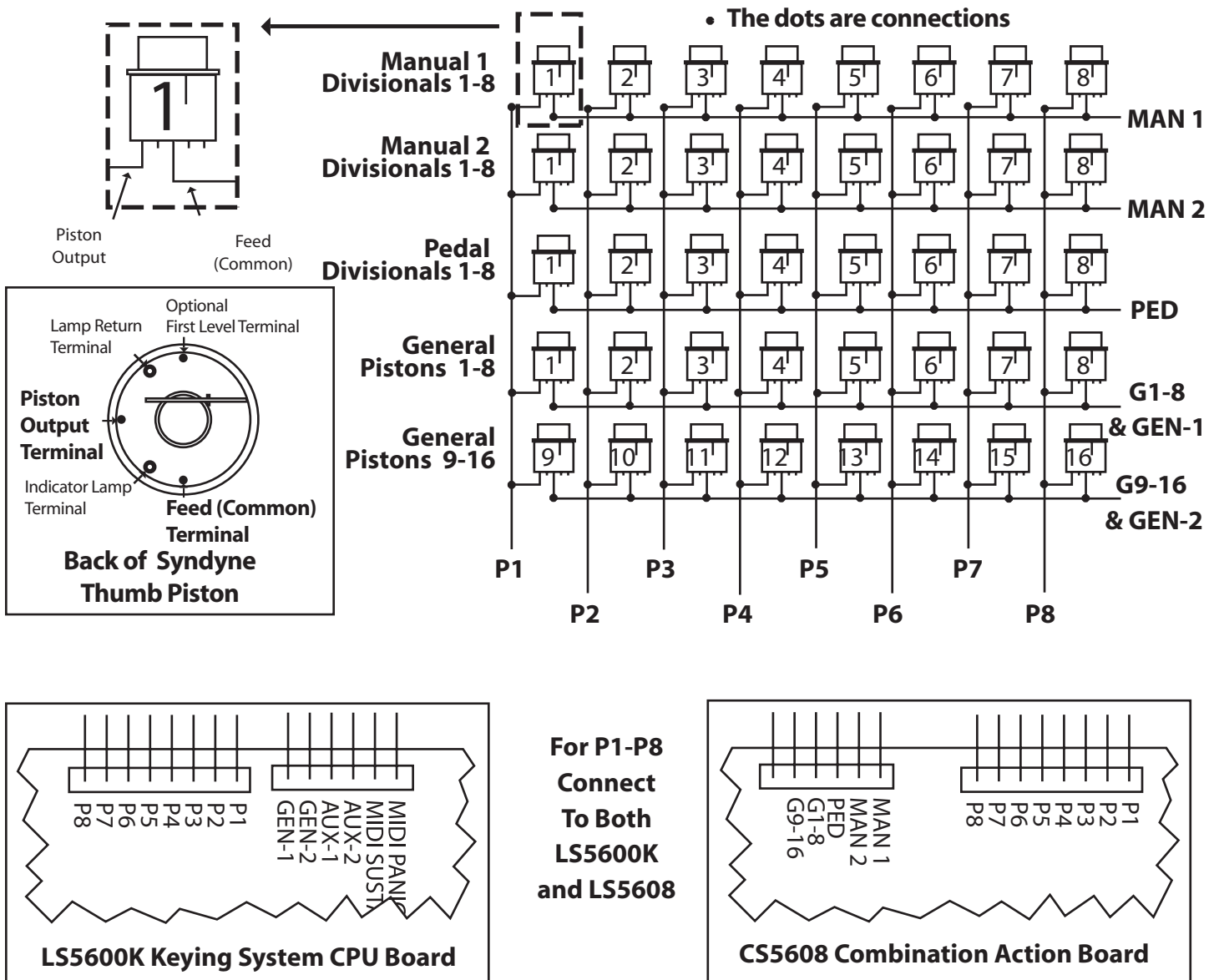


FIGURE 3.8 "MULTIPLXEDPISTONS"

# WIRING PISTONS USING AN LS5610I PISTON INTERFACE BOARD

The general and divisional pistons on the CS5608 are normally multiplexed. If there is a need for the pistons to be wired straight rather than multiplexed, an LS5610I Piston Interface Board can be used. Wire the pistons directly to the LS5610I. Inputs "M1 1" through "M1 8" are for the manual 1 pistons 1-8. Inputs "M2 1" through "M2 8" are for the manual 2 pistons 1-8. Inputs "PD 1" through "PD 8" are for the pedal pistons. Inputs "GN1" through "GN16" are for generals 1-16. Inputs "M1 REV1" through "PD REV4" are for reversible pistons. For more information on reversible pistons see page 3-5 in this section. The general cancel, set, and other specialty pistons are wired to the pins labeled "GC," "SET," "SFZ," "MEM PROTECT," and "CRES LOCKOUT." Please note that Pin 4 is for the Memory Protect, Pin 5 is Blank, Pin 6 is for the Crescendo Lockout, and Pin 7 is blank. Pin 8 labeled "SENSE RETURN" is for the piston return. For positive piston feed, connect negative power to the "SENSE RETURN" Pin. For negative piston feed, connect positive power to the "SENSE RETURN" Pin. Connect the pins labeled "To 5608" to the corresponding pins on the CS5608 Board. **When using the LS5610I the piston feed for the CS5608 must be set to Negative.** For more information on setting the piston feed for the CS5608 see page 3-5 in this section. Figure 3.9 "LS5610IWiring" shows the pins used for connecting pistons to the LS5610I and connecting the LS5610I to the CS5608. When using an LS5610I with an CS5608 and an LS5600K, it is best to double wire between the individual general pistons on the LS5610I and the LS5600K rather than double wire between the Multiplexed Outputs on the LS5610I and the LS5600K.

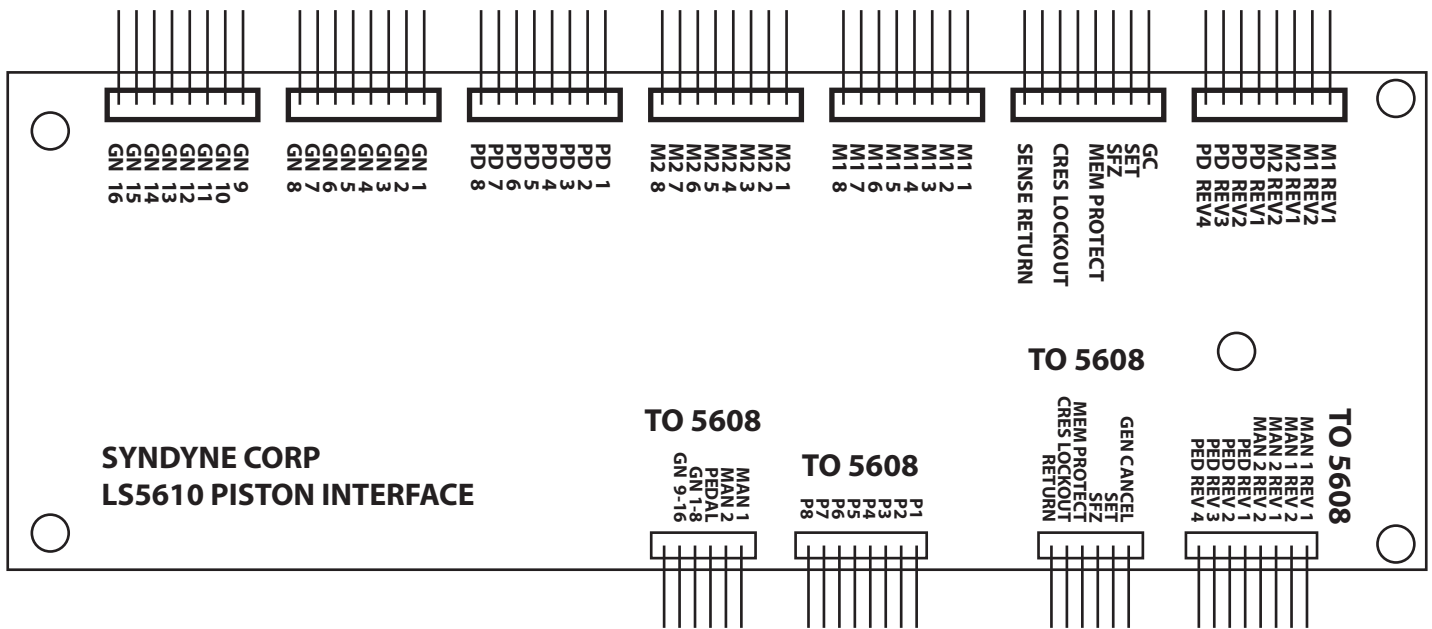


FIGURE 3.9 "LS5610IWIRING"

# WIRING THE SFZ56 SFORZANDO CONTROLLER BOARD

The SFZ Piston Input in the CS5608 board is used to activate and deactivate the SFZ56 Sforzando Controller Board in a reversible fashion. Wire all the Stop Sense Inputs to Pins "1" through "56" on the SFZ56. Wire the "SFZ-OUT" Pin on the CS5608 Board to the "SFZ" Pin on the SFZ56 Board. If desired, an LED can be wired to the "LED+" Pin and "LED-" Pin in order to show whether the Sforzando is active. One of the stop outputs can be used to drive a lamp if a lighted SFZ Piston is desired. Wire one side of the lamp to the stop output and the other side to a powersupply with a polarity opposite that of the stop sense feed. The onboard DIP Switches correspond with each of the 56 stop inputs on the SFZ56. If one of the stops should play with the Sforzando, set the corresponding DIP Switch to "ON." If one of the stops should not play with the Sforzando, set the corresponding DIP Switch to "OFF."

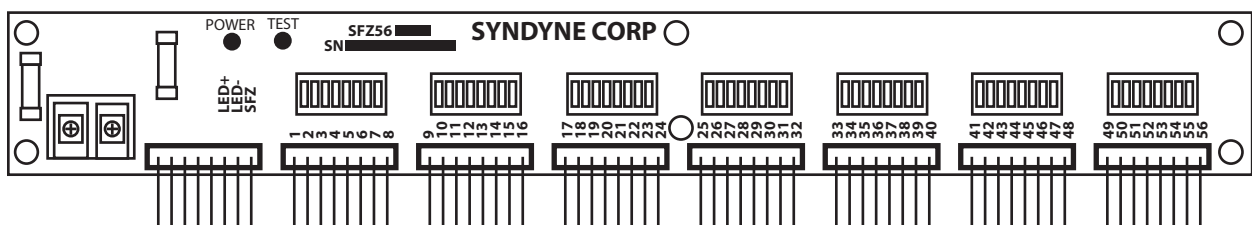


FIGURE 3.10 "PISTONFEEDPOLARITY"

# WIRING THE MEMORY LEVEL CONTROLLER

The CS5608 has 64 memory levels, and will work with the LS12MS, LS64MS, LS32EMS, LS64EMS, or the LS2403K.

## WIRING USING THE LS2403K CONTROL PANEL

Wire from the CS5608 Pins "A" through "F" to the LS2403K Control Panel Pins "A" through "F." Wire the CS5608 Pin "M-LOCK" to the LS2403K Pin "H." The LS2403K will commonly be used in conjunction with an LS5600K Keying System. It is possible to configure the LS2403 to operate as only a memory level controller without an LS5600K. See figure 3.11 "LS2403KWiring" for a wiring diagram.

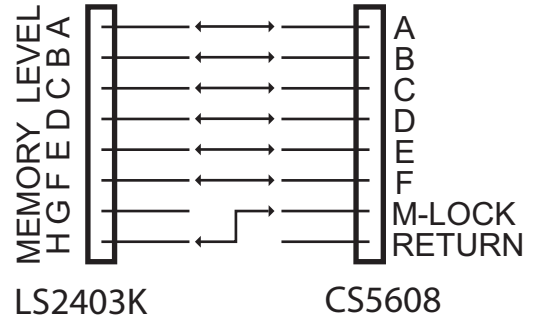


FIGURE 3.11 "PISTONFEEDPOLARITY"

### LS12MS TO CS5608

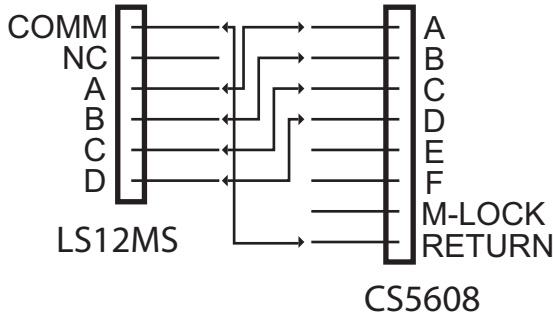


FIGURE 3.12 "PISTONFEEDPOLARITY"

## WIRING THE LS12MS

Wire from the CS5608 Pins "A" through "D" to the LS12MS Pins "A" through "D." The CS5608 Pins "E" and "F" are not used with the LS12MS. Wire the CS5608 Pin "RETURN" to the LS12MS Pin "COMM." See figure 3.12 "LS12MSWiring" for a wiring diagram.

### LS64MS TO CS5608

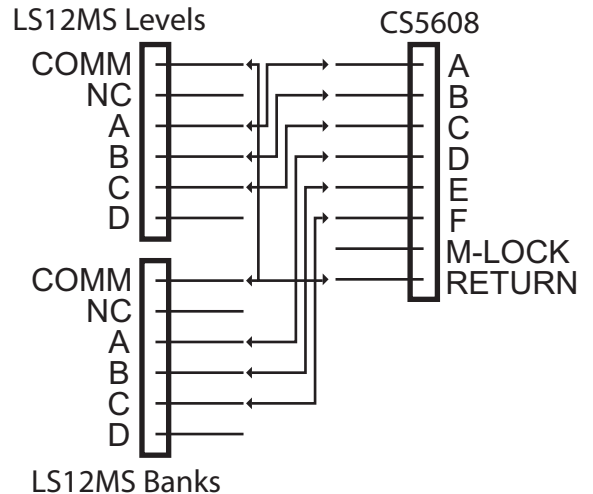


FIGURE 3.13 "PISTONFEEDPOLARITY"

## WIRING THE LS64MS

The LS64MS uses 8 memory levels with 8 banks. Each of the 8 banks holds 8 memory levels. The banks are controlled by the left rotary switch and the memory levels are controlled by the right rotary switch. Wire the CS5608 Pins "A", "B", and "C" to the LS64MS Memory Level Switch Pins "A", "B", and "C". Wire the CS5608 Pins "D", "E", and "F" to the LS64MS Memory Bank Switch Pins "A", "B", and "C". Wire the CS5608 Pin "RETURN" to both the LS64MS Memory Level Switch Pin "COMM" and the "LS64MS" Memory Bank Switch Pin "COMM". See figure 3.13 "LS32-64EMSWiring" for a wiring diagram.

### LS32/64EMS TO CS5608

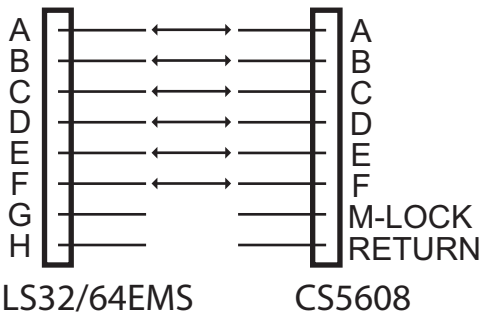


FIGURE 3.14 "PISTONFEEDPOLARITY"

## WIRING THE LS32EMS AND LS64EMS

Wire the CS5608 Pins "A" through "F" to the LS32EMS or LS64EMS Pins "A" through "F". The LS32EMS Pin "F" is unused and not required to be wired to the CS5608 Pin "F", but it will not hurt to wire it in case of future additions. See figure 3.14 "LS32-64EMSWiring" for a wiring diagram.

# WIRING THE STOP/SWITCH FOR PEDAL STOPS ON MANUAL 1 OR MANUAL 2 DIVISIONAL PISTONS

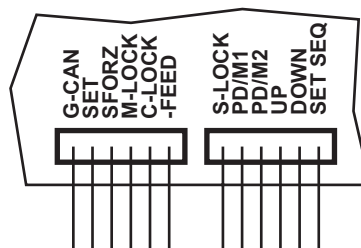
## PEDAL STOPS ON MANUAL - 1 DIVISIONALS

If desired, the pedal stops can be set on the Manual 1 divisional pistons using a stop or switch. Wire a stop or switch to the Input labeled "PD/MAN-1." While this stop input or switch is ON, the pedal stops will be set on the Manual 1 divisional pistons. Figure 3.14 depicts the location of the input used to wire the stop or switch. There is also a DIP switch that will permanently turn on this function and the stop or switch input will no longer work. For more information on this DIP switch see page 4-2 in "System Programming."

## PEDAL STOPS ON MANUAL - 2 DIVISIONALS

If desired, the pedal stops can be set on the Manual 2 divisional pistons using a stop or switch. Wire a stop or switch to the Input labeled "PD/MAN-2." While this stop input or switch is ON, the pedal stops will be set on the Manual 2 divisional pistons. Figure 3.14 depicts the location of the input used to wire the stop or switch. There is also a DIP switch that will permanently turn on this function and the stop or switch input will no longer work. For more information on this DIP switch see page 4-2 in "System Programming."

### GC, Set, and Special Pistons



**FIGURE 3.14 "PEDALSTOPS2MANUALS"**

SYNDYNE CORPORATION

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# SYSTEM PROGRAMMING

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PEDAL STOPS ON MANUAL - 2 DIVISIONALS .....	4-2
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PISTON SEQUENCER MODE E/A .....	4-3
LAST GENERAL PISTON NUMBER FOR PISTON SEQUENCER.....	4-3

# PROGRAMMING THE CS5608

## PEDAL STOPS ON MANUAL - 1 DIVISIONALS

If desired, the pedal stops can be set on the Manual 1 divisional pistons by setting the DIP Switch labeled "PD/MAN-1" to the ON position. If not, make sure the switch is set to the OFF position. This function can also be controlled using a stop or switch connected to the input labeled "PD/MAN-1." However, if the DIP switch is ON, the pedal stops will always be set on the Manual 1 divisional pistons and the "PD/MAN-1" input will not be operational. If this function is to be controlled by the "PD/MAN-1" input the DIP Switch should be set to OFF. Figure 4.1 "FunctionDIPSwitches" depicts the location of this switch.

## PEDAL STOPS ON MANUAL - 2 DIVISIONALS

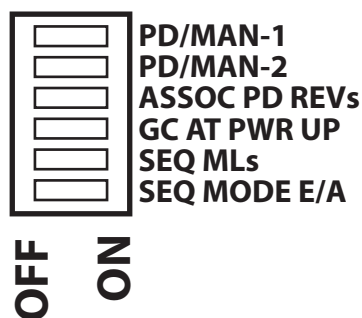
If desired, the pedal stops can be set on the Manual 2 divisional pistons by setting the DIP Switch labeled "PD/MAN-2" to the ON position. If not, make sure the switch is set to the OFF position. This function can also be controlled using a stop or switch connected to the input labeled "PD/MAN-2." However, if the DIP switch is ON, the pedal stops will always be set on the Manual 2 divisional pistons and the "PD/MAN-2" input will not be operational. If this function is to be controlled by the "PD/MAN-2" input the DIP Switch should be set to OFF. Figure 4.1 "FunctionDIPSwitches" depicts the location of this switch.

## ASSOCIATION OF PEDAL REVERSIBLE STOPS

If the pedal reversible pistons should be associated, set the DIP Switch labeled "ASSOC PD REV's" to the ON position. If not, make sure the switch is set to the OFF position. This function associates the pedal reversible stops in two pairs (13/14 and 15/16). If either the 13 or 14 reversible piston is reversed OFF, it will turn off its associated partner stop. If either the 15 or 16 reversible piston is reversed OFF, it will turn off its associated partner stop. Figure 4.1 "Function-DIPSwitches" depicts the location of this switch.

## GENERAL CANCEL AT POWERUP

If the organ should perform a general cancel at power up, set the DIP Switch labeled "GC AT PWR UP" to the ON position. If not, make sure the switch is set to the OFF position. Figure 4.1 "FunctionDIPSwitches" depicts the location of this switch.



**FIGURE 4.1 "FUNCTIONDIPSWITCHES"**

## PISTON SEQUENCER THROUGH MEMORY LEVELS

If the piston sequencer should sequence through memory levels then switch set the DIP Switch labeled "SEQ MLS" to the ON Position. If the piston sequencer should not sequence through memory levels, set the DIP Switch labeled "SEQ MLS" to the OFF Position. Figure 4.2 "FunctionDIPSwitches" depicts the location of this switch.

## PISTON SEQUENCER MODE EUROPEAN/AMERICAN

This switch is for future use. Figure 4.2 "FunctionDIPSwitches" depicts the location of this switch.

## LAST GENERAL PISTON NUMBER FOR PISTON SEQUENCER

When using the CS5608 Combination Action the last General Piston being used must be set using the Onboard DIP Switches on the CS5608. Turn on the combination of switches which equals the correct number of the last general piston being used. For example, if the last general piston being used was general piston 13 Switches "1," "4," and "8" would be turned on. Figure 4.3 "LastGeneralPiston" depicts the set of DIP Switches on the CS5608

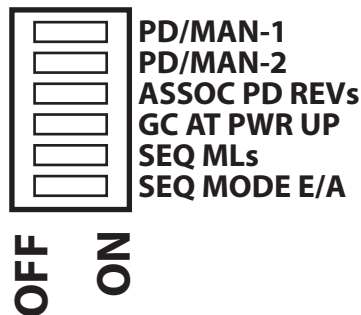


FIGURE 4.2 "FUNCTIONDIPSWITCHES"

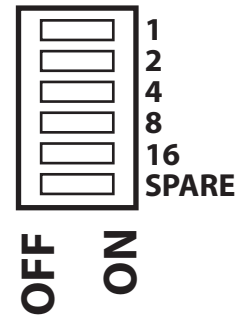


FIGURE 4.3 "LASTGENERALPISTON"

## SETTING THE PULSE TIMING

The CS5608 is factory set with a 0.1 seconds pulse time. This pulse time is adequate to drive the majority of stop controls on the market today. The pulse time can be made longer or shorter to accommodate older and weaker stop controls or a need for more rapid movement through piston combinations. The pulse time can be adjusted between 0.1 seconds and 0.6 seconds in 0.05 second increments. The following procedure will set the pulse time of the CS5608. No combination settings or other system parameters can be changed or erased when following the pulse time changing procedure. This procedure is not meant as a long term alternative to replacing a weak or failing stop control device. This procedure assumes that the system is fully operational prior to the procedure.

1. Start with the a fully functional CS5608 Combination Action Board with the power turned off.
2. Press and hold the general cancel piston while turning on power to the CS5608 board.
3. After the organ power is on and stable release the general cancel piston.
4. Press the general cancel piston to reset the pulse time to 0.1 seconds (can be done any time during this procedure to reset the pulse time to 0.1 seconds).
5. Press any general piston. Half of the stops will have their ON Coil energized and the other half will have their OFF Coil energized for an initial position. Pressing any general piston again will cause the stops to toggle (can be done any time during this procedure to toggle the stops).
6. Press the set piston to add 0.05 seconds to the pulse time. Test operation of all stops at the new pulse time by pressing any general piston. Press the set piston to add another 0.05 seconds. Test operation of all stops at the new pulse time by pressing any general piston. Continue until all stops are working properly. If 0.6 seconds is reached and the set piston is pressed again, the pulse time returns to 0.1 seconds.
7. When the optimum pulse time has been set, restore the CS5608 to normal operation by cycling the power off then on. Be sure that the power is left off long enough to allow the voltage at the CS5608 board to discharge to 0.5 volts. Some power supplies may take several minutes to discharge their capacitors.

If the maximum pulse time of 0.6 seconds is reached and a stop is not operating properly, that stop should be replaced. If all stops are not operating properly at 0.6 seconds the organ rectifier output voltage may be too low. If the rectifier has an adjustable output, raising the output voltage may cause weaker stop controls to operate satisfactorily. Only raise voltage in small steps, testing stop response at each step.

**DO NOT ADJUST ORGAN RECTIFIER ABOVE RECOMMENDED VOLTAGE LEVEL FOR ANY OF THE EQUIPMENT ATTACHED TO THE RECTIFIER, INCLUDING THE RECTIFIER ITSELF.**

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# APPENDIX A: SOLDERING TIPS

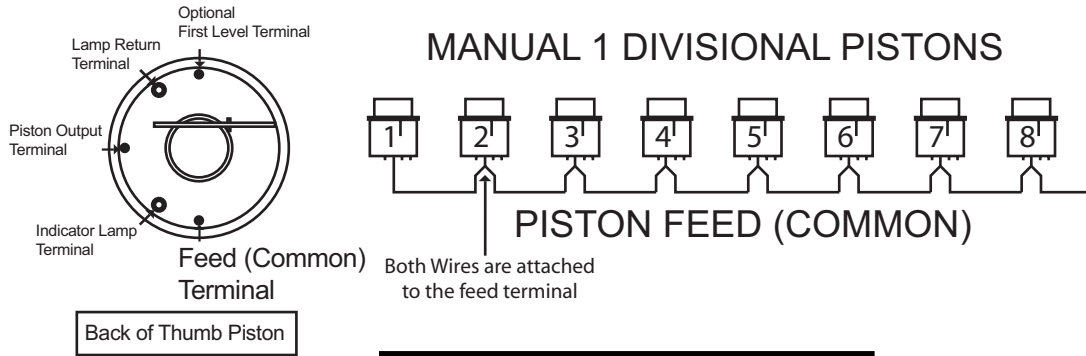
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Wiring the CS5608 can be quick and easy if the proper technique becomes familiar. Although there are many ways to make a solder joint, the wiring team at Syndyne has found a simple method that provides a quality connection as quickly as possible. It is important to remember that as with anything else in life, soldering becomes easier with practice, so it is best not to become discouraged if the process seems difficult in the beginning. Here is the syndyne wiring team's suggested soldering method. Also please keep in mind that syndyne offers full wire harnessing services for those who do not want to wire the system themselves.

1. Strip the wire or wires that will be used in the solder joint.
2. Place shrink tube on the wire(s) as far away from the bare end of the wire as possible. When soldering, the wire heats up close to the solder joint, and this heat can shrink the shrink tube before it is ready to cover the joint.
3. Use a damp sponge to clean any old solder from the tip of the soldering iron before tinning.
4. Apply some solder to the tip of the soldering iron and place the solder from the tip of the iron to both the bare end of the wire(s) and the connector terminal. This process is called pretinning and is highly recommended for increased speed, accuracy, and joint integrity.
5. Use a damp sponge to clean any old solder from the tip of the soldering iron.
6. Apply solder to the tip of the soldering iron.
7. If single soldering, hold the pretinned wire on the pretinned connector terminal. If double soldering, hold both pretinned wires parallel with each other. Hold both wires on the pretinned connector terminal.
8. Place the tip of the iron on the connector end of the bare wire(s).
8. Once the solder flows over the connection, run the iron over the wire up to the shielded end of the stripped wire. Do not touch the wire shielding with the iron or it may melt.
9. Let the solder joint cool and test its integrity by pulling lightly on both the connector and the wire in opposite directions.
10. Do not pull shrink tube over the solder joint at this time. First, complete all wiring to the connector then pull up and heat the shrink tube for each solder joint all at the same time. Otherwise, the shrink tube from one wire can get in the way when soldering the wire next to the shrink tube.

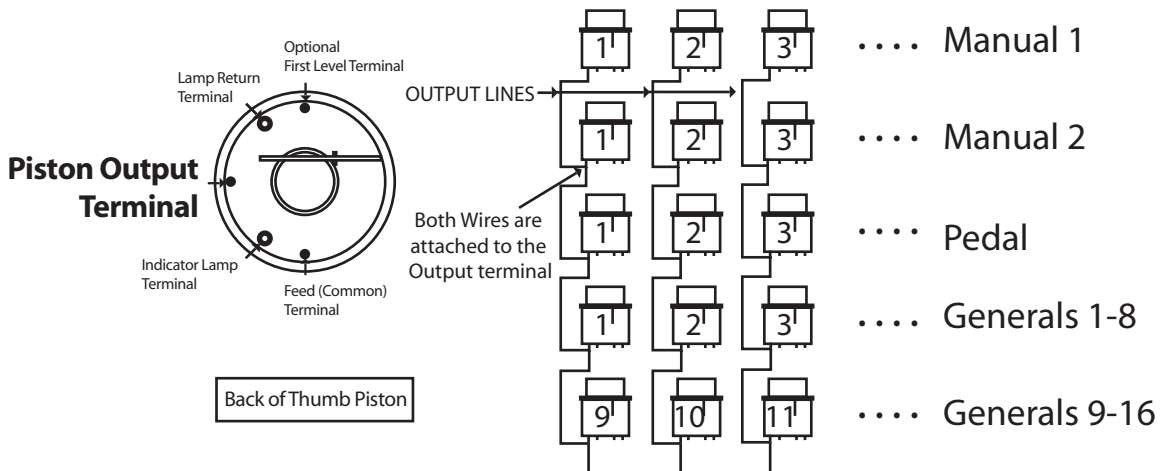
# APPENDIX B: MULTIPLEXING

Multiplexing can be a difficult concept to grasp. This section attempts to make multiplexing more understandable. Multiplexing is used to save space and lower costs by reducing the amount of components used. This helps keep Syndyne systems more compact and affordable. In essence, multiplexing the pistons breaks the piston feed into five smaller feeds. One feed each for the Manual 1, Manual 2, Pedal, Generals 1-8, and Generals 9-16 pistons. Figure AP.1 "MultiplexingFeed" shows an example of this using the feed for Manual 1.



**FIGURE AP.1 "MULTIPLEXINGFEED"**

When multiplexing, the piston outputs are no longer individually wired. Instead, the outputs are wired piston to piston similarly to the piston feed. However, the first piston from each group is wired together rather than all the pistons in that group. So the first piston from Manual 1, the first from Manual 2, the first from the pedal, the first from generals 1-8, and the first from generals 9-16 are all wired together. Figure AP.2 "MultiplexingOutputs" exemplifies this process.



**FIGURE AP.2 "MULTIPLEXINGOUTPUTS"**

A picture depicting a finished set of all 5 groups of pistons is included in the Wiring Section under "Wiring Pistons" This picture also explains where each of the feeds and outputs connect to the CS5608 System.