

# MULTILEVEL CAPTURE SYSTEM

MultiLevel Capture System

Installation Guide

MLC - 02

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## MLC - 02 Installation Instructions



The MLC - 02 is the very latest technology in Capture Systems from Solid State Logic, designed to satisfy popular demand for a compact but versatile system suitable for the smaller organ.

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## Summary of Features

Unlike previous systems the maximum specification for MLC - 02 is fixed. However, within these limits the versatility of the system is beyond anything so far available.

2 levels or channels.

24 pistons & reversers that may assigned in any way to Generals or Divisional pistons.

32 stops including couplers.

General cancel.

Set.

Adjustable hold time (0.3 seconds / 0.9 seconds)

Test mode - moves every stop on & then off in sequence. Allows all stop connections to be verified.

On Site Configuration - all pistons can be configured to affect any number of stops i.e. generals, divisional, great reeds, etc.

Each piston can also be configured to act as a reverser for any stop.

SCOPE input allows the organist to change the Scope (affected stops) of any piston.

SCOPE input allows any stops to be neutralised on any piston.

A Lock switch can be used to prohibit access to second level, or to prohibit use of SET switch.

SSL Silent Piston Transfer Relay

These solid state relays come in several forms and are suitable for most piston transfer functions including:-

- Great and Pedal pistons coupled
- Generals on Swell toe pistons
- Pedal on Swell pistons

## Considerations before cutting holes in the console!

To those of you familiar with installing capture systems this system will be very straight forward. However, there are as always, a few things to be decided before reaching for the tools.

The system will operate a total of 32 stops, which includes couplers and tremulants.

The system has inputs for 24 pistons/reversers plus master functions SET, SCOPE, and General Cancel.

**Consideration One:** This system is provided with a new control known as SCOPE. A decision must be made prior to installation as to whether the organist is allowed access to this control or not. SCOPE allows considerable versatility but because of this it can also set the system into a state where an inexperienced person would be led to believe the system was inoperative!

Please read the section on SCOPE before deciding on a course of action. SSL will of course be happy to advise based on experience.

**Consideration Two:** The SCOPE piston must be operated at the same time as the SET piston, while setting stops.

If the SCOPE piston is on the front of the console it needs to be within the span of one hand from the SET piston.

If the SCOPE piston is mounted inside the console it should be a latching switch to allow the system to be set by one person.

**Consideration Three:** Lock Switches. There are a number of possibilities here.

1. Wiring a lock switch in the feed to the SET and SCOPE pistons. We recommend disabling both, as the SCOPE piston will move stops if pushed on its own and this could be confusing.
2. The lock switch could also be wired in series with the level change switch, this will disable the level change, fixing the system at level 1. If you choose this course, we strongly recommend a lamp to indicate level 2. This will discourage the organist from setting pistons on level 1, thinking that the system is now working at level two.

## Fixing the System into the console:

The system arrives ready to operate, there is no assembly on site and what's more there are no ribbon cables to worry about.

The steel cabinet is fitted with a metal plate attached by 6 fixed bolts, this plate can be removed and attached to the console and the system can then be re-attached to the plate. Obviously the system is intended to be mounted with the hinge vertical, and on the left. The system will operate perfectly in any orientation to suit the space available. It is preferable not to mount the system upside down, as dirt, and possibly water will fall inside and become trapped.

## Damage from static electricity:

We cannot stress too greatly the importance of protecting the system from damage due to static electricity discharges. All modern electronics are sensitive to the charges of static electricity we build up in everyday life, when the components are unprotected by the case they are very vulnerable.

On an ordinary day an average person carries a charge of about 3000 Volts simply by walking through the air. When we touch or even approach a new object we transfer the charge to it. We cannot feel charges as low as 3000 volts. To a microchip it can be fatal. Or worse, it can bruise it, causing it to fail in years to come.

Anyone who tells you otherwise is not informed with current research and quality manufacturing practices.

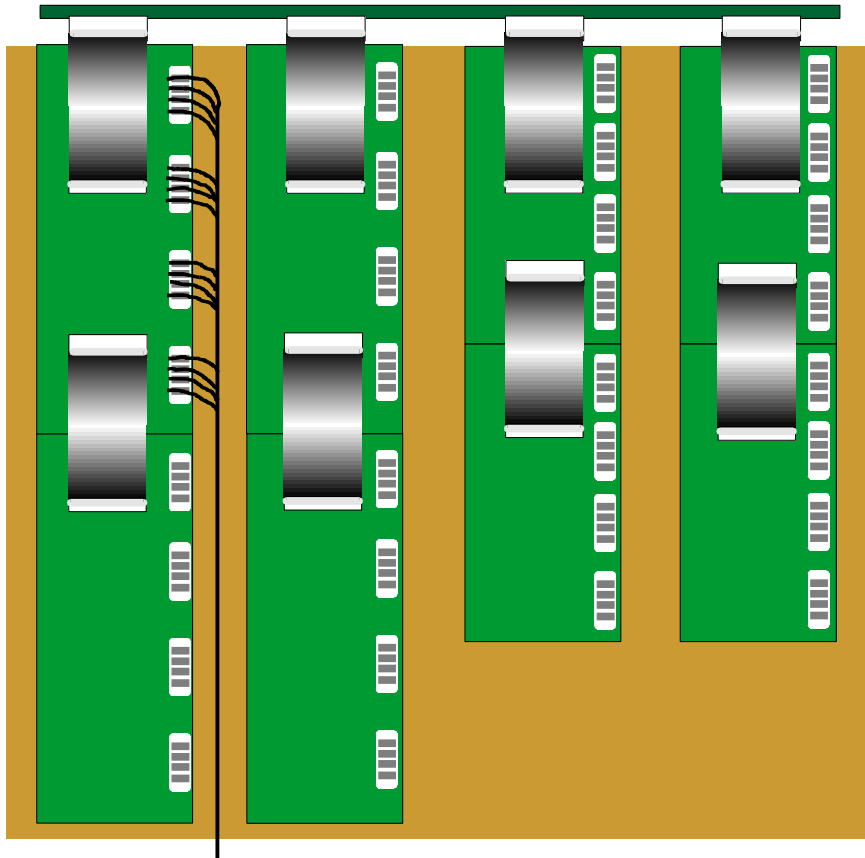
When you open this system, the electronics will have never been touched by anyone who has not been adequately grounded.

### **How do you protect your system?**

The system has been delivered with a disposable wristband. Follow the instructions on the packet. The most important thing is to be at the **same** potential as the system. Connect the wristband to the grounding tab in the system before starting work.

Replacement wristbands are available from SSL.

## Wiring:



All the wiring to the system is inside the box. This keeps the terminations free of dust and helps the system conform to European Union and FCC directives on emission of electromagnetic interference.

The cables must be passed up through the bottom of the box and onto the appropriate connection. A layout of the connections is detailed later in the booklet. The drawing above shows the first 16 pistons wired to the krone connections.

All inputs to the system must be fed from a positive supply.

All outputs from the system must be connected to a positive return.

The actions to the organ are wired directly from the stop switches.

## Power:

The plane is fitted with a pair of terminals to connect to the organ DC supply. This supply must be reasonably stable and free from electrical noise; most commercially available units are suitable. Unlike other SSL products which are limited to a maximum of 24 volts the MLC - 02 will operate over a range between 12 and 36 volts.

The system will not operate satisfactorily from DC supplies which are provided by a rotary generator, as the noise level is far too high and can confuse the system.

The OV or negative of this supply must be connected to the black terminal of the system using a cable of at least 4 mm<sup>2</sup>.

## Use of the Special Wiring Tool:

In order to terminate the system correctly you will require a special insertion/removal tool. The tool supplied is a professional quality tool and should last a lifetime. Spare tools are obtainable directly from SSL or other suppliers. They are manufactured by a European Company called Krone and the part number is 6089 2 030-21. Tools are also available from SSL as part number 80CLAV6C.

**Only use the special tool provided to insert wires. Any other tool may damage the blocks and cause unreliability.**

The tool has a number of functions. It can be used to insert wires or remove them from the blocks. It is also capable of cutting off excess wire if required.

If you wish **to cut off the excess wire**, remove the clip at the bottom of the tool and allow it to hang free on the string. If you wish to link the wire on to another point, make sure the clip is in place and this will prevent the cutters operating. Please be very careful not to allow the wire clippings to fall into the electronics where they may cause damage.

**To insert a wire**, place the wire over the top of the connection block. Insert the tool into the block with the grey plastic part closest to the cable register, and the cutters nearest the components. The small groove in the bottom of the tool should rest on the wire. Push the tool firmly into the block. If the cutters are enabled you will feel and hear a click as the excess wire is trimmed.

**Removing wires** is done with the other end of the tool. At the side is a black metal clip. Pulling this out in the same way as a penknife will reveal the removal tool.

Hook the wire between the block and the cable register and pull the wire out.

## Tips on Wiring

Wiring the MLC - 02 is easier than other capture systems because it is not necessary to select the stops by division prior to wiring. Any stop may be wired to any set of three matching connections in the box. A matching set would be Stop Switch 1, On Coil 1 and Off Coil 1. When the system is configured the divisions will be set.

**Important Notice: Do not test the stop magnets with a negative test lead, without the rectifier feeds being connected to the system. If you do, the system will be damaged.**

To assist those who service the system after you, we have provided a chart at the end of this handbook in which to record the names of the stops wired to each circuit of the system.

There is no need to leave gaps for additional stops. If a new stop is required on the Great after the system has been installed it may simply be added to the first vacant space at the bottom of the columns.

Likewise the pistons are also wired in any sequence that is convenient.

At the bottom of column 1 are the special functions.

### **SET. (Column 1 pin 25)**

The SET piston operates as normal, it takes its feed from the rectifier positive via the SET piston. If you wish to lock the operation of both levels the SET piston will need to be fed via a key switch.

### **General Cancel. (Column 1 pin 27)**

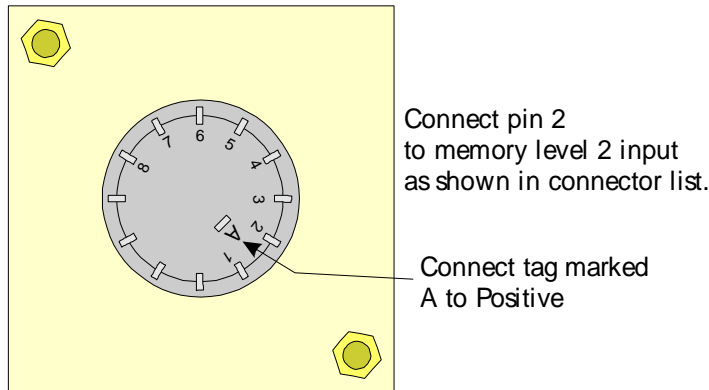
General Cancel will cause the system to send an off signal to all the stops that are drawn. It requires a positive feed from the rectifier.

### **SCOPE. (Column 1 pin 26)**

SCOPE is used to configure the system, a more detailed explanation of this pistons' operation is contained in a special section. For wiring purposes the SCOPE piston is wired to a positive feed.

## Level Switch. (Column 1 pin 28)

The input for a level switch will change the system to memory level 2 when a positive feed is applied. This would normally be fed through a switch on the console. If this level requires to be locked, then a lock switch may be fitted to access level 2. If you have ordered the "console pack" with this system, the level switch will be included. Please follow the directions below.



## Reverser Pistons and associated stops.

Reverser pistons and the stops they control should be wired to the system in the same way as other stops and pistons, but mark the chart at the back of this handbook to indicate that the piston is a reverser.

## Other Special Connections.

This leaves 4 pins un-terminated at the bottom of column 1.

**Pin 29. Extended Hold Time.** This pin will normally be left unconnected, but if the drawstops are slow, or the rectifier is weak, a positive feed to this pin will extend the time current is applied to the stops after a piston is pressed. The time is normally 0.3 seconds and will be extended to 0.9 seconds.

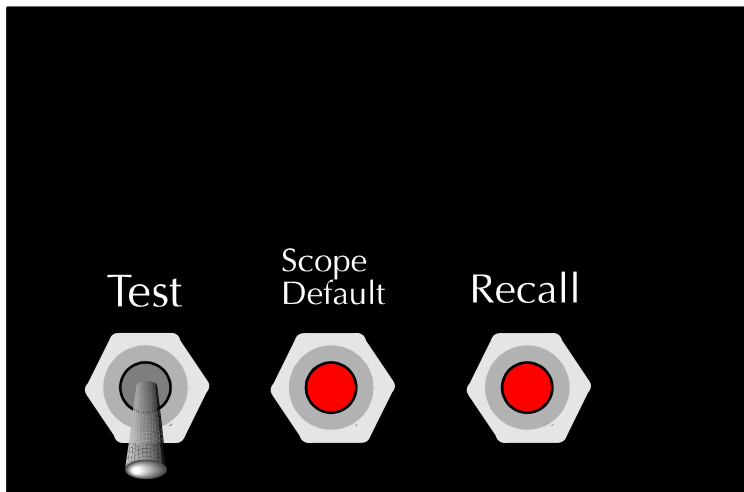
**Pin 30. Clear All Memory.** Not a pin to use lightly! This pin is used in the factory to clear the test patterns from the system prior to shipping. It may be used on site after commissioning, but beware, it clears all the SCOPE settings as well. It is not normally recommended to use this pin. The information is given for the sake of completeness. To operate press SET and then apply a positive to pin 30.

**Pin 31. Test Mode.** A switch is available on the door panel to operate Test Mode. However, the system may also be run in Test Mode by connecting a positive to this pin. Pressing general cancel will start the test program. Each stop will be turned on and off in sequence. This may be used to check for wiring faults. Stops are not moved if the system thinks they are already in the correct position. A stop will not move off if either its off coil or stop switch are not connected. If the test program stops at any stage, pressing general cancel will restart it.

**Pin 32. Configure.** (it is necessary to have read the section on SCOPE for this to make sense)  
When the system is being set up connecting this pin to positive will make the system behave as if SCOPE has been pushed. In addition to the features available with SCOPE, using this pin will copy the set-ups to both memory levels, saving time setting the second level. **Please remove the positive feed to this pin when the organ has been commissioned.**

## Configuration Switches.

On the inside of the door are three switches. These switches are deliberately hidden away because they should only be used with care. Incorrect use will do no physical harm to the system or the organ, but it is possible to lose the memory settings.



**Test:** The test switch allows the wiring to be tested by running through all the stops one at a time in the order they are numbered on the connector list. Pressing general cancel will start the test program. Each stop will be turned on and off in sequence. This may be used to check for wiring faults. Stops are not moved if the system thinks they are already in the correct position. A stop will not move off if either its off coil or stop switch are not connected. If the test program stops at any stage, pressing general cancel will restart it. The service section of this manual covers some typical faults and how they will be discovered using this program.

UP - Test Mode

DOWN - Off

**Scope Default:** The scope facility is very flexible and can allow the organist to set the system in many different ways. It is possible for the original SCOPE settings to become overwritten and confusion to reign. To help solve this problem we have introduced two red pushbuttons. The first of these allows you to store your preferred SCOPE settings in a secret & safe memory location which can then be used to reset the organ at a later stage.

To save the settings of the current level as the default settings for the organ.

1. Press and hold SET.
2. Press Scope Default.
3. Release SET.

**Recall:** If at any stage you wish to copy the settings from the safe location into the current level this can easily be accomplished by pressing Recall. You do not need to press SET.

It is of course possible to use this facility to copy SCOPE settings from one memory level to another.

To copy from Memory Level 1 to Memory Level 2:

Select Level 1

Press SET and Scope Default as above to store the settings.

Select Level 2

Press Recall.

# Wiring Information for Quick Connection Blocks.

The MLC - 02 is supplied with quick connection blocks. The quick connection blocks supplied are of the highest quality available and should not be confused with cheaper alternatives available from other sources. This design has been in use with telecommunications systems throughout the world for over 50 years.

The blocks are arranged in groups of 4 circuits with slots in the top where the wires are inserted.

The quick connection blocks will provide a very fast and extremely reliable connection if a few simple rules are used.

1. There is a limit to the range of wire size that can be used.
2. The special insertion/removal tool supplied must be used.
3. It is not necessary to remove the insulation from each wire.

It is possible to make 60 connections with this system in a little over one minute with very little previous experience.

**Technical Data.**

Stranded Wire Diameter Range.	
Strands / Dia. (mm)	Overall Dia. (mm) Including insulation
7/0.15	1.10
7/0.20	1.20
7/0.25	1.20

Single Wire Diameter.	
Copper conductor mm	0.40 - 0.65 26 - 22 AWG
Over Insulation	0.7 - 1.40 mm

It is possible to use cables outside this specification but this must be checked with your local SSL sales office. Two cables may be inserted into each slot for making parallel connections if required. The two wires should however, be identical. The connection blocks will accept up to 100 re-terminations without damage.

These connectors comply with European and tropical climate tests to 40/92 DIN 50015 and in corrosive industrial or salt laden air to reliability test DIN 40046. They are also suitable for high vibration environments.

## Scope.

There are two ways of installing the SCOPE feature.

1. Using SCOPE purely as a set up facility.
2. The Organist able to use SCOPE interactively.

If the Organist is to use SCOPE then the piston must be fitted on the console where it can be operated by the same hand as the SET piston. If not, then a latching switch inside the console would be helpful when setting up the system. We have supplied the system with two operating manuals, one with SCOPE and one without, for you to distribute as required.

The SCOPE piston adds a new degree of flexibility to the capture system. SCOPE adjusts the "SCOPE" a piston operates over.

This may sound a little complex, consider the difference between a general and a divisional piston. The general piston will alter all of the stops. A great divisional piston will only effect the stops on the great. The SCOPE of the great piston is the stops on the great. Until now the SCOPE of the pistons was fixed by the manufacturer, but advances in technology have allowed SSL to introduce this remarkable feature at an affordable price.

SCOPE used in a similar way to SET, but also it is normally used together with SET.

SCOPE may also be locked, by wiring a lock switch in series with the SCOPE piston.

<b>How to use the SCOPE piston.</b>	
To Set the SCOPE of a piston	Select all the stops to on, that are required to be in the SCOPE of that piston. Push and hold SET. Push and hold SCOPE. Push the piston to be set. Release SET and SCOPE in any sequence.
To check to SCOPE of a piston:	Push and hold SCOPE Push the piston and check which stops are now on.
To set a piston as a reverser.	Set the SCOPE of that piston to be the only the stop required to be reversed. The system will interpret a one SCOPE piston as a reverser.

<p>To set more than one Piston with the same SCOPE. (Setting up a Division)</p>	<p>Select all the stops to on, that are required to be in the SCOPE of the pistons. Push and hold SET. Push and hold SCOPE. Push the pistons to be set, one at a time. Release SET and SCOPE in any sequence.</p>
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## Helpful Hints.

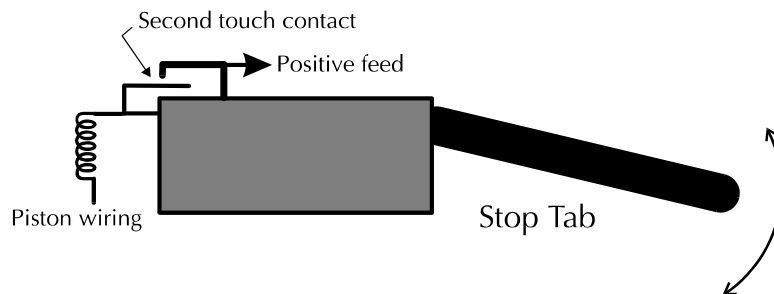
### 1. Setting up a stop tab with second touch using SCOPE.

These instructions apply when a contact has been fitted to the stops to provide a second switched circuit when the stop is moved against a spring pressure.

#### Some assumptions:

1. When activated the second touch cancels a selection of other stops.
2. The stops are arranged in divisions, for simplicity we will study the Great and Swell divisions, but the instructions will work equally well for any group of stops.

#### The wiring:



The second touch switch is wired into a spare piston input on the capture system. The Scope facility allows you to choose any stop that is not wired elsewhere. The function of the piston will be set later.

The second touch switch must provide a positive input to the stop when operated.

The second touch switch outputs normally have the same common for each division. This provides one piston for each division. Sometimes the feed from the second touch switch is taken through a disable switch, this switch will break the feed to the capture system.

## Setting the system.

### *Great Division.*

1. Press General Cancel to clear all stops.
2. Set all Great stops on, (include couplers etc. only if you wish them to be cancelled with a second touch).
3. Press SCOPE (or apply a positive feed to SCOPE input) and hold it on.
4. Press SET and hold it on.
5. Press one of the Great stops down far enough to close the second touch contact.
6. Release SET and the stop tab, in any sequence.
7. Press General Cancel.
7. To check that the SCOPE has been set correctly; with SCOPE still on, (if you have released SCOPE press it again now), press Great stop 1 through to second pressure. All the other Great stops should come on.

If not check the wiring and repeat from stage 1.

8. Now the memories must be set. First press General Cancel.
9. With all Great stops off, press SET and apply a positive feed to the Great second touch piston input as previously wired. Do not move the Great stops to do this.
10. Test the system. Put all Great stops on and push the first stop down to second touch, all the remaining Great stops will now cancel. Repeat for each of the remaining stops on the Great.

In conclusion. To set cancels on second touch, a separate piston input must be provided with a SCOPE of the division to cancel and memory containing all stops off.

The same procedure may now be repeated for both the Swell and Pedal divisions.

## Service Section:

### Fault Finding.

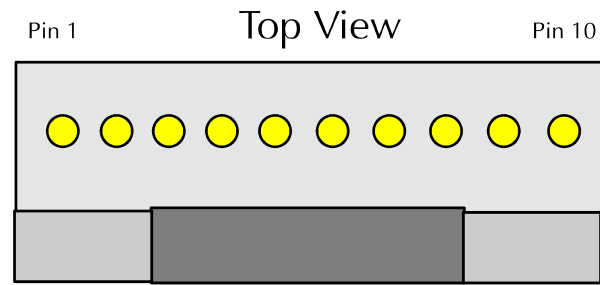
Using the Test Switch.

The test program is started by the Test Switch on the inside of the door. The switch is set to be active in the up position. The main use of the test program is to check that all of the stops have been wired correctly.

The test program moves through the stops one at a time first firing the on coil and then the off coil. Typical errors are:

1. **The stop moves on but not off.** Suspect the off coil wiring. It could be that the coil wiring has been crossed over. Try drawing all the stops on the console and running the test again. You may find that a different stop goes off to the one that you expect, simply re-wire the affected area.
2. **The stop moves off but not on.** Suspect the on coil wiring. It could be that the coil wiring has been crossed over. Try cancelling all the stops on the console and running the test again. You may find that a different stop goes on to the one that you expect, simply re-wire the affected area.
3. **Nothing happens.** Check to see if the red light is lit on the SSL power converter inside the door. If not, check that the power wiring is correct to the system. The converter is fitted with a fuse which will blow if the power supply is reversed and this can be replaced.

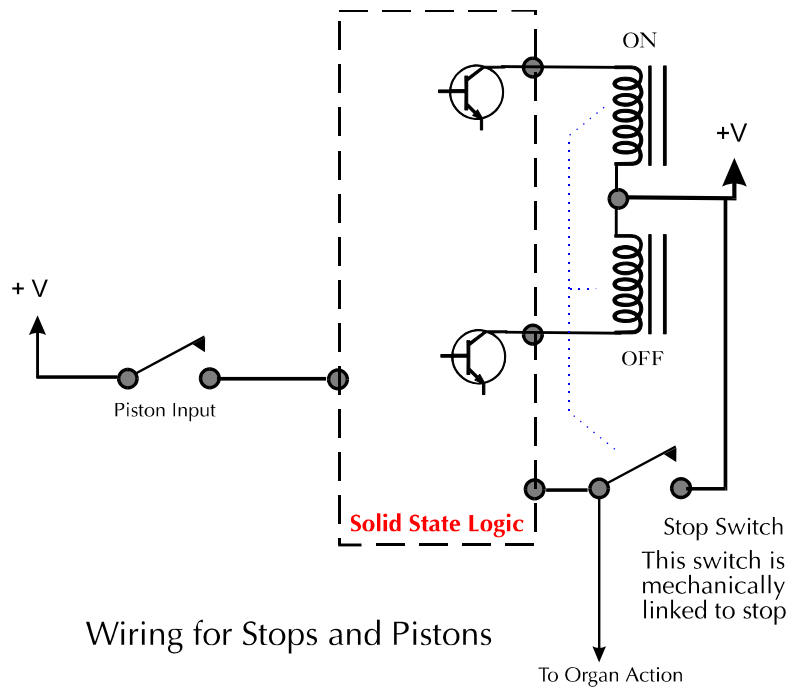
## Internal wiring.



Molex KK 10 Way Connector - Pin Locations

Molex Connector Q104		
From: Processor Panel	To: Processor Q104	Colour of wire
5 Volts	1	Not wired
	2	
Scope Default	3	Purple
Recall to Current Level	4	Yellow
	5	
Test Mode	6	Blue
	7	
	8	
	9	
0 Volts	10	Black

And now for the technical.



Wiring for Stops and Pistons

## Connector List:

Column 1 Piston Inputs		Column 2 Stop Inputs	
1	Piston 1	1	Stop Switch
2	Piston 2	2	Stop Switch
3	Piston 3	3	Stop Switch
4	Piston 4	4	Stop Switch
5	Piston 5	5	Stop Switch
6	Piston 6	6	Stop Switch
7	Piston 7	7	Stop Switch
8	Piston 8	8	Stop Switch
9	Piston 9	9	Stop Switch
10	Piston 10	10	Stop Switch
11	Piston 11	11	Stop Switch
12	Piston 12	12	Stop Switch
13	Piston 13	13	Stop Switch
14	Piston 14	14	Stop Switch
15	Piston 15	15	Stop Switch
16	Piston 16	16	Stop Switch
17	Piston 17	17	Stop Switch
18	Piston 18	18	Stop Switch
19	Piston 19	19	Stop Switch
20	Piston 20	20	Stop Switch
21	Piston 21	21	Stop Switch
22	Piston 22	22	Stop Switch
23	Piston 23	23	Stop Switch
24	Piston 24	24	Stop Switch
25	Set	25	Stop Switch
26	Scope	26	Stop Switch
27	General Cnl.	27	Stop Switch
28	Level 2 Select	28	Stop Switch
29	Extra Hold Time	29	Stop Switch
30	Clear Mem	30	Stop Switch
31	Test	31	Stop Switch
32	Configure	32	Stop Switch

Column 3 On Coil Outputs		Column 4 Off Coil Outputs	
1	On Coil 1	1	Off Coil 1
2	On Coil 2	2	Off Coil 2
3	On Coil 3	3	Off Coil 3
4	On Coil 4	4	Off Coil 4
5	On Coil 5	5	Off Coil 5
6	On Coil 6	6	Off Coil 6
7	On Coil 7	7	Off Coil 7
8	On Coil 8	8	Off Coil 8
9	On Coil 9	9	Off Coil 9
10	On Coil 10	10	Off Coil 10
11	On Coil 11	11	Off Coil 11
12	On Coil 12	12	Off Coil 12
13	On Coil 13	13	Off Coil 13
14	On Coil 14	14	Off Coil 14
15	On Coil 15	15	Off Coil 15
16	On Coil 16	16	Off Coil 16
17	On Coil 17	17	Off Coil 17
18	On Coil 18	18	Off Coil 18
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23	On Coil 23	23	Off Coil 23
24	On Coil 24	24	Off Coil 24
25	On Coil 25	25	Off Coil 25
26	On Coil 26	26	Off Coil 26
27	On Coil 27	27	Off Coil 27
28	On Coil 28	28	Off Coil 28
29	On Coil 29	29	Off Coil 29
30	On Coil 30	30	Off Coil 30
31	On Coil 31	31	Off Coil 31
32	On Coil 32	32	Off Coil 32

## Installation Settings:

Wiring configuration for \_\_\_\_\_ Organ.

Column 1 Pistons 1-24 & Controls		Column 2 Stop Switches Column 3 On Coils Column 4 Off Coils
	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
	13	
	14	
	15	
	16	
	17	
	18	
	19	
	20	
	21	
	22	
	23	
	24	
Set Switch	25	
SCOPE Switch	26	
General Cancel	27	
Level 2 Select	28	
Extended Hold Time	29	
Clear All Memory	30	
Test Mode	31	
Configure Mode	32	

Customer Feedback from ..... at .....

**To:**

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I have recently installed an MLC-02 Capture System and I wish to feedback the following comments.

We welcome any comments that you can spare the time to forward to us, and would be grateful if you could find the time to feed back any experiences while they are fresh in your mind. Remember, without your feedback this product would not have existed! Thank you.