CapLite – Positive Version Installation Guide

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Overview

Although small, this system is powerful and extremely flexible. Featuring the very latest in switching technology, this system has extensive inbuilt diagnostics monitoring which speeds troubleshooting of wiring problems. Diagnostics for shorts and opens help to ensure long term reliability and reporting of intermittent failures.

The Positive Switch Version of CapLite uses the same standards as other SSOS products with all switch inputs positive and all coil drivers negative output. This allows all the common feeds to be positive going.

The system is shipped with some default settings like set and general cancel. However, the system is designed to be fully programmable on site using a regular computer with no additional software.

Base Unit Features:

The base unit switches controls up to 64 stops. The stops are grouped into divisions which you can define from a list.

There are 48 control inputs which can be assigned in any order. These may be used for:

- Up to 32 General pistons or
- Up to 32 Divisional pistons in each division with a maximum of 7 divisions.
- Any mix of the two above that does not exceed 32. However, 1 general is equivalent to 1 divisional piston in each division.
- Up to 4 Inclusive Tutti reversers plus lamps. Each Tutti counts a general piston in the maximum piston count above.

Example: 8 Generals, 1 tutti, and 8 divisionals each for 4 divisions = 8+1+8= 17 of a total of 32. Set and General Cancel

Memory Level controls (also available elsewhere)

As many reversers as you have pins left for, there is no other limit.

The base unit also supports:

- Digital memory controls
- An expansion port to control a second unit of 64 stops and another 48 piston inputs
- Accessory Port
- Computer set-up and diagnostics with a serial port
- A program "dongle" for pre-programmed systems or copying form one system to another.

Options:

Cables

The stops and pistons are wired to the unit using high quality gold plated 50 Way telecom connectors. We supply 6ft and 12ft lengths of cable with a connector on one end using a standard American wiring colour code. 6ft Cables with plugs on both ends are also available for pinboards. If you wish to make your own cables please use the wiring sheet on page 36.

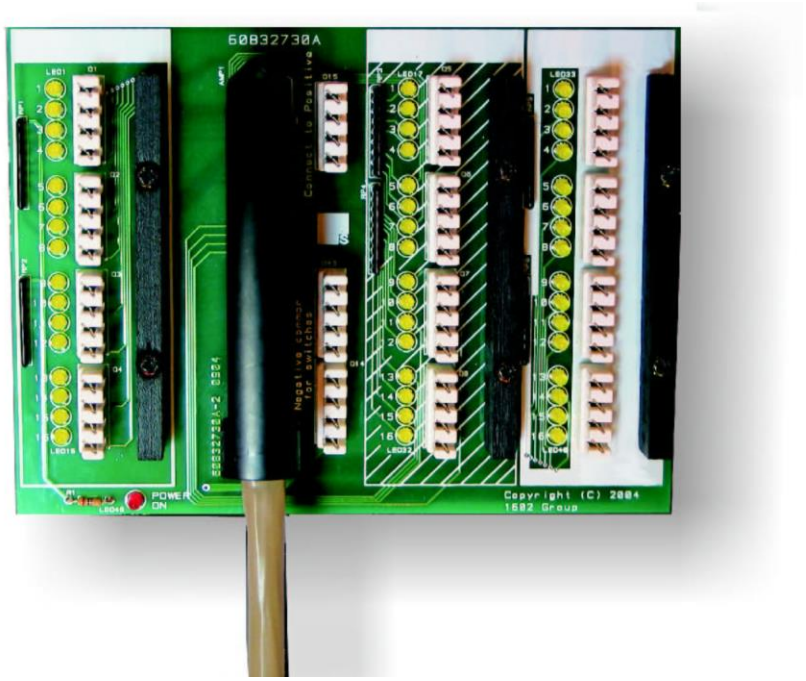
Displays and Controls

Memory levels are controlled by either a rotary switch for up to 10 levels or a digital display for up to 100 levels. These parts are extra and can be ordered anytime. The system is pre-configured to work with either control and they both plug into a dedicated socket on the end of the box.

Pinboards

If wiring direct to connectors doesn't suit you, pinboards are available with Krone connectors and cables which plug into the base unit. These pinboards are fitted with LEDS to help trace wiring faults. Each pinboard connects to one cable and so it is possible to have a mix of pinboards and directly wired cables.

IMPORTANT
There are two types of pinboards with this system as the LEDs must be fitted to match the polarity of the pins. The stops have positive inputs and negative outputs and use a pinboard marked STOPS. The Pistons are a positive inputs 1-44 and the pinboard is marked PISTONS.



Pinboards have three wiring zones.
Open box
Shaded box
Filled box

The three boxes are used to distinguish between three different functions for wiring and can be seen in the photograph above. See connector listing on page 14.
If you wish to use the LEDs fitted to the pinboard please connect one of the Krone connections marked “connected to Negative” to negative and one of the Krone connections marked “connect to Positive” to positive.

Fitting the System in the Console

The system is extremely compact and designed to fit into almost any space. There are a few important details to consider:

Leave space at the ends of the box. One end for power wires and the other for displays, set-up and testing.

The cables exit as shown in the picture below. Make sure this edge is clear of obstructions. In this view with the cables toward you the connector on the left is number one.

This system requires stop switches connected to positive.
This system requires On and Off coils with a positive return.
This system has been designed to be resistant to electrical noise. However an organ can be electrically very noisy. It is always best to ensure that all the coils to an existing electro-pneumatic relay have been suppressed with diodes. If you don’t, the pistons may operate randomly when you release the keys on unsuppressed magnets. All magnets connected to one of our systems are suppressed.

CapLite Installation Recommendations

We suggest the following method of installation:

Choose a location in the console for the unit such that the cables can be routed neatly and are not too short. It is suggested that any extra cable length be dressed rather than removed. This will provide an opportunity to revise cabling at a later date without having to abandon a cable or lengthen wires. Remember to consider any control panel needs as well.

The system does not require any ventilation and will operate happily under all temperature and humidity conditions normally encountered in an organ environment.

Although we make every effort to reduce sensitivity to electrical noise it is possible that poorly installed ballast for lamps will interfere with the system if they become faulty or old. It is a good precaution to mount all electric lamp wiring for fluorescent and halogen lamps away from the system and its wiring.

Power Wiring

The box is fitted with a pair of terminals to connect to the console DC supply. This supply must be stable and free from electrical noise. The system will operate over a range between 12 and 24 volts.
If necessary, choose a location for the power supply. Bear in mind that this power supply must turn on and off with the blower. Also, switching type power supplies have large start-up currents and can fuse relay contacts that are too small. We supply suitable power supplies and UL approved power relays.

Sizing of Power Supply

Solid State Organ Systems provides a wide range of power supplies designed to be fully compatible with CapLite and also to meet local safety and interference regulations such as UL, CSA and CE.
In the US and Canada we recommend using a PowerLight 30A unit for this system up to 50 stops at 12 to 15V. It is not necessary to consider pistons and displays when calculating the current requirement. Other units are available for a greater number of stops or when more than one CapLite system is used.

In Europe we recommend the PowerLight 300W for consoles up to 20 stops and the PowerLight 600W for consoles up to 40 stops.

More than one PowerLight can be used in parallel to add more current. Please also add extra current capability for the organ chamber if this is on the same circuit.

The negative wire connecting CapLite to the power supply needs to be capable of carrying the full power supply capability. The positive supply to CapLite in contrast, carries no coil current at all and does not need to be the same size as the negative wire. However, bear in mind that the positive wire to the coils does need to be sized for the full load though it is distributed among the coils.
Wire size recommendations are:

Main feed from Power Supply Positive to coils common - #8 wire (10mm^2)
From Power Supply Positive to CapLite - #14 wire (2mm^2)
From Power Supply Negative to CapLite - #8 wire (10mm^2)
From Power Supply Positive to piston and stop switch commons - #18 to #22 (0.5mm^2)
More cable information is available in a conversion chart at the end of the manual.

Connection Summary

Overview:

The system is fitted with five connectors for stops and pistons. Connectors 1-4 are used for the stops and connector 5 is used for pistons and other controls.

The following connector lists cover the two different types of cable. Firstly 4 cables for 16 stop drivers each on page 14 and then 48 pins for pistons, switches and lamps on page 16. These sheets are for the customisable configuration where using a simple computer program the builder teaches the system the individual configuration of the console. There are also a set of different standard configurations available for different piston combinations which are programmed simply by plugging a "dongle" into the accessory connector on the system. Wiring plans for these configurations are available with the dongle supplied to program that configuration.

Standard Pre-configured System

CapLite also comes with a number of standard configurations which are read from a "dongle" inserted into the accessory connector on the side of the unit before powering the system.

The pre-configured systems can be edited using the computer serial port if required after the dongle has been removed.

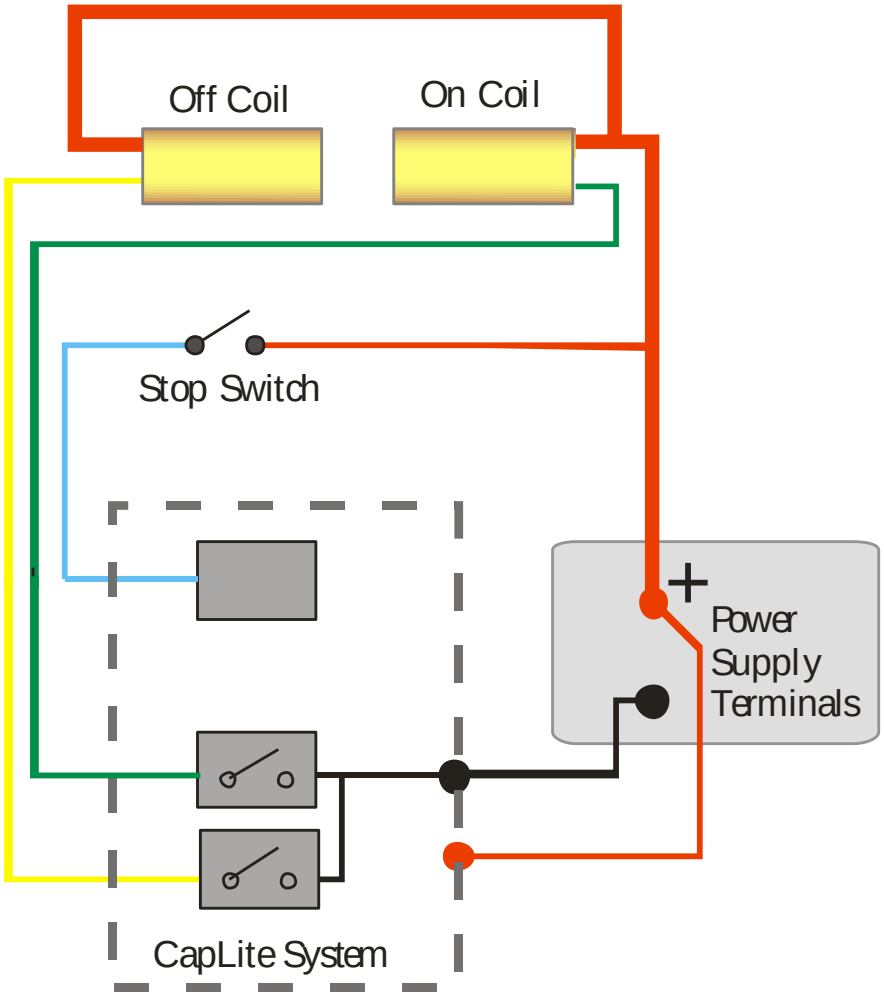
Connector lists are supplied separately for these configurations.

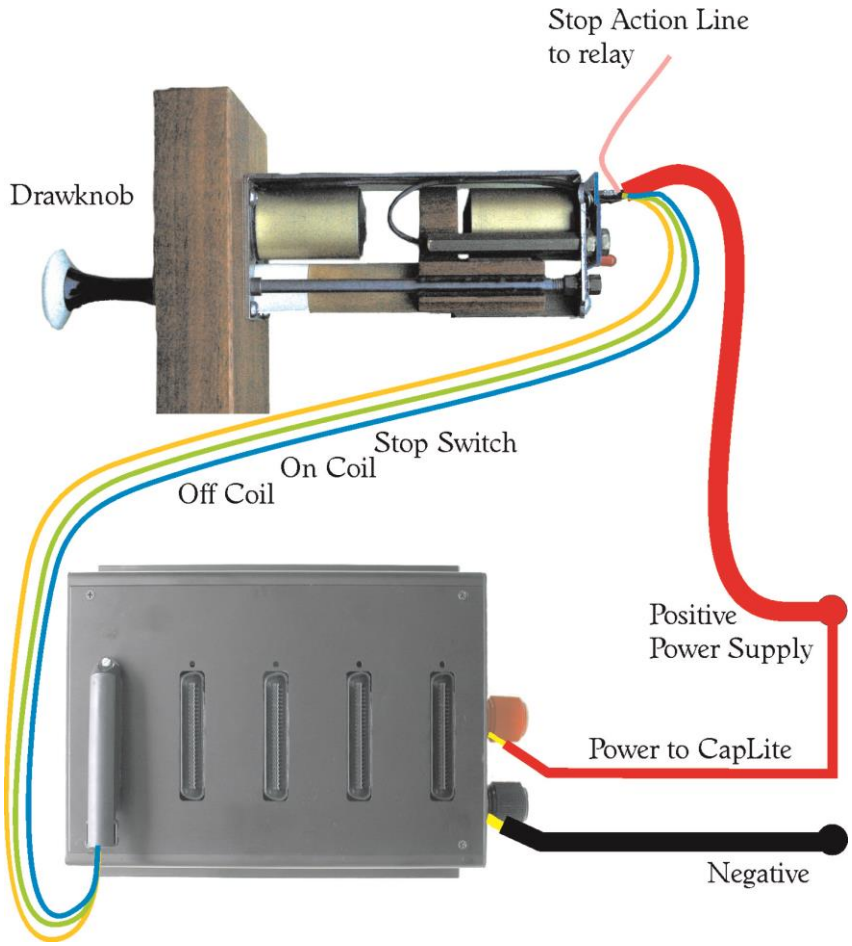
Customisable Configuration

With a custom configuration, the 4 action cables can be wired to the drawknob/tablet actions in any convenient order as long as the three wires in a group are kept together. That is, the on coil wire, the off coil wire and the switch wire must stay together. 16 wire groups are available in each cable.

Once the system has been wired it will be necessary to program it to suit your wiring.

Good wiring practice would try to make the cables correspond to divisions if possible and would leave spare groups in places where future drawknobs might be added (you never know).


Off Coil
On Coil
Stop Switch
+
Power
Supply
Terminals
CapLite System

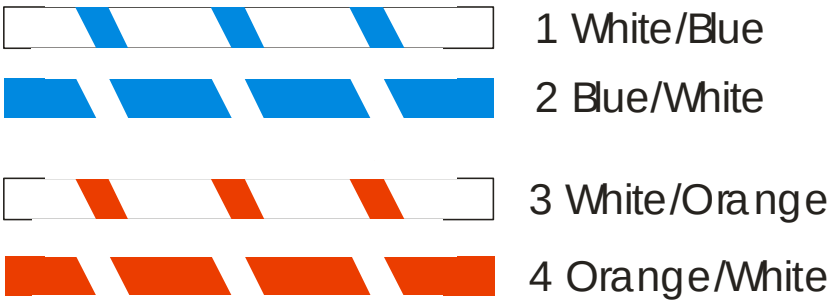

Stop Action Line
to relay
Drawknob
Stop Switch
On Coil
Off Coil
Positive
Power Supply
Power to CapLite
Negative

Stop Wiring

Stops –- Connector 1-4

Cable No.	Colour	Stop Number	Pinboard Zone	Function
1	White/Blue	1	Open Box 1	Contact
2	Blue/White	2	Open Box 2	Contact
3	White/Orange	3	Open Box 3	Contact
4	Orange/White	4	Open Box 4	Contact
5	White/Green	5	Open Box 5	Contact
6	Green/White	6	Open Box 6	Contact
7	White/Brown	7	Open Box 7	Contact
8	Brown/White	8	Open Box 8	Contact
9	White/Slate	9	Open Box 9	Contact
10	Slate/White	10	Open Box 10	Contact
11	Red/Blue	11	Open Box 11	Contact
12	Blue/Red	12	Open Box 12	Contact
13	Red/Orange	13	Open Box 13	Contact
14	Orange/Red	14	Open Box 14	Contact
15	Red/Green	15	Open Box 15	Contact
16	Green/Red	16	Open Box 16	Contact

Recognising wire codes:



Stops –- Connector 1-4

Cable No.	Colour	Stop Number	Pinboard Zone	Function
17	Red/Brown	1	Shaded Box 1	On Coil
18	Brown/Red	1	Shaded Box 2	Off Coil
19	Red/Slate	2	Shaded Box 3	On Coil
20	Slate/Red	2	Shaded Box 4	Off Coil
21	Black/Blue	3	Shaded Box 5	On Coil
22	Blue/Black	3	Shaded Box 6	Off Coil
23	Black/Orange	4	Shaded Box 7	On Coil
24	Orange/Black	4	Shaded Box 8	Off Coil
25	Black/Green	5	Shaded Box 9	On Coil
26	Green/Black	5	Shaded Box 10	Off Coil
27	Black/Brown	6	Shaded Box 11	On Coil
28	Brown/Black	6	Shaded Box 12	Off Coil
29	Black/Slate	7	Shaded Box 13	On Coil
30	Slate/Black	7	Shaded Box 14	Off Coil
31	Yellow/Blue	8	Shaded Box 15	On Coil
32	Blue/Yellow	8	Shaded Box 16	Off Coil
33	Yellow/Orange	9	Filled Box 1	On Coil
34	Orange/Yellow	9	Filled Box 2	Off Coil
35	Yellow/Green	10	Filled Box 3	On Coil
36	Green/Yellow	10	Filled Box 4	Off Coil
37	Yellow/Brown	11	Filled Box 5	On Coil
38	Brown/Yellow	11	Filled Box 6	Off Coil
39	Yellow/Slate	12	Filled Box 7	On Coil
40	Slate/Yellow	12	Filled Box 8	Off Coil
41	Violet/Blue	13	Filled Box 9	On Coil
42	Blue/Violet	13	Filled Box 10	Off Coil
43	Violet/Orange	14	Filled Box 11	On Coil
44	Orange/Violet	14	Filled Box 12	Off Coil
45	Violet/Green	15	Filled Box 13	On Coil
46	Green/Violet	15	Filled Box 14	Off Coil
47	Violet/Brown	16	Filled Box 15	On Coil
48	Brown/Violet	16	Filled Box 16	Off Coil
49	Violet/Slate	Connected to Negative		
50	Slate/Violet	Connected to Negative		

Pistons and Controls

Pistons and Controls –- Connector 5 – Custom Version				
Cable No.	Colour	Pin Number	Pinboard Zone	Function
1	White/Blue	1	Open Box 1	Assignable
2	Blue/White	2	Open Box 2	Assignable
3	White/Orange	3	Open Box 3	Assignable
4	Orange/White	4	Open Box 4	Assignable
5	White/Green	5	Open Box 5	Assignable
6	Green/White	6	Open Box 6	Assignable
7	White/Brown	7	Open Box 7	Assignable
8	Brown/White	8	Open Box 8	Assignable
9	White/Slate	9	Open Box 9	Assignable
10	Slate/White	10	Open Box 10	Assignable
11	Red/Blue	11	Open Box 11	Assignable
12	Blue/Red	12	Open Box 12	Assignable
13	Red/Orange	13	Open Box 13	Assignable
14	Orange/Red	14	Open Box 14	Assignable
15	Red/Green	15	Open Box 15	Assignable
16	Green/Red	16	Open Box 16	Assignable

Wiring note: If a crescendo shoe is being used, assign two piston inputs to be connected to stage 1 of the crescendo; “Crescendo On”. (see section “Setting Up Pistons”).

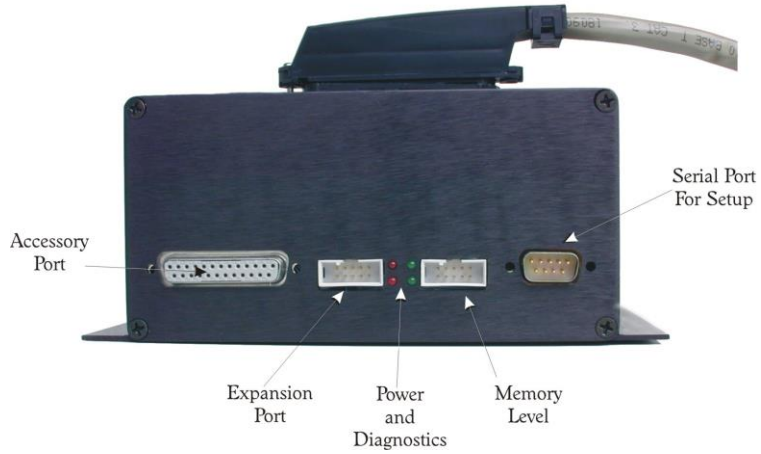
Wiring information for making your own cables is available on page 36. Please note that due to a lack of standards the connector pin numbers and the cable numbers used by organ builders do not tie up in North America. In the rest of the world the standards are completely different.

Pistons and Controls – Connector 5				
Cable No.	Colour	Pin No.	Pinboard Zone	Function
17	Red/Brown	17	Shaded Box 1	Assignable
18	Brown/Red	18	Shaded Box 2	Assignable
19	Red/Slate	19	Shaded Box 3	Assignable
20	Slate/Red	20	Shaded Box 4	Assignable
21	Black/Blue	21	Shaded Box 5	Assignable
22	Blue/Black	22	Shaded Box 6	Assignable
23	Black/Orange	23	Shaded Box 7	Assignable
24	Orange/Black	24	Shaded Box 8	Assignable
25	Black/Green	25	Shaded Box 9	Assignable
26	Green/Black	26	Shaded Box 10	Assignable
27	Black/Brown	27	Shaded Box 11	Assignable
28	Brown/Black	28	Shaded Box 12	Assignable
29	Black/Slate	29	Shaded Box 13	Assignable
30	Slate/Black	30	Shaded Box 14	Assignable
31	Yellow/Blue	31	Shaded Box 15	Assignable
32	Blue/Yellow	32	Shaded Box 16	Assignable
33	Yellow/Orange	33	Solid Box 1	Assignable
34	Orange/Yellow	34	Solid Box 2	Assignable
35	Yellow/Green	35	Solid Box 3	Assignable
36	Green/Yellow	36	Solid Box 4	Assignable
37	Yellow/Brown	37	Solid Box 5	Assignable
38	Brown/Yellow	38	Solid Box 6	Assignable
39	Yellow/Slate	39	Solid Box 7	Assignable
40	Slate/Yellow	40	Solid Box 8	Assignable
41	Violet/Blue	41	Solid Box 9	Assignable
42	Blue/Violet	42	Solid Box 10	Assignable
43	Violet/Orange	43	Solid Box 11	Set
44	Orange/Violet	44	Solid Box 12	General Cancel
45	Violet/Green	45	Solid Box 13	Mem Up*
46	Green/Violet	46	Solid Box 14	Mem Down*
47	Violet/Brown	47	Solid Box 15	Seq Up*
48	Brown/Violet	48	Solid Box 16	Seq Down*
49	Violet/Slate	Internally Connected to CapLite Negative		
50	Slate/Violet	Internally Connected to CapLite Negative		

* Internal links from the control panel for Memory and Sequencer controls. Additional Memory and Sequencer Pistons maybe connected to these pins. If the 10 way control switch is used these pins are for the level control and should not be used with additional pistons. These pins are NEGATIVE IN.

Control Connections

This end of the base unit is used to talk to the master processor system. It is not necessary to connect anything here to use the system.



Accessory Port

Used to connect SSOS accessories for controlling the capture system and communication. Information is given with the accessories for the use of this connector. The configuration "dongle" also goes here.

Expansion Port

A base system controls 64 stops. You can control another 64 stops with an additional unit. Information such as general pistons and tutti are sent to the second unit using this connector and a short cable supplied with the second unit. There is no need to wire the general pistons to the second unit. Memory levels etc between the two units will be kept in sync.

Power and Diagnostics

In the centre of the panel are four LEDS. The red LEDS indicate power on the unit and the green LEDS are for diagnostic readings.

The lower red led indicates power is applied to the unit and the upper red led shows the internal 5V power is on.

Memory Level

Memory level controllers plug in here. The simplest version is a 10 Way rotary switch but to access more memory a display panel is required.

Serial Port

A standard RS232 serial port as used on PCs. The system will also work with a USB to serial converter which we can supply if your computer does not have a serial port.

This port is configured so it will connect to a PC serial port with a straight cable and software set at 9600 Baud, 8 bits and no parity which is the default for most terminal emulators.

Set the display type to ANSI and the Handshaking or Flow control to None.
More information on setting this port and configuring the system is available on page 25.

Blind Check

A piston pin can be programmed to provide a “Blind Check” input. When this input is positive (it is not a reversible) any Tutti piston pushed will operate the stops on the console to display their setting.

PIN Locking

The lock switch input is normally used with a key to lock an individual level. However it may also be programmed to use a PIN number typed in from the pistons. If you wish to offer this then the lock input should be wired to a piston close to the set piston.

Press set and Lock at same time and while holding them in select 4 pistons as a lock code. The lock code is the actual piston not the number engraved on it and so a divisional piston creates a different PIN code to a general.

To unlock push the same 4 pistons in the correct order when selecting the level.

Sequencer

If you have the digital display the right side digits (unless you have opted to swap them) will show the last general piston pressed. The buttons on the right move through the available generals in order until the maximum general is reached and then the memory level changes. The number of general pistons defaults to 8 but can be set to any number to suit the pistons available on the console.

It is possible to use the general piston memories that are not available as pistons as follows: Advanced Programming feature

Some organists use the sequencer extensively and like the idea of having more generals per level than there are pistons. To make this possible, a 'restore' button is required to allow you to set the piston since otherwise, you do not have a piston. So, the first step is to install and configure the 'Restore' button.

Then, you need to offset the divisional pistons so that you have room for more than 16 generals. To do this the divisional piston numbers (chosen when programming the system) must start at a number higher than the last general piston memory you wish to use and less than 32.. If 16 Generals is OK then there is no need to do anything.

If, for example you have 8 divisional pistons they can be numbered 9 - 16 and this will give you memory 24 Generals because you have shifted the divisional piston memory allocations by 8 to create the extra 8 spaces from 16 to 24.

Finally, you need to adjust the 'Maximum General' variable in configuration to the highest general before the memory scrolls to a new value.

To set one of these generals, you sequence to the general, choose the registration, hold set and press restore.

Similarly, if you want to set the next general, you hold set and press Up. To set the previous general, you hold set and press down.

Testing

Before powering the system make sure that the positive and negative feeds are wired correctly as in the diagrams above.

Once the power wiring is checked it is time to switch on. When the system powers up correctly the LEDS on the end of the box will look like this.

If they do not, please consult the fault finding section on page 23.

Testing the wiring for functionality

If your system was not pre-configured you will need to do so first. Please refer to the instructions on configuring your system on page 25.

Test 1

To test that the system is working correctly first put all the stops on and then push general cancel. If they all cancel then things are looking good. Proceed to test 2. If they don't then follow the chart to identify the problem.

No stops cancel	Check the fault finding process below. First using the diagnostics to see if the general cancel piston is being read by the system. Refer to the pre-configured wiring sheet that came with the dongle or set-up the system to create an input for the General Cancel. Check with a test lamp connected to negative that the cancel piston is working. The piston feed must be positive on this system. Check that the connector for the pistons is connected to connector 5 on the box.
No stops cancel but GC piston is OK	Test the stop on an off coil wiring. Make sure that the positive common is connected to the stop coils. If the stops are fitted with LEDS are they lit when the stops are on?
Some stops cancel	Push General Cancel a second time. Do more stops cancel now? If so suspect the power feed. either the power supply is too small or the cables are too thin or badly connected.
Some stops cancel but no more.	If it is always the same stops that fail, are they all in the same area? Check the positive feed to this group of stops. Check that the on and off coil wiring is not reversed. Moving the connector to another position on the system will verify that the system is OK. Say the problem is on stops connected to the first connector. Remove this and plug the cable from the second set of stops into the first connector. Is the fault the same? If so suspect an internal fault in the system and call us. If not suspect the wiring.

Test 2

Pull on each stop one at a time and then cancel it using General Cancel. Any stop that does not cancel leave it on. If it cancels when another stop is pulled, then the on and off coils are cross wired. Correct any problems and move on to the next test.

Test 3

Put on one stop. Now set it on all the general pistons. Check that it has set correctly by pushing each piston in turn followed by General Cancel.

Test 4

Set up a recognizable pattern on the stop knobs with half of the stops on and half off. Set this pattern on all the odd numbered pistons including divisionals. Change all the stops to the mirror image setting. Now set this on all the even numbered pistons including divisionals. Now stress test the system by repeatedly pushing odd and even generals to make sure everything is solid. Finally check that the appropriate pattern has been set on each division.

Fault Finding

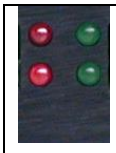
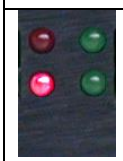
Diagnostics are run each time the CapLite system is powered to determine if it is functioning properly.

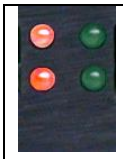
In order to assist the builder, the system comes with sophisticated built in diagnostics.

The first level of diagnostics involves LED indicators that can be used to check that connections to the unit are sound. An LED is included that can display error conditions that the system has found such as a short circuit connection or an open magnet connection.

By connecting a computer to the CapLite, further diagnostic information is available to more quickly locate a problem, often right to division, connector and wire. It is also via this computer connection that the system can be custom configured.

System is completely dead

	No LEDS lit. Check voltage at the main power terminals on the other end of the box. This should measure between 12 and 24V DC.
	Bottom red led only lit. Console power is getting to the system but not running the circuits inside. This can happen if the console voltage falls below 9V or if there is an internal fault. If the power was reversed earlier it may take a few moments for the internal fuse to reset. Try also removing all of the connectors from the system to see if any have a short in them that is draining the power.

	Both red LEDS lit shows correct operation. The lower green led will flash when piston or stop goes on.

The first suspect is always power. Look at the LEDS on the end of the box. If the power is correct both red LEDS will be lit.

System appears to be running but doesn't do anything

	The upper green led will flash rapidly and continuously if the supply voltage drops below 10V and the system will go into standby mode to protect the memory settings from bad power. Check the supply voltage under load. It is normal for this led to flash for about 1 second when the console is switched off and the power dies down.
	The lower green led will flash if a stop switch goes on or a piston is pushed. If it doesn't check the common is connected to the switch.

Wiring Error codes

	The upper green LED will light and stay on if the system counts a different number of On coils wired to OFF coils. This would normally indicate a wiring error.

Configuring your System

To configure the system you will need a computer with a serial port. This can be identified as a male 9 Way D type connector on the back of the computer. If you do not have a serial port a USB port will work fine with a suitable adaptor which we recommend KeySpan which is good quality.

Setting up the USB to Serial converter supplied by SSOS

Installation Overview
Installation is 3 part process where you will

1) Install the Keyspan software,
2) Connect your adapter
3) Determine your adapter's COM port assignment.
This last step is important because this is COM port that you will tell your serial device to use. Please follow the instructions below to complete this process

Install Keyspan Software
Important Notes:
DISCONNECT your Keyspan adapter BEFORE installing the Keyspan software.

CDROM Installation:
Windows will automatically open the Keyspan CD Browser window (Note: you can manually start the CD browser by locating and running the "Launch.exe" program on the CD-ROM). Using the onscreen menus, locate the Keyspan Installer selection and click it to start the installation process.
Follow the instructions on-screen.

Installation via download:
Download the Keyspan driver from Keyspan's website (http://www.keyspan.com). Find and download the Keyspan USA-19HS installer. When you have downloaded the installer, run the installer.

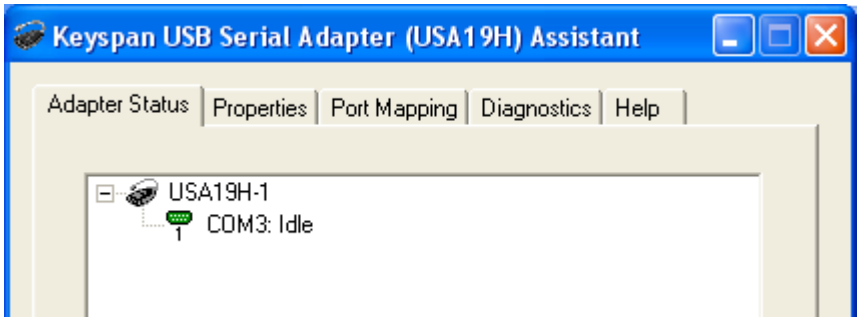
WINDOWS Tech Note:
During and/or after the software installation, Windows may report "Windows can't verify the publisher of this software", click the "Install this driver software anyway" selection.

Follow the installer's onscreen instructions to finish the software installation. When the installer completes, proceed to Step 2 (Setup Hardware).

2. Setup and Connect the Keyspan Hardware
Connect one end of the USB cable to the USB port on the back of the Keyspan adapter. Connect the other end of the USB cable to the USB port on your computer. When you connect the adapter, Windows will detect your Keyspan adapter. During this time, you may see Windows messages appear and disappear showing the names of different components of the Keyspan adapter. This is normal during the first installation of your adapter.
WINDOWS Tech Note:
During and/or after the hardware installation, the Windows New Hardware Wizard may ask you to install software several times. Select 'Install the software automatically'. You may also

get an additional prompt regarding logo testing, click 'Continue Anyway' if it appears. Note that you may get this message several times. Continue through all the Hardware Wizards that appear until they stop appearing (you may see up to 3 Hardware Wizards).
When Windows has finished the installation of drivers for your adapter, proceed to the Step 4 (Determine Keyspan's COM Port Assignment).

3. Determine Keyspan's COM Port Assignment
We now need to determine which COM port was assigned to the Keyspan adapter. The adapter's COM port is used to setup the terminal emulation software later. You can determine Keyspan's COM port assignment by using the **Keyspan Serial Assistant** utility. Open **Keyspan Serial Assistant** utility (START menu > (All) Programs > Keyspan > Keyspan Serial Assistant). You will be presented with the following window: Keyspan Serial Assistant window



In the Keyspan Serial Assistant window, you will see your adapter's COM port assignment. You should see **COMxxx : IDLE** or **COMxxx: BUSY.**
Note the **COM port address** (ie COM1, COM2, etc) as you will need this information later.

IDLE message:
If you see the **IDLE** status message, **the Keyspan adapter is working** and waiting for some program
to access the Keyspan COM port. This is the normal state of the adapter. If you look at your adapter's status light, it will be blinking slowly (1 blink per sec.) to indicate that it is idle.

BUSY message:
If you see the **BUSY** status message, **the Keyspan adapter is working** and some program has already
gained access the Keyspan COM port. If you look at your adapter's status light, it will be on (not blinking) or blinking every time data is sent or received (this can be a rapid blink or a blink every couple of seconds). Assuming that your serial device's software gained accessed to the Keyspan adapter, you should be able to start using your serial device right away. In some cases, it may be another program that is accessing the COM port before your serial device has had a chance to get to the COM port. In these cases, please read the **Troubleshooting** section in the Keyspan manual for further assistance.

No Keyspan Adapters Detected message:
If you see the **No Keyspan Adapters Detected** status message, there is a problem with the installation.
Please read the **Troubleshooting** section in the Keyspan manual for further assistance.

Terminal emulation setup

The computer 'talks' to the serial port using a program called a terminal emulator. Here is no actual programming software installed in the computer it is all built into the CapLite.

Mac Users:

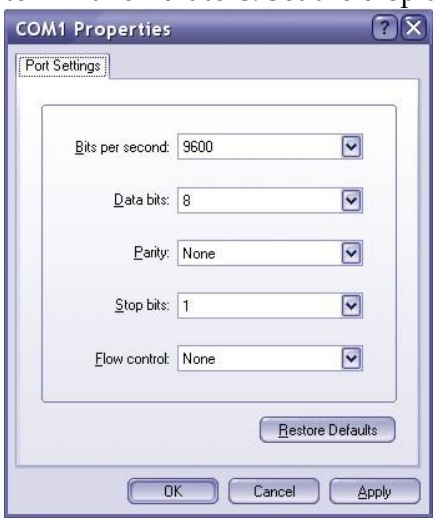
1. From the Apple App store download and install SerialTools
2. With organ off, plug Keyspan into CapLite, then into the Mac
3. Start SerialTools
4. Select the serial port from drop down menu (USA19H142P1.1)
5. Leave other settings as default but make sure Local Echo is deselected)
6. Press "Connect" button
7. Switch on organ and follow CapLite programming instruction.

Windows Users:

In windows XP there is a program called Hyper Terminal and is located in Start, Programs, Accessories, Communications. Newer versions of Windows do not include the program, a free trial can be downloaded from http://www.hilgraeve.com/hyperterminal/

In HyperTerminal create a new connection and choose the correct serial port. Serial ports are called COM in Windows You need to choose the correct COM number, if you are using the SSOS USB converter this will be the number you wrote down from the installation.

Then set this COM port to 9600 Baud, 8 bits and no parity which is the default for most terminal emulators. Set the display type to ANSI and the Handshaking to None.



All Users:
To connect between the computer and the CapLite processor you will need a 9 pin D cable male to female. The cable needs to be wired pin to pin which is sometimes called “straight’ do not use a “cross-over’ or ‘null-modem’ cable.
With the terminal emulator program running switch on the CapLite and you should see the initial screen with a cursor. The computer must be on before the CapLite is switched on or this first screen will be missed.

Internal RAM OK
External RAM OK
ROM OK
Vectors OK
CapLite 1.05N - 110211
COP on
CFM Panel
Ready
Level 0001

The first screen shows the results of the start-up test and also the version of software installed which may be needed if you have a technical support question. In this case it is 1.05N, your system may be different. It also displays the type of control panel connected.

Press ENTER for the initial set-up screen will appear. If the characters are garbled you may have forgotten to set-up the emulation software.

CHOOSE CONFIGURATION OPTION

1 - Setup a Piston
2 - Setup Divisions
3 - Setup a Piston Coupler
4 - Setup Values
5 - Setup Control Panel
6 - Run Internal I/O Tests
7 - Maintenance Tools

Enter a menu number and press Enter
>

During the set-up procedure the CapLite remains fully functional and so your programming can be tested.

You will see are a series of menus to guide you through setting up the pistons etc. You can press 'q' at anytime to exit set-up mode.

If you accidentally quit the setup program simply type **setup** to restart the program. It is always necessary to press the Enter key to enter the command.

The programming applies to all memory levels and only needs to be done once for the system. You do not need to copy the settings to all the other levels except for tutti settings which are covered in menu 7.

Setting up Divisions

The first task is normally to teach the system the stops wired to each division including generals as it is possible to have stops that are not settable on generals but will cancel on general cancel if you wish.

The general division is set in the factory to control all stops but can be reprogrammed if required.
Choose item 2 on the top menu to reveal the divisional setup menu.

```
CONFIGURE DIVISIONS

Step One - Place all drawknobs and tablets associated with the division on.
Step Two - Place all others off.
Step Three - Select division to complete operation

1 - Configure Great
2 - Configure Swell
3 - Configure Choir
4 - Configure Pedal
5 - Configure Solo
6 - Configure Antiphonal
7 - Configure Extra A
8 - Configure General
q – Return to Main Menu
>
```

Our apologies for not being able to interpret the names of the divisions on your console. All of the divisions are the same except for the Pedal and General. Please use them as seems suitable.

Remember the names you assign to each division as you will need this for the next step when setting the pistons.

Follow the instructions on screen to work through all the divisions you have wired. Setting the stops for each division into memory.

Notice that you can also assign the knobs to be controlled by 'Generals'. This will allow you to choose all of them (the usual case) or have the unit ignore certain knobs if you wish (Great and Pedal for example).

Setting up Pistons

From the main menu, choose Setup a piston and the following menu will appear.

```
SETUP A PISTON

Choose the type of Piston

1 - Setup a General or Divisional Piston
2 - Reverser
3 - Tutti
4 - Control (Cancel, Set, Sequencer, Memory Level, Cres On, Lock Switch)
5 - Remove a Piston Entry
```

Set and General Cancel have been pre-programmed for convenience but if you wish to relocate them you can from the piston menu.

Memory up and down and Sequencer Up and Down are accessible on the cable connector but are duplicates of the four buttons on the control panel. If you reprogram them here the buttons on the control panel will also change. It is important to note that if you use these four pins they are negative inputs.

If you wish to assign piston inputs to additional sequencer pins with a positive input this is OK.

```
Choose the type of Piston

1 - Setup a General or Divisional Piston
2 - Reverser
3 - Tutti
4 - Control (Cancel, Set, Sequencer, Ste Disable, Lock Switch, Memory Level)
>1

Press the piston you want to set up -
>
Choose the division
1 - Great
2 - Swell
3 - Choir
4 - Pedal
5 - Solo
6 - Antiphonal
7 - Extra A
8 - Extra B
9 - General
>

>1

Enter Piston #
>1
```

To set-up pistons, follow the menu system through the process. Notice that CapLite uses the piston number to allocate memory. Giving two pistons the same number will make them use the same memory. This is how General pistons and Toestuds can be configured.

The numbering of general pistons is also important as the sequencer will use this number to operate the generals in order.
Setting up reversers is very similar with the added step of telling CapLite which tablet/drawstop to assign to the button.

Tutti

Tutti reverser pistons are set in the system as well as the pin assignment for the lamp. The lamp requires a negative return. When prompted to activate the lamp pin please connect the pin to positive as if it were a piston, if the lamp is wired it will light at this point to confirm a correct connection. It is OK to use the switched side of the lamp to activate the lamp.

Once programmed a tutti is set the same way as a general piston. The stops won't move when it is activated of course but the stop switches will go on.

Crescendo On

Crescendo On is used to define a pin on the assignable inputs that when connected to positive will disable the set piston. This should be wired to the first output stage of the crescendo shoe so that when the crescendo is engaged the stops on the crescendo cannot be set into the system memory. The program menu will ask you to push a piston to set this, when asked open the crescendo shoe and close it again. Crescendo On can also be used with a latching style lock switch to prevent pistons being set.

Lock Switch

Any assignable input can be programmed to lock memory levels using a reverser action on a momentary switch. Setting up the lock switch input is carried out in the piston menu in the same way as other input pins. The locked indicator lamp is available on the digital display and also by assigning a lamp to one pin during setup in the same way as the tutti. If you change the lamp pin assignment it is necessary to reboot before it takes effect. We can supply suitable lock switches and keys.

Unlock Switch

If the organist intends to use PIN code locking it may be worth programming this pin to a hidden switch in the console. Activating the unlock switch will clear the PIN lock code for the current level when it has been lost.

Program the pin in the normal way by activating it when it has been selected in the menu.

Blind Check

If you wish to display the Tutti setting on the console then program this pin. It is useful if you need to set the Tutti in the workshop before the console is connected to the organ.
When programmed the Blind check input is active when a positive input is applied. This input does not latch and it isn't a reversible. It is only active while a positive signal is present.

Piston Coupling

Switches to combine pistons are also set-up in the software as shown below.

```
CHOOSE PISTON COUPLER OPTION

 1 - Configure Great and Pedal Switch
 2 - Configure Swell and Pedal Switch
 3 - Configure Choir and Pedal Switch
 4 - Configure Solo and Pedal Switch
 5 - Configure Great and Pedal Pistons Combined
 6 - Not Implemented
 7 - Configure Generals on Swell Pistons
 8 - Not Implemented

 9 - Remove Great and Pedal Switch
10 - Remove Swell and Pedal Switch
11 - Remove Choir and Pedal Switch
12 - Remove Solo and Pedal Switch
13 - Remove Great and Pedal Pistons Combined
14 - Not Implemented
15 - Remove Generals on Swell Pistons
16 - Not Implemented
q - Return to Main Menu
>
```

Menu 7 – Maintenance Tasks

1 - Copy Level 1 tutti(s) to all levels (must be on level 1)
2 - Clear all memory lock codes

Tutti. Once you have enabled the tutti piston and set the memory on level 1 use option 1 in the maintenance menu to copy the setting to all the other levels. This will save time.

Menu choice 2 allows the organbuilder to clear out locked levels where the organist has forgotten the PIN codes. This can be done level by level using an assignable pin called Unlock. See page 31.

Final Adjustments

And finally system wide changes can be made to tune the system. It is not necessary to do this as the system is pre-configured for average settings.

Set up Values
Choose the value to change

1 - Memory Level Scrolling Delay
2 - Memory Level Scrolling Speed
3 - Set Lamp Timing
4 - Coil Hold Time
5 - Reverser/Tutti/Sequencer Piston Repetition Speed
6 - Number of General Pistons on Console
7 - Maximum Memory Level
8 - Tutti Disable Time
9 - Debounce Time

Memory Level Scrolling Delay is the time before the memory button will start to scroll. The longer the rollover delay the long you have to hold the button before the memory scrolls. If this is too short it is possible to jump memory levels by not letting go quickly enough and if it is too long it can become tedious. Default setting is 128 or 512ms.
Memory Level Scrolling Rate is the speed the levels will scroll on the display. Default setting is 11 or 44ms.
Set Lamp Timing is the length of time the Setting lamp flashes each time a piston is set. Default setting is 128 or 512ms.
Coil Hold Time is used to fine tune the stop controls, the longer the hold time the more power available to the coils. This is best set by trial.
The values range from 1 to 255 and increase the hold time in increments of 4ms. Default setting is 48 or 192ms. The default has been chosen to work successfully under most circumstances.
If the hold time is too short some of the stops will not always move properly especially when all the stops are moved with a piston or cancel. A long hold time may make the stops unnecessarily noisy.
Reverser Repetition Speed helps the system respond better to worn out or poorly designed pistons. This is sometimes called de-bounce. If the contact on a reverser piston bounces excessively the system could interpret that the organist had pushed the reverser twice and hence ignore it. To avoid this, the reverser repetition speed needs to be reduced. However there is a trade off. A slow repetition speed will make the reverser slow to respond if genuinely hit twice. Default setting is 48 or 64ms.
Number of Generals on Console sets the maximum number of generals required by the piston sequencer before it changes levels. Set by default to 8 pistons it will need to be changed if there are more or less than this.
Maximum Memory Level sets the maximum memories that can be accessed from the control panel.
Tutti Disable Time sets the time the stops that are on in the Tutti are disabled to allow the correct on and off coils to fire when a piston is pressed. Not normally needed to be changed.
Debounce Time is a global control that affects the sensitivity of all the pistons and so it is set to be shorter than the repetition speed.

Configure Control Panel

The control panel display can also be altered to individual requirements but remember that it will not tie up with the operation manual!

```
CONFIGURE CONTROL PANEL

1 - Memory Display on Left, Sequencer on Right
2 - Sequencer Display on Left, Memory Display on Right
3 - Assume Rectangular Display
4 - Assume Small Alphanumeric Display (Dual Display Interface)
5 - Assume Small Alphanumeric Display (Alpha T Interface)
6 - Assume Memory Switch
7 - Enable Auto Configuration
>
```

Items 1 and 2 choose which way the digits are displayed, with number 1 being default.
Items 2-7 setup the display type. This is normally set to 7 as the CapLite will check the type of display at power up and configure for it. If you choose you can force the system to fix on a display type.

Making your own 50 Way cables

CapLite is designed to be wired directly into a console with no pinboards which halves the wiring time. We recommend purchasing the cables from us as they are tested and so you will know the connector wiring is correct. If you have the tooling to make your own connectors please follow the charts below to get the correct connections.

Stop Wiring

Stops –- Connector 1-4		
Stop Number	Connector Pin.	Function
1	26	Contact
2	1	Contact
3	27	Contact
4	2	Contact
5	28	Contact
6	3	Contact
7	29	Contact
8	4	Contact
9	30	Contact
10	5	Contact
11	31	Contact
12	6	Contact
13	32	Contact
14	7	Contact
15	33	Contact
16	8	Contact

Stops –- Connector 1-4		
Stop Number	Connector Pin Number	Function
1	34	On Coil
1	9	Off Coil
2	35	On Coil
2	10	Off Coil
3	36	On Coil
3	11	Off Coil
4	37	On Coil
4	12	Off Coil
5	38	On Coil
5	13	Off Coil
6	39	On Coil
6	14	Off Coil
7	40	On Coil
7	15	Off Coil
8	41	On Coil
8	16	Off Coil
9	42	On Coil
9	17	Off Coil
10	43	On Coil
10	18	Off Coil
11	44	On Coil
11	19	Off Coil
12	45	On Coil
12	20	Off Coil
13	46	On Coil
13	21	Off Coil
14	47	On Coil
14	22	Off Coil
15	48	On Coil
15	23	Off Coil
16	49	On Coil
16	24	Off Coil
	50	Internally Connected to CapLite Negative
	25	

Pistons and Controls

Pistons and Controls –- Connector 5		
Piston Number	Connector Pin.	Function
1	26	Assignable
2	1	Assignable
3	27	Assignable
4	2	Assignable
5	28	Assignable
6	3	Assignable
7	29	Assignable
8	4	Assignable
9	30	Assignable
10	5	Assignable
11	31	Assignable
12	6	Assignable
13	32	Assignable
14	7	Assignable
15	33	Assignable
16	8	Assignable

* Internal links from the control panel for Memory and Sequencer controls. Additional Memory and Sequencer Pistons maybe connected to these pins. If the 10 way control switch is used these pins are for the level control and should not be used with additional pistons. These pins are NEGATIVE IN.

Pistons and Controls –- Connector 5		
Piston Number	Connector Pin Number	Function
17	34	Assignable
18	9	Assignable
19	35	Assignable
20	10	Assignable
21	36	Assignable
22	11	Assignable
23	37	Assignable
24	12	Assignable
25	38	Assignable
26	13	Assignable
27	39	Assignable
28	14	Assignable
29	40	Assignable
30	15	Assignable
31	41	Assignable
32	16	Assignable
33	42	Assignable
34	17	Assignable
35	43	Assignable
36	18	Assignable
37	44	Assignable
38	19	Assignable
39	45	Assignable
40	20	Assignable
41	46	Assignable
42	21	Assignable
43	47	Set
44	22	General Cancel
45	48	Mem Up*
46	23	Mem Down*
47	49	Seq Up*
48	24	Seq Down*
	50	Internally Connected to CapLite Negative
	25	

METRIC-TO-AWG CONVERSION TABLE	
Metric Size mm2	AWG Size
0.5	20
0.8	18
1.0	16
2.0	14
3.0	12
5.0	10
8.0	8
13.0	6
19.0	4
32.0	2
52.0	0