Capture For MultiSystem

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Installation Guide

CFM-20, 40, 100, 200, 300

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This MultiSystem is fitted with an integrated Capture System; we call it Capture For MultiSystem or CFM for short.

In the package you will find an operating guide for the organist. Please leave this in the console when you have completed the installation. We are always happy to supply extra copies, should you require them. This document is concerned only with the installation of the system.

CFM systems are available in three models, CFM10 and CFM 20 - 300. Each system is quite different, and to avoid confusion we have provided separate installation manuals for each system.

This manual is for CFM-20, 40, 100, 200, 300.

Even if you are not familiar with our MultiSystems and MultiLevel Capture Systems, it is possible to adapt very easily to the CFM system. The two-minute guide should get you up and running with the minimum of fuss.

CFM is a supplementary product to the MultiSystem.

In addition to the MultiSystem, the CFM-300 adds:

- An extra processor box containing the CFM processor unit.
- Outputs on the console plane to drive the drawstops (on and off coils).
- A small a.c. power supply that must be connected to a source that remains on after the main power is turned off.
- Three control panels for the console
- Set General Cancel, and Possibly Scope pistons for the console
- A Crescendo encoder and wiring
- Possibility of additional modules such piston sequencers, bargraphs.

Assembly differences.

The CFM-300 processor box must be added to the MultiSystem Network. It can be added anywhere in the network that is suitable, using link protection boards and a coloured ribbon cable. It is normally next to the console processor. An NP linker (see below for details) may be used to simplify this connection.

The console will require a cutout for the three control panels and capture functions as ordered.

The following instructions are intended to be read in conjunction with the MultiSystem Installation Guide, which was delivered with the MultiSystem. If you are upgrading a system and the information has been lost, please contact us and we will gladly supply a fresh copy from our archives.

Connections to the MultiSystem Network.

It is necessary to connect the CFM-300 system to the MultiSystem Network.

There are two ways to do this.

1. Normally the CFM-300 system can be fitted less than 0.5 metres (18 inches) from another MultiSystem processor. In this case the two coloured ribbon cables can be connected directly using an NP linker.

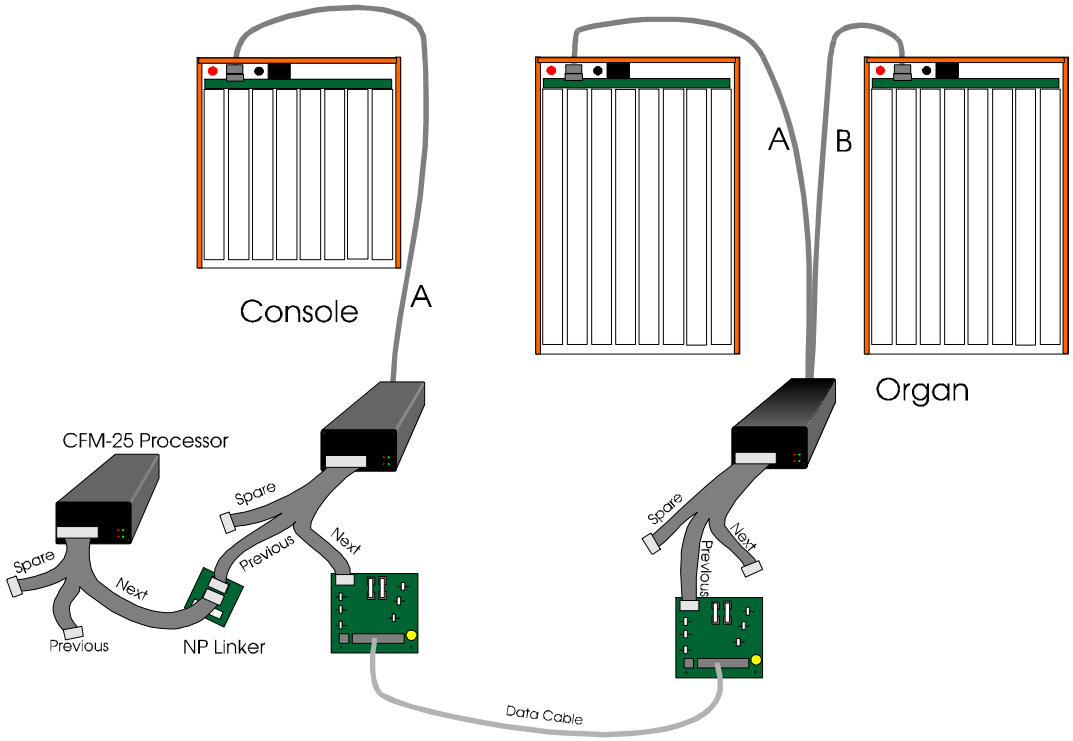
2. When greater distances are required, the cable entry to the system must be taken through a link protection board at each end. This is identical to a MultiSystem installation. Unless this has been specified at the time of ordering you will require two more Link Protection boards, which are available ex-stock from your local SSL office, part number 62310260.

Direct Connection.

The system will be supplied with a multicoloured ribbon cable for each black box. The cable plugs into the 25 way "D type" connector in the box at one end, and has 3 small 10-way connectors at the other end of the cable. These connectors are labelled NEXT, PREVIOUS and SPARE.

For more details on how these connectors relate to the MultiSystem, please refer to the MultiSystem Installation Guide.

The CFM-300 system is supplied with a small circuit board with 2 connectors, known as an NP Linker. If you wish to connect the CFM-10 system directly, plug the NEXT connection of one ribbon cable and the PREVIOUS connection of the other ribbon cable into the board. Which NEXT and PREVIOUS you chose will be determined by the existing wiring on the MultiSystem. It does not matter to the CFM-300 system, either will operate perfectly.



Power Wiring:

The CFM system requires power from a local DC rectifier. The box is fitted with a pair of terminals to connect to the supply. This supply must be stable and free from electrical noise; most commercially available units are suitable. The Solid State Organ Systems PowerLight series of rectifiers are an ideal solution and are fully approved to work with this system and conform to local electrical approvals such as UL and CE.

The CFM 300 system also requires an additional a.c. power source that is normally on. As a minimum this supply must remain on for five minutes after the main supply is switched off so it is OK to remove the power for maintenance.

The system will not operate satisfactorily from DC supplies that are provided by a rotary generator, as the interference level is far too high.

Drawstops and Tabstops:

Drawstops and tabstops require three connections to the MultiSystem as well as one power connection per stop.

- The switch contact connects to the stop or coupler input on the console plane.
- The on coil of the stop unit connects to the on coil output on the console plane.
- The off coil of the stop unit connects to the off coil output on the console plane.
- The switch feed and the on and off coil returns all connect to rectifier positive.

The switch inputs are suitable for use with mechanical switches, reed switches or electronic switches.

The on and off coil outputs are equipped with 'back EMF' or 'spark' suppression.

Luminous Stops:

Luminous stops require two connections to the MultiSystem as well as one power connection per stop.

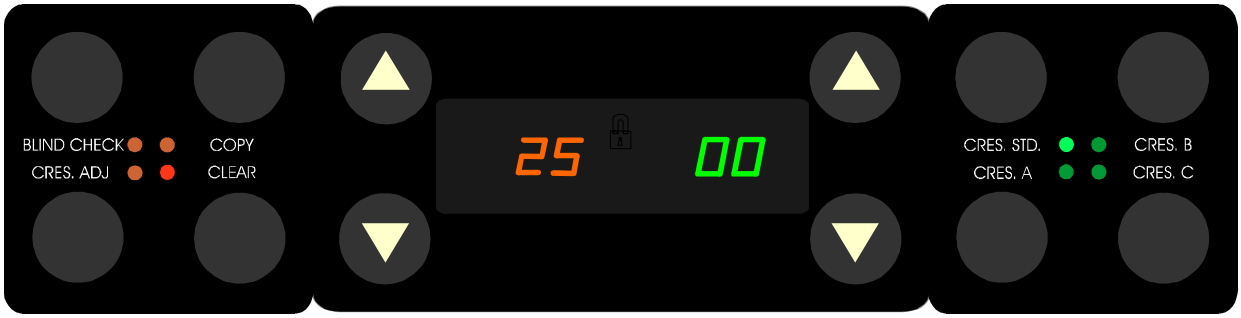
- The switch contact connects to the stop or coupler input on the console plane.
- The stop lamp connects to the stop lamp output on the console plane.
- The switch feed and the lamp return both connect to rectifier positive.

The switch inputs are suitable for use with mechanical switches, reed switches or electronic switches.

Set Piston and General Cancel:

- The set piston should be wired to the set input on the MultiSystem console plane.
- The general cancel piston should be wired to the general cancel input on the MultiSystem console plane.
- The feed to both set and general cancel should connect to rectifier positive.

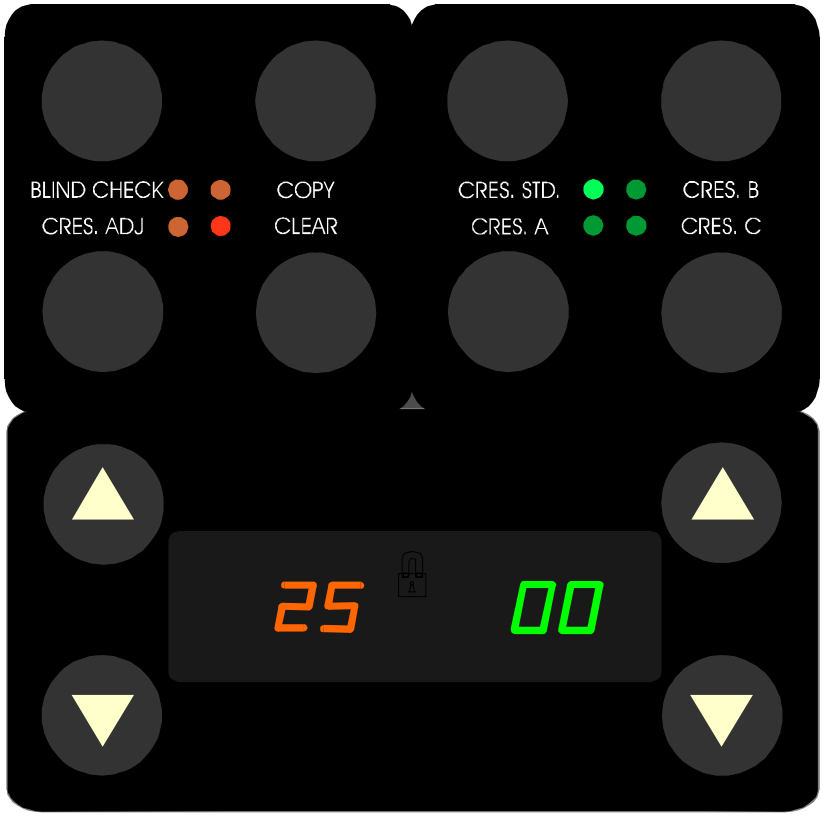
The CFM-300 is normally delivered with three control panels. By splitting the controls into three separate panels the installer has a wider range of options. Obviously the panels can now be grouped together in different ways or even split apart. But if the organ is not going to be fitted with a crescendo then there is no need



to install the control panel for the crescendo.

The panels may be fitted side by side for a low profile installation, under the music rack, for instance. In this configuration it is important to fit the crescendo panel to the right and the Blind check, Clear panel to the left. This is because the crescendo display is shown on the right side of the level control panel in the centre.

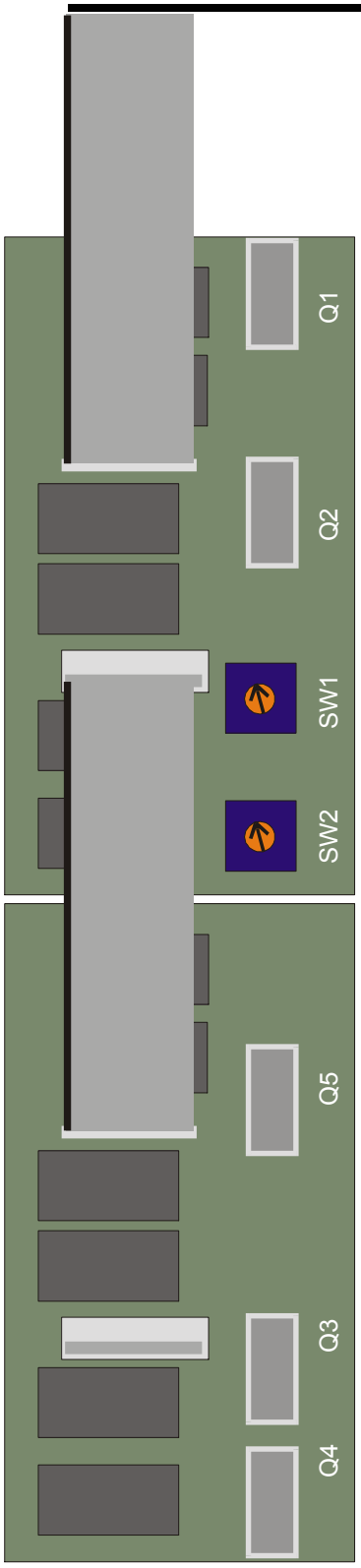
The small panels are square and the display panel is the same height but twice as



long and so the panels will equally well fit in a square configuration shown below.

The panels will fit tightly together and form a neat square. It is important to note that the panels have rounded corners and so in this configuration a small hole will be visible through the centre where the three panels do not meet. A black support behind this area will be required; firstly to support the small panels as the top edge will be unsupported, but also to prevent light shining through from behind.

Dimensioned drawings of the panels are available on page 22 at the rear of this manual. If you would prefer to manufacture your own cover plates for these panels SSL are happy to provide complete engineering drawings to assist you.



Q1 Master Level Control

Q2 Blind Check, Clear etc.

SW1 Debounce Control

SW2 Hold Time

Q5 Crescendo Pedal

Q3 Crescendo Control Panel

Q4 Bargraph

Each panel is connected to the console plane with a 10-way ribbon cable. The cables are supplied with the system in 6ft (2metre) lengths although longer cables are available to special order.

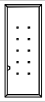
When running the cables from the displays to the plane try to avoid power supplies and control devices for lamps such as the music rack illumination as this may cause interference.

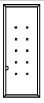
There are two boards fitted to the console plane which are described in the connector list and will be noticeably different to the other boards.

In addition to the three control panels there is a connection for the crescendo shoe. In some versions of the system this will be linked to another board on the plane. Leave this link in and connect to the other board. Further details are available in the crescendo section on page 14.

Controls are also provided for hold time and debounce adjustment. These functions will be described later in the commissioning section.

A sample of the section in the connector list showing this is shown below.

Q1	Level Control Panel Connector	
Q2	Blind Check Control Panel Connector	
SW1	Hold Time Selector	
SW2	Debounce Time Selector	

Q5	Crescendo Position Encoder Connector	
Q3	Crescendo A/B/C Selector Panel Connector	
Q4	Bargraph	

Scope is a new feature, which allows the organ builder and organist to define which stops are affected by which pistons.

Scope should be mounted as a piston adjacent to the set piston, as it needs to be operated by the same hand that presses the set piston. If this is not possible then add a small illuminated latching switch to the console that can be set on for "scoping".

If it is not desirable to mount Scope on the console, it should be wired to a toggle switch behind the music stand or in the back of the console.

Important Note: Scope is required for commissioning.

- One side of the Scope piston should be wired to the Scope input on the MultiSystem console plane.

- The other side of the Scope piston should be wired to rectifier positive.

Ordinary Pistons & Piston Lamps:

MultiSystem makes no differentiation between General pistons, Divisional pistons, and reversers. These are all referred to as Ordinary Pistons. Their function will be set during commissioning.

The MultiSystem console plane documentation may list the ordinary pistons as piston 1, piston 2, etc. wherever possible we will use the information supplied with the order for the system.

- The feed to the piston contacts should connect to rectifier positive.

If luminous pistons are fitted, their lamps should be connected as follows: -

- One side of each lamp should be connected to the Piston Lamp output on the MultiSystem console plane that corresponds to the piston.

- The return for the piston lamps should connect to rectifier positive.

Blind Pistons and Lamps:

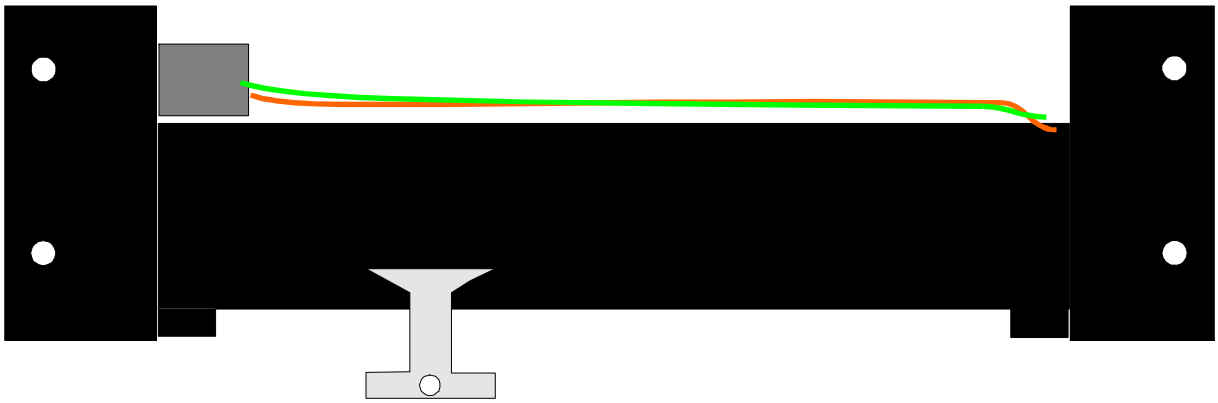
Blind Pistons are treated separately in the CFM system. They are normally reversible, i.e. they turn on when the piston is first pressed, and they turn off when it is pressed a second time. They will normally have an indicator lamp to show whether they are on or off. Being blind pistons, when set they will turn on stops in the organ but not normally show the change on the console.

MultiSystem makes no differentiation between Inclusive Tutti (or Sforzando) pistons, Exclusive Tutti pistons, and Ventil pistons. These are all referred to as Blind Pistons. Their function will be set during commissioning.

The MultiSystem console plane documentation will list the pistons as tutti, Sforzando etc.

- Wire each blind piston to one of the blind piston inputs as listed in the MultiSystem console plane documentation.
- The feed to the piston contacts should connect to rectifier positive.
- One side of each lamp should be connected to the Piston Lamp output on the MultiSystem console plane that corresponds to the piston.
- The return for the piston lamps should connect to rectifier positive.

The analogue encoder.



The moving arm on the encoder is connected to the crescendo pedal via a link that should designed to prevent the organist forcing the encoder beyond its normal travel. The maximum travel is 104mm (4 1/8").

You will note that the moving arm is facing down. This is to help prevent dust entering the slot and causing premature wear.

A small slide switch is fitted to the assembly. This switch reverses the direction of the encoder. If you assemble the crescendo and find that the pedal operates backwards, simply switch off and move the switch to the alternate position and restart the system.

Connection to the plane is made using a small 3.5mm jack plug. Do not change this connection with the system power on, damage may occur to the encoder. Please note that although these plugs are readily available they are not all the same. This connector uses the professional standard and is not compatible with other designs. You may damage the system by using plugs other than those supplied by SSL.

The other end of this jack cable plugs into the plane directly as detailed in the connector listing.

Calibrating the Slider.

Sometimes it is not possible to adjust the travel of the pedal to be exactly the same as the slider. To setup the travel correctly first set the pedal at the closed or minimum postion.

The pedal is connected to the analogue input board shown below. When the power is on the red led on this board will light. The green led is used to indicate that the slider is at the end of travel.

1. Move the shoe to the closed or minimum position.
2. Adjust the linkage so that the slider is fully at one end of the travel but is not being forced as this will damage the unit.
3. Check that the green led is lit. If not check the wiring.
4. Move the shoe to the approximate centre of travel.
5. Check the green led goes out.
6. Move the shoe to the opposite end of the travel.
7. Check the slider is not stressed beyond the normal limits of travel but is as close to the end of the travel as possible.
8. Locate the small preset control next to the green led on the position encoder.
9. With a small scredriver turn the preset control counter clockwise until the led goes out. Now turn the control clockwise slowly until the green led just comes on.
10. Move the pedal a few times open and closed and check that the green led still comes on in the very last part of the travel.
11. If the calibration is not completed successfully some of the highest crescendo positions may not be available.

LED's are solid state devices that emit light. They may be used in place of lamps if certain conditions are met.

LED's only work one way round. The cathode connects to the negative end of the circuit and is indicated by the shortest lead, or by a "flat" on the body of the LED.

LED's work at voltages between 2V and 3V. To prevent damage, they require a resistor in series with them in order to limit the current flowing through them. The resistor has two values, its resistance measured in ohms, and its power measured in watts.

To calculate these two values use the following formulae: -

Resistance = ((RECTIFIER voltage - 2) ÷ 100) ohms (Ω)

Power = ((RECTIFIER voltage - 2) ÷ 100) watts (W)

Exact values are not necessary, but larger values are safer than lower ones.

Suitable resistors for a variety of rectifier voltages are shown below

12V	1K0 (1000Ω) 5% 0.25W (min.)
15V	1K3 (1300Ω) 5% 0.25W (min.)
18V	1K6 (1600Ω) 5% 0.25W (min.)
24V	2K2 (2200Ω) 5% 0.25W (min.)

All of the above assume LED's rated at a current of 10mA. These values are safe for use with any LED.

Some LED's are recommended to have a higher current of 20mA. In this case, the value of the resistor will need to be reduced. The resistance should be halved, and the power should be doubled.

Some LED's are available with built in resistors. These will usually be labelled as 12V or 24V, and do not require a resistor when used at their rated voltage.

When the system wiring is complete the memories will need to be programmed.

Coil Wiring

The first stage is to check the connection of the on and off coils.

- Connect a positive lead to the pin marked test input in the connector list for the console plane.
- Press General Cancel.
- In test mode each stop's on and then off coil are fired in sequence.
- If correctly wired, each stop will move on and then off. In this way wiring errors can be easily identified and corrected before proceeding.

A stop not moving on may also not move off. Try putting stops on and checking to see if they go off during test. It is not necessary to stop the test to do this. A stop not going on but going off has a faulty off coil. A stop not moving at all may have the on and off coils swapped.

A stop not going off, but does go on, may have a faulty stop switch - not giving a positive to the CFM stop input. Try testing each as follows: -

Stop switch: With a test lamp connected to negative and all stops on, test mode not selected. Check each stop switch has a positive voltage, the lamp will light.

Off coils: After checking stop switches, connect test lamp to positive. Switch first stop on, connect test lamp to first stop, push General Cancel, lamp should flash briefly, repeat for next stop until complete.

Setting Default Level including Crescendo Standard

Referring to the User Manual, carry out the following steps: -

- Select level one.
- Set the Scope of every ordinary piston.

Within the system, momentarily connect a positive lead to the default level input. This will store the default scopes and settings of all the pistons including blind functions but not crescendo. The crescendo is stored independently by the following process.

- Select level one.

- Set Crescendo A as detailed in the "Crescendo Adjust" section of the operating manual.

Within the system, momentarily connect a positive lead to the default level input, while Crescendo adjust is still lit. This will cause the current crescendo A that has just been set, to be stored in Crescendo standard for later use.

Clearing Levels

Referring to the User Manual, now carry out the following steps: -

- Select level two.
- Set the scope for any piston
- Set some stops in that piston
- Clear Level two.
- Clear Level two a second time. (To restore scope)
- Repeat the above operations for the remaining levels (3-25).

This will set the default scopes and blind functions on each of the levels. It will leave all of the pistons blank, ready for use.

It is also possible to set different stops in different levels. Full instructions for this and other functions may be found in the user manual.

The CFM-300 processor behaves in the same way as a regular MultiSystem processor in the network. The rest of the system will work correctly if it is missing from the system. Obviously pistons and other capture functions will be disabled, and the displays may light up with all digits but the organ will be playable. This is very useful when diagnosing possible problems.

Diagnosing the system.

If the MultiSystem is not operating correctly it is important to solve any problems with that first. The CFM is entirely dependent on the MultiSystem for all of its functions. If necessary, to simplify fault finding, unplug the NEXT/PREVIOUS connection from the CFM processor and proceed with the MultiSystem fault finding as described in the MultiSystem installation manual.

The following guide has been written in order of the problem solving process. Please check that the system operates at each stage as the next stage in the trouble shooting normally assumes that the previous stage already works.

Once the MultiSystem is operating correctly we can move on to the CFM.

Test function

The commissioning section explains how to use the test function to check the wiring. However, for the test program to work at all, some basic level of functionality must be present.

The easiest check to perform is General Cancel. Pull on some stops and push General Cancel. If at least one stop cancels we have a basic operation.

CFM Processor has no lights on

Check that the red and black terminals on the CFM processor are wired correctly. If at some stage the power was reversed at these terminals the internal fuse will have blown. Call SSL for advice on how to change this fuse.

Measure the voltage at the power terminals it must be between 8 and 30 volts. The power wires should be fitted in the small holes close to the panel and crewed down tightly avoiding clamping on the insulation.

CFM Processor has two red lights on.

The processor has an internal failure, probably due to shipping damage and must be returned to SSL for repair.

CFM Processor has the bottom red light on and two slowly flashing green lights.

This is the normal situation for a processor that is operating correctly but not connected to the network. Use the faultfinding information in the MultiSystem guide to check NEXT PREVIOUS connections.

Displays are not correct

If the CFM processor is operating correctly and is communicating with the MultiSystem network (see MultiSystem installation guide) then check the following.

The normal status of displays at switch on is. Last memory level used, Current crescendo position, Crescendo Standard lit, and maybe clear if the level is clear. All other lamps will be off.

If the displays are blank the most obvious problem is that they may not be connected. Each display has a 10-way cable that links it to the plane connectors. It is also possible that the cables have become switched although this is more likely to show as random digits on the display.

Check that the 10 way cables that link the display driver cards on the plane are connected securely (see MultiSystem installation guide).

Check that the displays are operating correctly by changing memory levels, the display will scroll slowly at first and then speed up if the button is held down for a period of time. The numbers will also scroll all the way round that is level one will be followed by twenty-five.

The crescendo control panel should be able to be changed to any of the four settings. Std. A, B, & C.

Pushing the blind check switch will cause the blind check lamp to light but copy, clear and crescendo adjust require a special sequence of controls to operate before they will light. This is covered elsewhere in this manual and the operation guide.

General Cancel is dead

If general cancel is dead and all of the previous tests are OK then check the wiring as follows.

Make sure that a negative connection is made from the MultiSystem console plane to the console rectifier, as you will damage the system with the next test if it is not.

Make sure all the stops are off.

Use a test lead connected to negative (not on the test pad on the MultiSystem) and touch the lead briefly but firmly on the connection to each on coil on the plane. As you do this, each stop will move on if the wiring is correct.

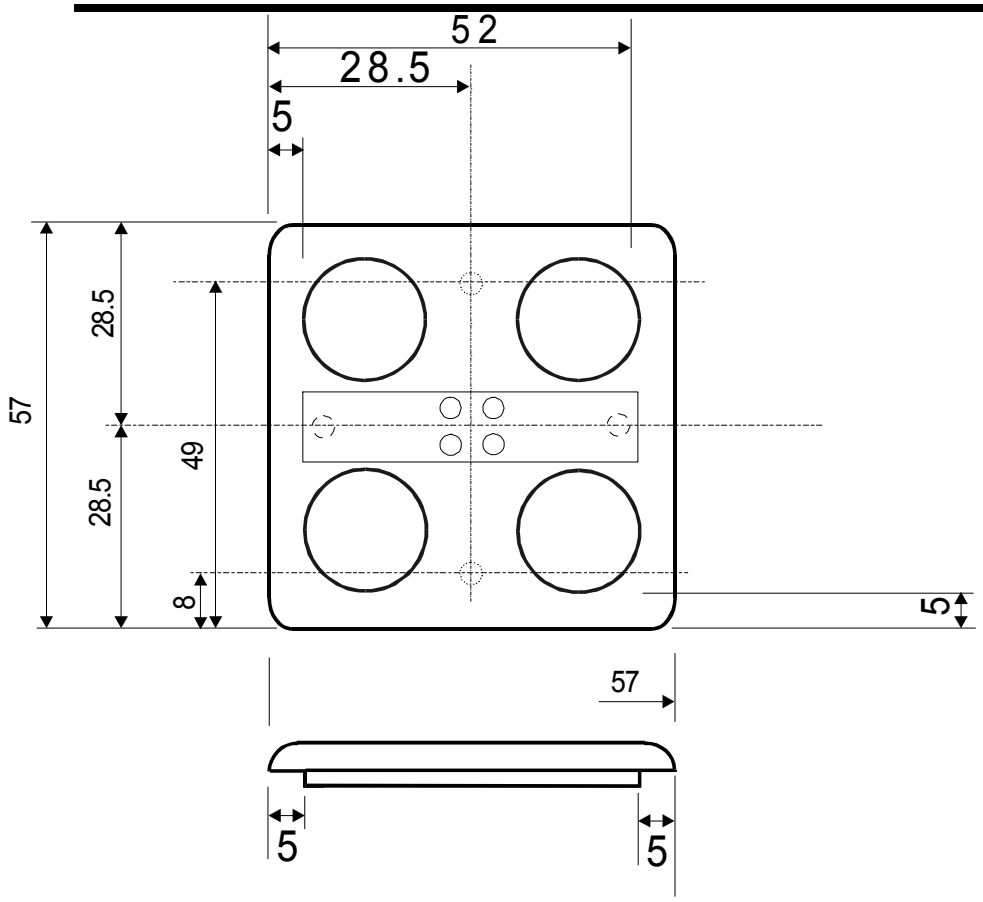
With all the stops on repeat the process with the off coil wiring. If both are dead check that the off and on coils are not reversed. Also check that a positive voltage is measurable with a test meter at the output of the MultiSystem. If a positive voltage is present it means that the cable is connected in some way a power source. If it is not there is a break in the circuit.

If all of these test s are OK, check that a positive voltage appears at the General Cancel input pin when it is pushed and returns to zero when the piston is released.

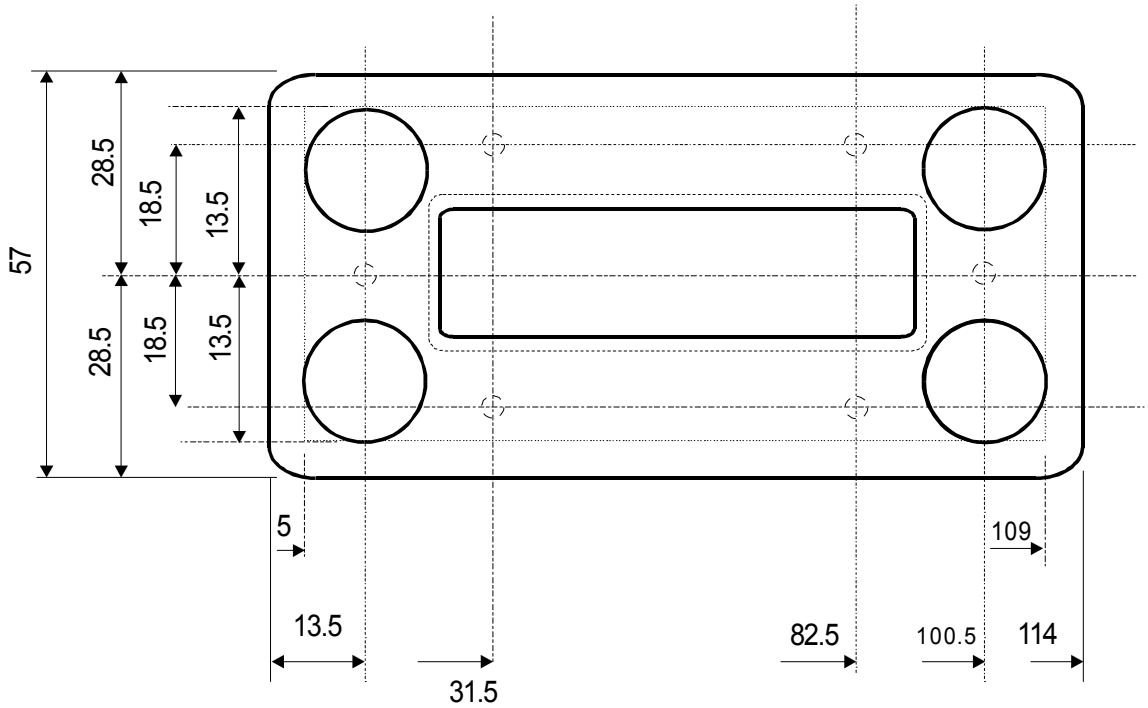
Check also that the MultiSystem boards are correctly seated and no obvious damage has occurred. Follow the module faultfinding guide in the MultiSystem installation guide.

Crescendo adjust lamp does not light.

You must be in crescendo A, B or C not crescendo standard for this option. You must also be pushing set when you push crescendo adjust.



Note: 1 inch = 25.4mm & 1mm = 0,04 inches.



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