

## **Welcome to Solid State Organ Systems .....**

Solid State Organ Systems is the World's leading supplier of electronic control systems for the Pipe Organ.

This has not been an easy accolade to achieve. It has been won by the continued devotion to the instrument and to those organ builders who actively strive to bring their artistry to others.

Right from its early beginnings in 1968, Solid State Logic demonstrated a commitment beyond all others by producing the Diode Coupling and Switching System. Despite other attempts of the period, this is recognised as the first reliable system of its type and probably has the widest installed base within the industry.

Building on such beginnings, further innovation within our Audio Products division brought about the introduction of a piston capture combination system - now a standard feature on almost every console. Continuing technological advances resulted in the now 'industry standard' MultiLevel Capture System in 1982. This fully programmable microprocessor based system allowed the player unprecedented flexibility in the creative process and continues to enjoy ongoing enhancement.

1992 saw the launch of yet another milestone in control systems for the pipe organ. This was the MultiSystem.

Crucial to this advancement was the ethic of successfully elevating such equipment from the limited two-dimensional stage still employed by others, to a new three-dimensional platform. This network-based platform brings many benefits from major computing technologies allowing SSOS customers to enjoy pipe control systems with unparalleled flexibility and quality.

A network platform has already allowed us to integrate the piston capture combination system within the MultiSystem and offer other ground-breaking functions such as SCOPE™ where pistons can be 'taught' their functionality and which stops they will control. Enhanced creativity through the introduction of MIDI For MultiSystem has seen the creation of yet another industry standard for organ builders and players alike.

And so now you will install our latest advance in technology – IntelliKey for MultiSystem, combining the most reliable method of key contacting available with a unique level of adjustment and control.

Over many years SSOS's skill in bringing the benefits of advance technologies in simple format to organ building has been an inspiration for many others. Throughout all manner of change, we recognize the need in our industry for stability and support. Our creative process is intrinsically linked to yours and we hope that you will feel part of such a mutually beneficial partnership.

Thank you for choosing Solid State Organ Systems.

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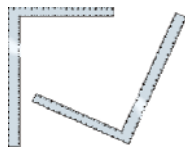
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## List of parts

The following parts should be included in your IntelliKey kit with the smaller items being attached to the outside of any anti-static packaging. (The components for the pedal version will be contained within one anti-static bag). Please take time to check them so that you do not find yourself short of an item while carrying out the installation of your IntelliKey equipment.

If you are missing any of the parts described on this page, please do not hesitate to contact your nearest SSOS office who will be pleased to rectify the situation.

The IntelliKey circuit boards for each manual keyboard will be supplied already fixed onto an aluminum mounting rail. These are the largest item in the package. Separately supplied will be the fitting kit and the calibration handpiece, one per instrument, although further units are available from your nearest SSOS office.



IntelliKey Rail  
Mounting Brackets  
(two flat and two  
angled)



Magnets

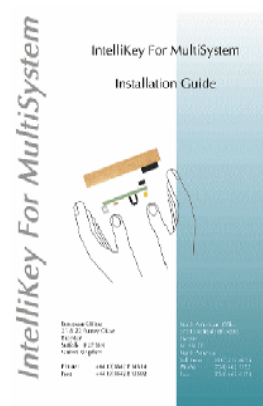
### *The IntelliKey Fitting Kit*



Fitting Tool



Super Glue



This Installation Manual

## Overview of Procedure

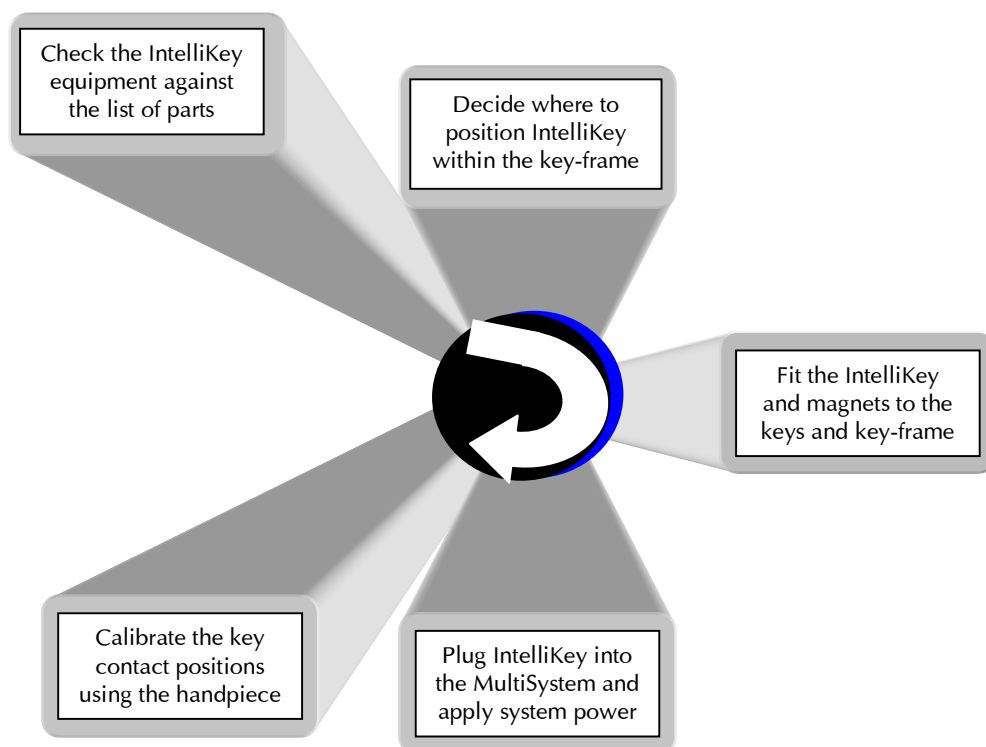
When fitting IntelliKey into an instrument, the basic procedure remains the same for all instruments. The first step is to confirm that you have all the necessary parts against the 'List of Parts' page that you can see on the left (please be careful to check that no small parts are left within the packaging!). Next, consider the preferred position for fitting the equipment within the key-frame. Specific considerations for this are explained in detail later in this manual, but once this is decided, you are able to proceed to fit the IntelliKey PCB rail.

With this in position you will then fit the magnets to each key. This is simplified by use of the supplied templates and fitting tool. And then the IntelliKey manual is ready to be plugged in to the MultiSystem using the single cable supplied.

The procedure for fitting to the pedals is very similar although for maximum flexibility, each PCB is supplied as an individual item rather than on a rail.

If you are upgrading a previously installed MultiSystem, your IntelliKey system will include a specifically designed input card that you will need to mount onto the plane. This will need to be done before being able to successfully connect the IntelliKey cable.

With all connections made and the system power on, you can then carry out a quick setup for the key contact to confirm successful operation and then carry out other areas of work on the instrument. Finally, a specific calibration can be made to set up the key action with the exact contact points that you require.



# For the Manuals

## Making your first move .....

### *Fitting the IntelliKey Rail*

When you have confirmed all of the enclosed parts, the first step is to decide where you will fit the IntelliKey system onto your set of keys.

The choices are very flexible. Aside from your own considerations in making adjustment to the key frame, the only requirements for IntelliKey is that the available movement between each key magnet and its corresponding sensor should be between 2mm (1/16") and 5mm (3/16") - ideally 4mm (2/16"). This is made simpler by the fact that, when correctly fitted, the magnet should lie flush with the surface of the key. The magnet on the key will then move toward the sensor when the key is pressed.

The IntelliKey rail may be mounted to the key-frame using the two right-angled brackets supplied.

Once you have decided on your preferred position, either above or below the keys, the next step is to mark this position on each key along the complete width of the key compass.

This line will in fact be the center position of the IntelliKey sensors (and also the centerline for fitting the magnets). Measure back from the line 35mm (1<sup>3/8</sup>") to give the center position for the right-angled mounting brackets and then mark this on the sides of the key-frame. At this point, measure 40mm (1<sup>9/16</sup>") up from the face of the key to give the center of the required mounting screw hole for each right-angle bracket.

With these holes drilled and the rail and brackets mounted, confirm that the center of the sensors on the board lies above the first line that you marked on the key surface. The design of these brackets is such that a reasonable amount of vertical and 'tilt' adjustment is possible to assist with this.

Before removing the IntelliKey rail from the key-frame, first make a small mark on keys 1, 32, 33 and the top note of the compass. This mark should indicate the center position of the sensor on each of these keys and will be used to help align the center guides for the magnets in the next stage.

## **Fitting the Magnets**

### ***Preparation***

To allow correct alignment, use the Intellikey Template (SSOS Part Number 53412170). This template is available from your local SSOS Office on a Sale Or Return (SOR) Basis. The template needs to be attached to the keys to mark the center of each magnet before drilling. The Template corresponds to one half of the compass as marked. The procedure is as follows.

Position the template so that the alignment marks are in line with the key markings made at the end of the previous section. When you are satisfied that the guide fits correctly and that the center markings on it span the compass without any alignment problems, temporarily fix the template in position. Be sure to keep the guide straight along the keys.

Using the template, drill or punch each key surface with a 3mm (1/8") hole to a depth of 1mm (i.e. the thickness of the magnets).

### ***Fixing the Magnets***

The magnets supplied should be glued into each drilled hole using cyanoacrylate adhesive (Super Glue) taking care to observe the characteristics of this adhesive. A suitable quantity is supplied within the IntelliKey fitting kit.

A single magnet should be placed onto the tip of the insertion tool provided. It will automatically attach itself and be the correct way around for fitting. We recommend that you use the tool for convenience and to avoid key failure through incorrectly fitting magnets in reverse position.

A small amount of glue can then be placed into the hole and the magnet inserted. Hold the magnet in place to allow the glue to set and then slide the tool sideways from the magnet leaving the magnet sitting flush and flat in the hole.

Repeat for each key and then refit the IntelliKey rail, (readjusting as necessary), so that each magnet travels to within 0.5mm of the surface of the sensors when the key is fully depressed.

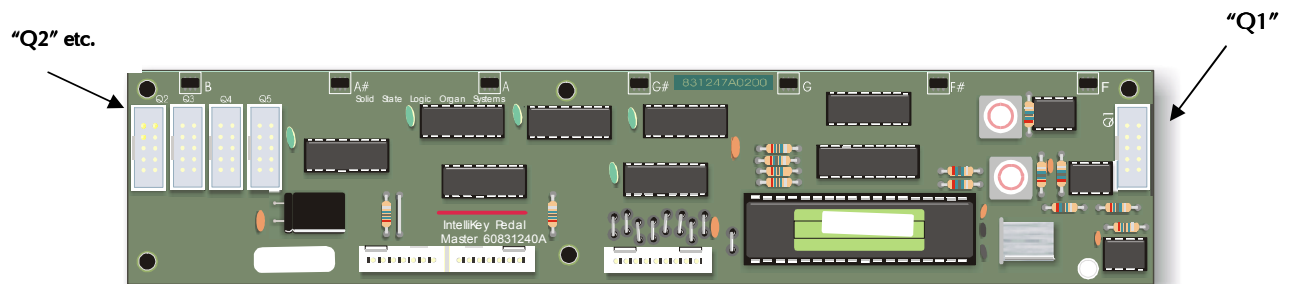
# For the Pedals

## Making your first move .....

### *Fitting the IntelliKey Assembly to the pedalboard*

Having confirmed that all of the required parts are enclosed, the first step is to align the set of PCB's to the toe-rail of the pedalboard.

Each of the PCB's will relate to specific groupings of pedal keys across the compass. The exact grouping will depend on the pedal compass ordered but may include 7 note, 5 note and 3 note PCB's. The principal is that there is a master PCB into which the required configuration of other PCB's will connect using small ribbon cable.



The master PCB (shown above) is labelled and easily identified from the quantity of electronic components fitted to it. On this PCB you will find 5 ribbon cable connectors – one on its own (marked 'Q1') and four together (marked 'Q2, Q3, Q4 and Q5'). The numbers refer to the PCB's that make up the whole assembly.

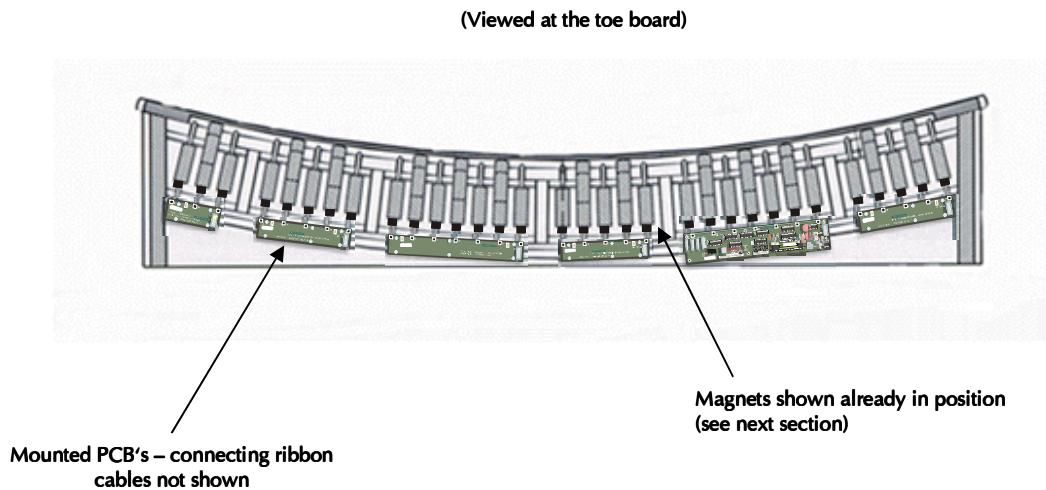
The master PCB is always the second card in the chain as shown in the following diagram. (It is probably a wise step to lay out the boards in their correct order, matching this diagram before you begin).



The next step is to offer up the IntelliKey PCB's into a temporary position so that the exact position of each magnet may be determined.

The positioning of each PCB should allow for the alignment of each sensor under each pedal key. This alignment should be both left and right and front to back, aiming for as central a position as possible. The vertical positioning should allow for the magnet to come within 4mm of the sensor when depressed.

Align the master PCB and its sensors under the keys F6 to B12. When you have a position that allows the best central alignment between each magnet and sensor, mark the screw positions and fix this first card to the toe rail. Making sure that each of the ribbon cables has the correct length to connect back to the master PCB, carefully mark the screw-hole positions of the remaining PCB's.



Offer up each of the PCB's in turn, matching the screw positions you have marked. Then make an alignment mark on the underside of each pedal key to indicate the fixing position of the magnet. (Remember to aim for the most centrally aligning position of the magnet over the sensor).

Remove all of the PCB's, including the master PCB and return to their anti-static bags for protection.

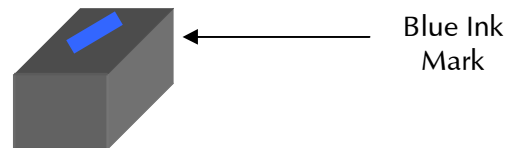
Next, proceed to fix the magnets in place using the following method.



## Fixing the Magnets

The magnets supplied for the pedalboard are appreciably larger than for the manuals (200mm x 10mm x 5mm). They should be glued into each drilled hole using cyanoacrylate adhesive (Super Glue) taking care to observe the characteristics of this adhesive. The required quantity is supplied within the IntelliKey fitting kit.

Because the size of the pedal magnets allows easy handling, there is no need to use the fitting tool. The magnet can be affixed direct to the underside of the key without the need to recess it. Each magnet should be attached to the underside of the pedal key by glueing the surface marked with indelible blue ink. Should a magnet be fixed to the key in reverse, then the most likely symptom will be the reverse operation of those pedal key(s) concerned (e.g. a cyphering of the note which is cleared when the key is depressed).



If it is necessary to modify the relationship between the magnet and sensor when a key is depressed, we recommend making any necessary adjustment by moving the relevant printed circuit-board rather than the magnet.

## *Remounting the PCB's*

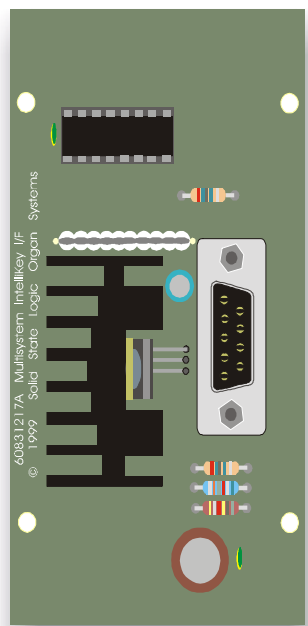
With the magnets attached to the keys, refix the master PCB into place. Realign the first PCB (Q1) under notes C1 to E5 and screw into position before reconnecting the ribbon cable into Q1 on the master PCB. In some cases it may be desirable to fit non-conductive washers over the screws between the PCB and the toe-board. This will allow each CB to be 'spaced' forward.

Continue in the same manner for all of the other PCB's, connecting each ribbon cable in turn to the relevant 'Q' connector. Finally connect the calibration socket extension cable (with the widest connector) and the MultiSystem linking cable supplied to the white molex type connectors on the master PCB.

# Linking to your MultiSystem

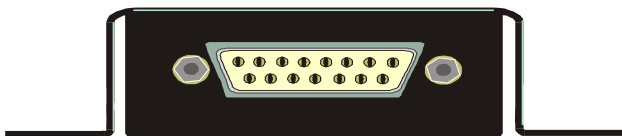
Once the IntelliKey rail or PCB's have been successfully fitted, route the two cables from each manual or pedalboard as preferred and secure to the key-frame/pedalboard with cable ties or clips as appropriate.

There are two means of connecting IntelliKey to the MultiSystem depending on the configuration of your system. The first is a straight connection onto the MultiSystem Input Plane and the second is a direct connection to the MIDI For MultiSystem processor box.



If you are fitting IntelliKey as an upgrade, you will either have an interface card (left) supplied to fit onto the plane or a replacement MIDI processor box fitted with a dedicated IntelliKey socket.

If you are fitting IntelliKey from new, then the required information will be contained in the Connector List for the instrument and you will find the input card pictured left already mounted on the Plane.



The second of the cables from the IntelliKey terminates in a 'D' connector mounted on a black metal bracket. This is the connector for the calibration handpiece. Fit the bracket in a discrete position within the console area (perhaps behind the music desk) so that it can be readily accessed whenever the system is to be calibrated.

With the calibration handpiece plugged into the calibration connector for the chosen keyboard or pedals, switch on the power to the system. You can then inspect the LED on the front of the calibration unit (which should flash slowly) to confirm that the system is correctly connected and ready for operation. If the LED does not begin to flash within 5 seconds, turn off the power and re-check all connections before switching on a second time.

You are now ready to calibrate each of the manuals in turn .....

## Time to calibrate .....

### *Setting the key travel*

This is the first step and where you will tell IntelliKey exactly what are the normal travel limits required for each key. All of the steps involved in the calibration process require the calibration handpiece to be plugged into the system as described in the previous section.

Despite the speed of the overall process of setting up and calibrating IntelliKey, it is important not to be too quick with this step. IntelliKey will make all the following adjustments based on the information you are about to give it and so if a key is not fully or cleanly depressed, you may find it distorts subsequent adjustments.

The recommended method to gain consistent pressure is to use the same finger, first depressing the white keys and then the black keys. Care should be taken to achieve the same consistent pressure for the pedal keys. Although it does not matter in which order the keys are depressed, we suggest the following procedure.

On the Calibration Handpiece, turn the 'Travel' switch ON



Starting at the top note, work down through each natural key in turn. Press firmly (but not excessively) into its bedding. When releasing the key, do so gently to avoid the key bouncing above its normal rest position. Repeat this method for the sharp keys, again starting from the top and attempting to exert consistent pressure.

When you have completed this, turn off the Travel switch and wait a few seconds for the LED to begin flashing once again. Should you need to re-enter the key travel information for any reason, turn off the Travel switch and then turn it on again before recommencing the above process.

You now have the choice of either a quick calibration or full calibration as described in the following sections.

Quick calibration will set the manual up in readiness to allow very general operation. This can be useful in allowing other tasks to be carried out that do not rely on the final adjustment of the key action.

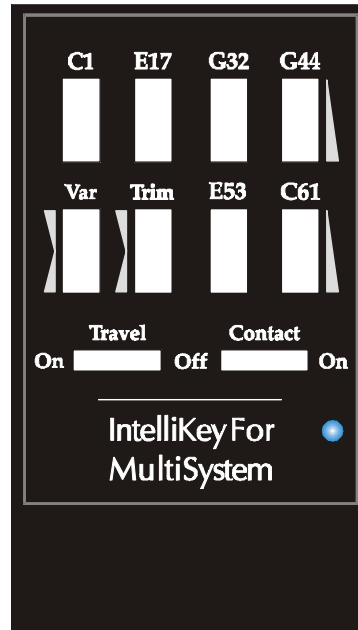
Full calibration will give a more specific adjustment of the key action in readiness for final use by the player.

## Quick Calibration

Before continuing with this section, please ensure that you have completed the actions detailed in “*Setting up the key travel*”.

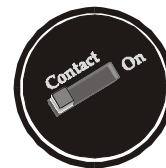
Looking at the Calibration Handpiece, you will see eight rotary wheels mounted in two rows. Six are labeled with note names, beginning from top left. If you calibrating a pedalboard, only the first three are operational.

Each has a grey tab protruding over the white of the control. Adjust this so that it is slightly above the center position for each control.



Check that the ‘Trim’ and ‘Var’ controls are adjusted to their central position.

Next, turn the Contact switch on and then off. Wait for the LED to begin flashing again.



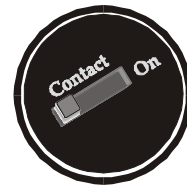
The manual or pedalboard should now be operational and each key can be tested. Please refer to *Full Calibration* for information on how to modify these settings if you wish to change the contact points that you have just set.

## ***Full Calibration***

Before continuing with this section please ensure that you have completed the actions detailed in *Setting up the key travel* unless you have not moved the IntelliKey rail or the keys themselves.

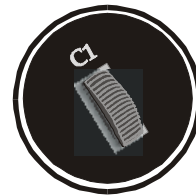
Ensure that the 'Var' and 'Trim' controls are set to their central position on the handpiece and turn on the switch marked 'Contact'.

(For reference, turning on the 'Contact' switch disables the 'Trim' function).



The remaining six rotary controls can now be used to manually adjust the individual contact-on points for the labeled keys – C1, E17, G32, G44, E53 and C61 (or the top note of the compass). For the pedalboard, the first three notes only are used.

Adjust each control in turn, forward to raise the contact-on point in the key travel or back to lower it.



Turning off the 'Contact' switch will allow IntelliKey calibrate a smooth progression between each of the six keys you have set (three for the pedals). In this way, a considerable variety of depths of touch can be achieved across the compass to suit your preference.

## ***Making Final Adjustments***

The 'Var' control actually stands for 'Variance'. It is this control that can now be used to adjust the contact-off position for each key.

With the control set to its central position, the contact-off point will be the same as the contact-on point.

However, by moving the control forward, the contact-off point will be set individually for each key above the contact-on point.

Rotating the control backward will move the contact-off point to be below the contact-on point.



'Variance' is a global control but the nature of its operation in relation to the individually set contact-on point, ensures a contact-off point unique to each key. This is because each contact-off point is calculated individually from the set contact-on point. It is this unique flexibility that allows the contact-off point to be anywhere above or below the contact-on point in the key travel.

It is recommended that you spend some time setting different configurations to experience the full variety of adjustment possible.

When you are satisfied with the contact settings for the manual, turn the 'Contact' switch off and wait for the LED to start flashing again.

With both the 'Travel' and 'Contact' switches off, the 'Trim' control becomes active. 'Trim' is a second global control that allows all of the contact points – both on and off - to be adjusted up or down by the same factor.

This factor is a small amount and is only intended to offer a tweak to the settings you have made. Larger adjustment (in either direction) are best handled by repeating the above process which can be accomplished quite swiftly. However, the Trim adjustment will be more than adequate in compensating for moderate wear in key felts etc.

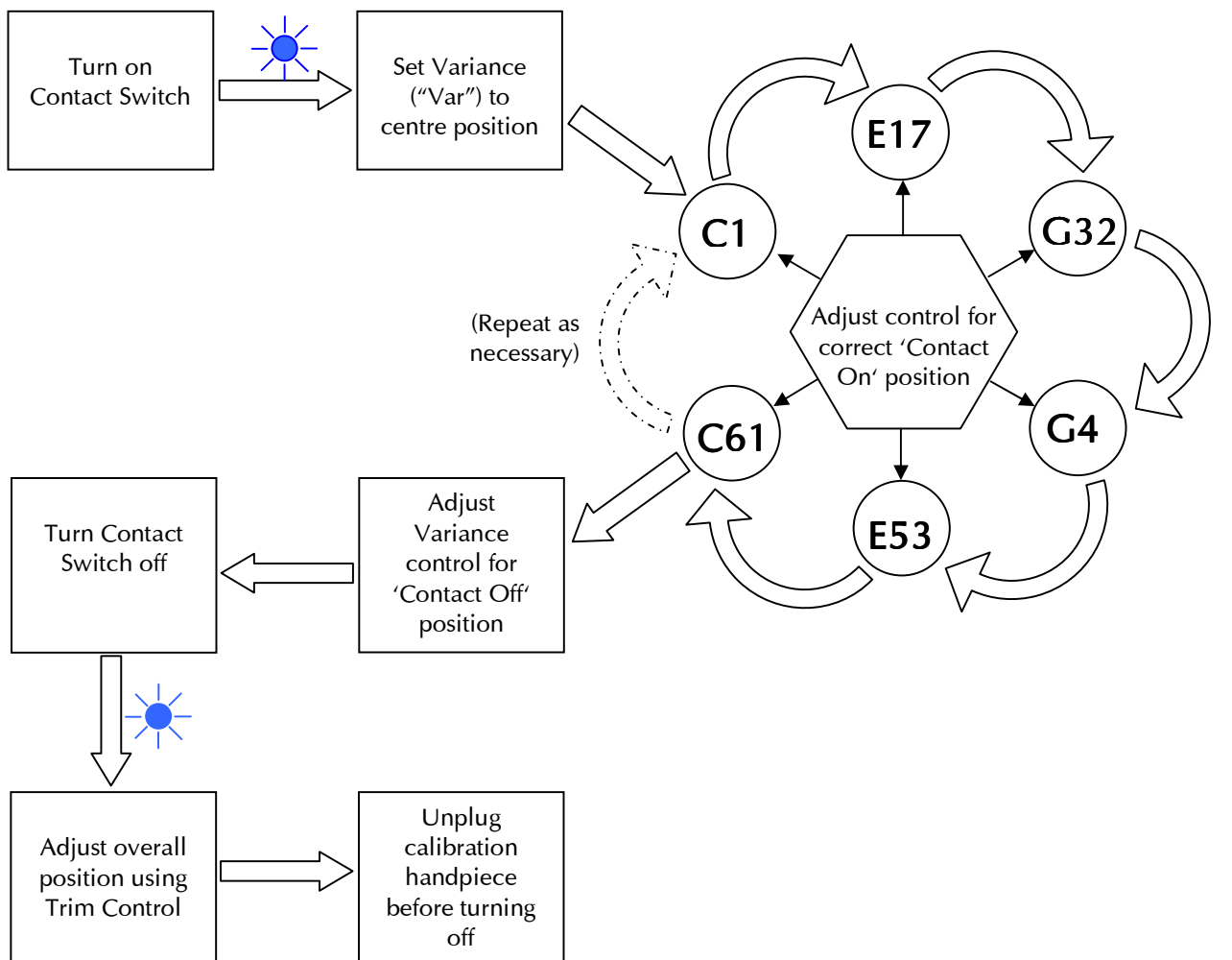


Finally, unplug the Calibration Handpiece and wait approximately five seconds for the settings you have made to be written to permanent memory. Failure to do this will mean that the calibration procedure will need to be repeated.


(Tip – If you are careful not to move any controls when you remove the calibration handpiece, you will be able to transfer the same settings to other manuals on the instrument. Plug the handpiece into the next manual socket, set the key travel as above, then simply switch the 'Contact' switch on and off and unplug the handpiece again to repeat the same settings to the new manual).

# Summary Diagram of Calibration Procedure

Once you have read the installation procedure, you may find it helpful to study the following diagram, which summarises the calibration process.



**PLEASE NOTE**



= Wait for LED to start flashing

## Other SSOS products

For 30 years, SSOS has been building superior products for organ builders worldwide. Performance-tested products, designed and developed for organists by our team of organ builders, electronics technicians and organists. From the largest instruments around the World to those in smaller chapels, Solid State Logic provides a range of high quality products to enhance your organ building.

### *Diode Coupling and Switching Systems*

The system that started it all – the Solid State Coupling Relay System. Comprised of discrete components this is the simplest switching relay and is custom built to order.

### *The MultiLevel Capture System*

The MultiLevel Capture System, like all quality products from SSOS, is fully flexible and adaptable to your needs. You can select any number of memory levels (channels), each with its own complete set of piston combinations. You may include such optional features as Programmable Crescendii, Tuttis, Ventils Divisional Cancels and Reversibles to name a few.

### *The CapKard and Total Recall™*

Designed for the MultiLevel Capture System, CapKard is removable capture memory. Each CapKard can hold all settings from the first 32 levels of memory on the system – including all settable functions such as Crescendo or LIST. Unlike similar systems, the CapKard is instantaneous and enables the player to build a library of registration settings for frequent pieces. Total Recall is available for MultiLevel Capture System and Capture For MultiSystem. It offers all the benefits of a CapKard, plus the ability to store the complete contents of any number of memory levels to the ubiquitous floppy disk. Both are available as upgrades.

### *Direct Connect*

Newly redesigned, this popular system provides a quick and reliable means of installing a variety of auxiliary functions within the instrument. Most commonly used are the solenoid control cards which are available in several formats and offer convenient and total control to gain maximum solenoid performance.

### *The MultiSystem*

The MultiSystem is a sophisticated, integrated control system of bi-directional communication. This may be between console and organ or vice-versa or ..... you choose! As the MultiSystem is software based, modifications can be made swiftly and simply without the cost of rewiring, requiring only minimal hardware changes.

### *Capture For MultiSystem*

Capture For MultiSystem (CFM) is a new and exciting piston capture system that is integral to the MultiSystem and incorporates our universally popular SCOPE™ feature. Installation costs are greatly reduced as much of the wiring is already complete in the MultiSystem and hardware is kept to a minimum.

### *MIDI For MultiSystem (MFM & MFM-D)*

The various options of MIDI For MultiSystem allow record and playback facilities together with tonal expansion through additional tone generators. Even scoring of recordings through a suitable music notation program is possible! MFM-D offers all this and more through a console-mounted display screen giving the player total fingertip control.



**Customer feedback from :.....**

**at : .....**

**To:**

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**Or in the USA to:**

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USA

I have recently installed IntelliKey for MultiSystem and I wish to make 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.