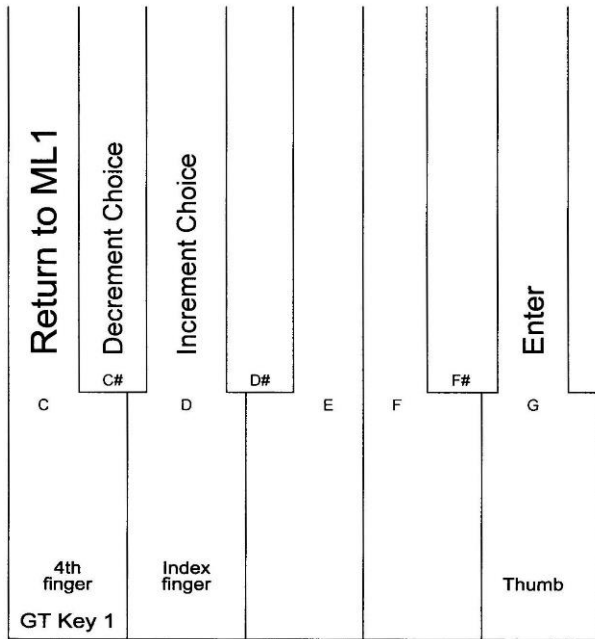


Power Up Programming Overview

CPx

After installation and wiring of the generic Input and Output cards, it is necessary to program the CPx card from the wiring pin lists to make each instrument 'unique'.

This programming is done by using Great keys 1-8 with the left hand. The key definitions are consistent throughout the programming sequences as follows:



Thumb on Great key 8 – **enter** key

2nd (index) finger on Great key 3 - **increment** choice key

3rd finger on Great key 2 - **decrement** choice key

4th finger on Great key 1 - **escape** or return key

5th finger resting on key cheek for stability

To access this Power Up Programming sequence from a cold start: hold Great keys 1, 2, and 3, then turn on power.

To access this Power Up Programming sequence from ML1 on the LCD: hold SET piston and Great key 1, then depress the Player/Menu piston.

Please follow the Power Up Programming instructions in numeric sequence, completing each number before proceeding to the next.

When complete, return to ML1 on LCD by repeated presses of Great key 1. Test for correct and complete programming. When correct and complete, capture FFF piston and Crescendo Pedal with flash drive removed using Great key 1 with the 'Set' piston. Then insert flash drive, return to PUP/10. Memory Config/Memory Backup, first Save: PUP to Flash Drive and second, Copy FO/CRES to MLs. For step by step, please refer to Installation Manual/VIII. Initial Power Up Sequence.

NOTE: When using the optical key contact rails, initial setup of on/off firing points for programming Great keys 1-8 must be done with only the Great keyboard, dip switch address 0 card, in the fiber optic loop with the CPx card. To access the setup screen for these firing points, use the cold start holding or reflecting Great key 1 only.

1. Input Card Address Assignments

CPx

Each Input Card dipswitch address, from 0 to 15, needs to be assigned a definition as listed in the **Wiring Outline-CPx System: IV. Inputs.**

Invoke the **Power Up Programming** sequence as instructed in the **Power Up Programming Overview.**

Release keys and/or pistons. **1. Input Card Address Assignments** will now be displayed on the LCD.

Return to PUP	Dec Assignment	Inc Assignment	Toggle Stops2-5 pistons only	Inc # of keys	Inc Non-Coupling Div#	Enter & Inc Address
C	C#	D	D#	E	F	F#
4th finger GT Key 1		Index finger				Thumb

Enter by depressing key 8 and the first address, 0, with Great/Div1 will be displayed. By default address 0 is assigned to be the Great/Div1, this cannot be changed.

Set the number of keys in Div 1 and Div 3-9 with **key 5**.

Use **key 6** to further qualify the selected keyboard division for non-coupling.

Key 4 will qualify Stops 2-5 as pistons only.

When choices are correct, depress the **'enter'** key 8 and the address assignment displayed will be written into memory.

Release key 8, the LCD will increment to the next address and display the assignment that is stored in memory.

Change assignment and qualifiers using **keys 2 – 6** for each address.

When all address assignments are completed, use the **'escape'** key 1 to exit. The LCD will auto increment to **2. Inputs Test.**

Any address that exists at the board level but does not have any wiring attached should say **'Not Used'**.

All addresses that do not exist at the board level, hence not in the fiber optic loop, must say **'Not Used'**

All address assignments can be checked and read from memory by repeatedly depressing the **'enter'** key 8.

NOTE: Floating division can be assigned. For this, skip a complete card address, that is base address and base+1 address, these being **'not used'**, then assign the floating division number.

NOTE: When assigning for manual transfers, Div1 (GT) and Div4 exchange, or Div5 and Div4 exchange.

NOTE: There are 3 non-coupling divisions, nc1, nc2, and nc3. which can be applied on any keyboard division in any order. This will allow the non-coupling division qualifiers in 7. Stop Programming.

NOTE: StopsX addresses are more versatile.

- Stops1: Stops, Couplers, MIDI stops, Pistons, chime volume.
- Stops2&3: Stops, Couplers, MIDI stops, Pistons.
- Stops4&5: Stops, Pistons.

NOTE: When Input card addressing assigning, there must be a Stops1. If needed assign Stops 2-5 in ascending order, no gap in the number sequence is allowed. Stops2-5 addresses can be assigned for pistons only reducing the file size of the combination action memory level, use **key 4** to qualify. Piston only stopsX assignments must be the highest of the stopsX numbers.

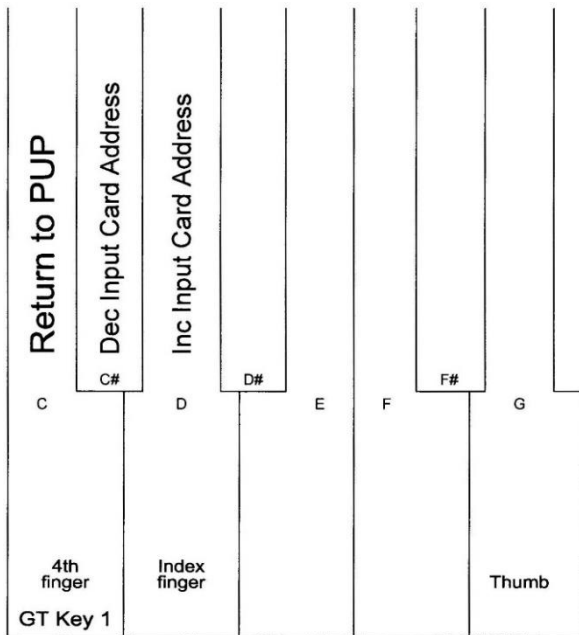
2. Inputs Test

CPx

This is a read only sequence in Power Up Programming, that is, there is nothing to program into memory.

Inputs Test gives a read out on the LCD of any Input that is currently on, a test and diagnostic tool for all of the wiring and programming that you have done to this point. An aid in setting firing points for keyboards, the LCD will read out the pin number at the point of turning on. If there are inputs stuck on, you will see them displayed on the LCD, a quick way to get the inside picture of the total number on and the first one to fix.

Invoke the **Power Up Programming** sequence as instructed in the **Power Up Programming Overview**, then 'Increment' with key 3 to **2. Inputs Test** and 'enter' with key 8. The LCD will start with address 0/Great keys.



Any Great key that you depress will be displayed on the LCD at the moment of switch contact. Hold Key 9 only, displayed: "Total# on: 1 and High Pin#: 9". The LCD has display room for only 1 pin, hence the highest of a group that is on. For example hold keys 9 and 10 down together, the LCD will say: "Total# on: 2 and High Pin#: 10".

Keys 2 & 3 will change the address number which equates with the dipswitch setting, only 1 address can be actively tested at a time.

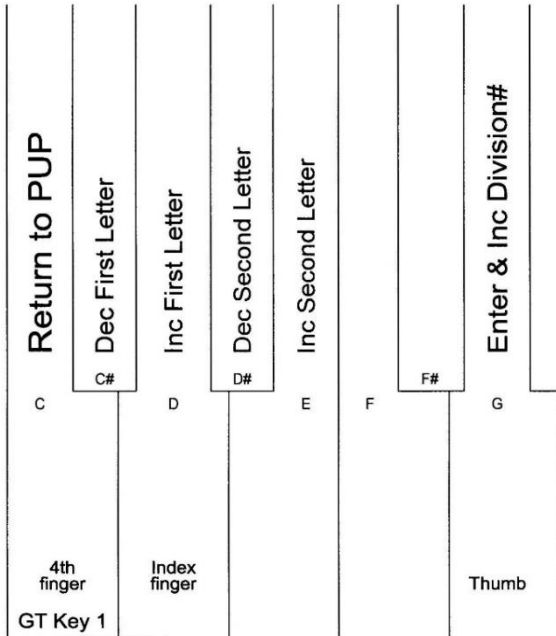
'Escape' depressing great key 1. The LCD will auto increment to 3. Division Naming.

NOTE: By default address 0 is assigned to be the Great division. Since the first 8 keys of the Great keyboard are the programming keys, they are ignored in this test, but Great keys 9-61 will display.

3. Division Naming

This sequence lets you name each keyboard division with a two letter abbreviation that makes sense in organ terminology. By default, Division 1 is the Great division—GT and Division 2 is the Pedal division-PD. Divisions 3 – 9 can be named if they have been assigned in 1. Input Card Address Assignments.

Invoke the **Power Up Programming** sequence as instructed in the **Power Up Programming Overview**, then 'Increment' with key 3 to **3. Division Naming** and 'enter' with key 8. The LCD will display **Division 1 GT**.



Keys 2 & 3 change the first letter.

Keys 4 & 5 change the second letter.

'Enter' with **key 8** to accept, the LCD will increment to the next assigned division number.

Repeatedly hit **key 8** to display the names of all of the divisions assigned, in ascending order, and wrapping from highest division to lowest division number.

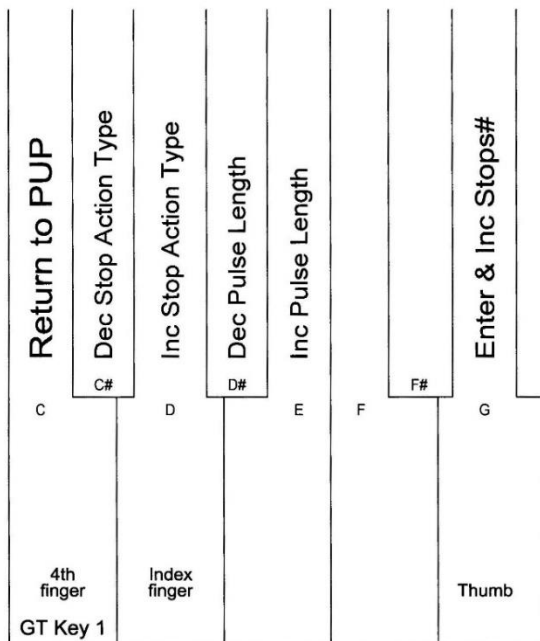
Use great **key 1** to 'escape' or exit. The LCD will auto increment to 4. Stop/Coupler Switch Hardware.

4. Stop/Coupler Switch Hardware

CPx

Each StopsX address assignment has to have the type of stop action defined, either SAMs or LEDs. Positional switches that use on/off coils, these are displayed by the name SAMs and momentary switches with some sort of light indication, these are displayed by the name LED's. When defining SAMs, you are able to enter a pulse length, this being the amount of time that the on/off coils are energized to get this positional switch to change or reverse position.

Invoke the **Power Up Programming** sequence as instructed in the **Power Up Programming Overview**, then 'Increment' with key 3 to **4. S/C Switch Hardware** and 'enter' with key 8. The LCD will display the settings for Stops1.



Keys 2 & 3 toggle between SAMs and LEDs.

Keys 4 & 5 change the pulse length if SAMs was selected. Numbers between 5 and 12 scan cycles are available, 8 being a good starting point.

'Enter' with key 8 to accept the settings and the LCD will increment to the next StopsX address assignment.

'Escape' or exit with key 1. The LCD will auto increment to 5. Define Pistons.

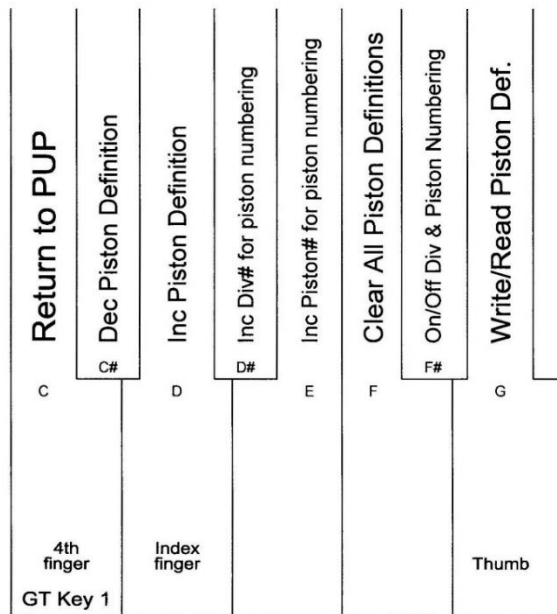
NOTE: After **Power Up Programming** has been completed, experiment with the pulse length in conjunction with the voltage setting of the power supply to the magnet coils. Strive for the lowest voltage that is reliable, this for the quietest operation, balanced by the shortest pulse length, this to reduce the duty cycle required by the power supply. This balance will consume the least amount of energy.

5. Define Pistons

CPx

Each Input pin that has been wired to a piston must be defined. The system scans all of the possible piston input pins from Stops1-5 and Pistons1-2 Input card address assignments, as described in the wiring outline. When a piston is 'hit', the definition choice selected on the LCD will be written into memory or defined for this input pin. Every other pin that is not used for pistons must remain undefined in this sequence.

Invoke the **Power Up Programming** sequence as instructed in the **Power Up Programming Overview**, then 'Increment' with key 3 to **5. Define Pistons** and 'enter' with key 8. The LCD will display "Write to Memory" and "Piston 1" when all inputs are released or off.



Keys 3 increments the piston pin definition, **key 2** decrements.

Hit the corresponding piston to record in memory this definition. The LCD will go blank and increment to the next definition when the piston is released.

Define general pistons from Piston1, that is Piston 1 on General 1, Piston 2 on General 2, ... continuing with Divisional pistons after the Generals.

After completing Generals and Divisionals, use **key 3** to skip the remaining piston numbers, up to 128, to display the definitions starting with O. Rev 1-8 (organist programmable reversibles), then P. Cancel 1-8 (programmable or divisional cancels), next the B. Rev 1-16 (builder reversibles such as Gt/Pd, Sw/Pd, etc.), followed by all the special function

pistons.

The final definition choice is "undefined", this means that you are defining the input to **not** be a piston. To be able to define any possible piston input as "Undefined" is necessary if a stop or coupler input pin has been mistakenly programmed as a piston.

If using manual interchanges or piston couplers, divisional pistons must be assigned to their corresponding division and number within the division up to 8 maximum. First select the piston number, then toggle **key 7** to turn on this div# and piston# within the division. Use **key 4** to select the correct div# and **key 5** to select the piston#, and then proceed with hitting these divisional pistons in numeric increasing sequence. The choices on the LCD will auto increment. Toggle **key 7** when finished with the division.

Toggle **key 8** to change the LCD to from 'Write to Memory' to 'Read from Memory'. This allows the definition in memory to be displayed on the LCD when a piston is hit, thus checking that the definition in memory matches the engraving and defining.

'Escape' or exit with Great **key 1**. The LCD will auto increment to 6. Define Couplers.

NOTE: Duplicate toe studs by the same name but wired to different input pins have to be defined to match the manual pistons definition, again choose the matching definitions with Great key 3, then hit the toe studs.

NOTE: manual interchange of B. Rev#s (maximum 2/div respectively):

GT or Div1 - B.Rev 1&2

Div4 - B.Rev 7&8

Div5 - B.Rev 9&10

For example, when exchanging the GT with the CH (div4), B.Rev1 will exchange with B.Rev7

NOTE: manual interchange of P. Can#s:

GT or Div1 - P. Can1

Div4 - P. Can4

Div5 - P. Can5

NOTE: "Read from Memory" all stops, couplers, and MIDI stops, they must say undefined.

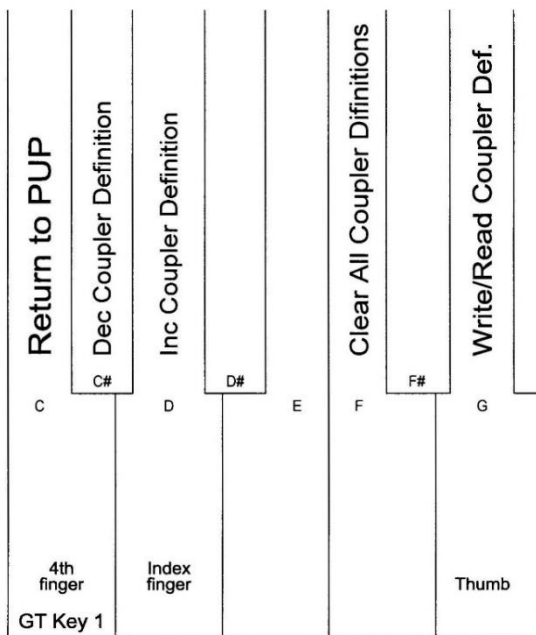
NOTE: Key 6 will clear or erase or "undefine" all possible piston input pins.

6. Define Couplers

CPx

Each Input pin that has been wired to a coupler must be defined. The system scans all of the possible coupler input pins from Stops1, 2,& 3 Input card address assignments, as described in the wiring outline. If turned on, the definition choice selected on the LCD will be written into memory or defined for this input pin. Every other pin that is not used for couplers must remain undefined in this sequence.

Invoke the **Power Up Programming** sequence as instructed in the **Power Up Programming Overview**, then 'Increment' with key 3 to **6. Define Couplers** and 'enter' with key 8. The LCD will display "Write to Memory" and "D1/D1" "GT/GT 16" when all inputs are released or off.



Key 3 increments the coupler definition, and **key 2** decrements this definition.

Turn on the appropriate coupler to program this selected definition into the input pin's memory. The LCD will go blank and increment to the next definition when the coupler is turned off.

Skip with **key 3** any definition that is not used.

Toggle **key 8** to change the LCD from "Write to Memory" to "Read from Memory". This allows the definition in memory to be displayed on the LCD when a coupler is turned on, thus checking that the definition in memory matches the engraving.

'Escape' or exit with Great key 1. The LCD will auto increment to 7. Stop Programming.

NOTE: "Read from Memory" all stops, pistons, and MIDI stops that are wired to Stops1, 2, & 3 Input card address assignments must say "undefined".

NOTE: **Key 6** will clear or erase or "undefine" all possible coupler input pins.

7. Stop Programming

CPx

Each stop and expression shoe must be mapped to magnets in the pipe chamber that are wired to pins on output cards with unique dip switch addresses.

This is done by use of levels, each level being a group of consecutive ascending keys or input pins mapped or programmed to a group of consecutive ascending output pins of the same number, aligned at the low pin of each group.

These levels are calculated from the Input and Output pin lists, and are to be documented on the Programming Levels Pin Lists before attempting to enter the numbers in this sequence.

Since this is a spreadsheet implementation where levels are rows, these levels can be manipulated by inserting, deleting, and clearing using **key 6** for the choice, **key 8** to enter, or **key 1** to escape.

Any level that is not used must be cleared using the **key 6** choice, and when clear, the word “clear” will be displayed next to the level number.

Invoke the **Power Up Programming** sequence as instructed in the **Power Up Programming Overview**, then ‘Increment’ with key 3 to **7. Stop Programming** and ‘enter’ with key 8. The LCD will display “Stop Programming” and “L1”.

Return to PUP	Dec Choice	Inc Choice	Dec division qualifier	Inc division qualifier	Clear/Insert/Del Level(s)	Dec Parameter	Enter & Inc Parameter
C	C#	D	D#	E	F	F#	G
4th finger		Index finger					Thumb
GT Key 1							

Select the desired level with **key 3** and ‘enter’ with **key 8**.

The LCD will display the stop number and move the stop wired to this pin number to the ‘on’ position by use of the combination action.

If not the desired stop, then manually select the desired stop, and any other stop that is ‘on’ will go ‘off’ by use of the combination action off coils.

Only one stop can be on at a time, the system will search and pulse to have only one ‘on’.

Speaking stops are associated with keyboards by turning the stop ‘on’ and will be indicated on the LCD with a number Sx-xx indicating which Stops# from 1-5 followed by the input pin number from 1-64 where this stop is wired.

Stop actions, tremolos, zimbelsterns, and chime volumes will be associated with pipe chamber magnets by leaving the stop in the ‘off’ position, which is displayed by S0-0. When correct, ‘enter’ with **key 8**.

The LCD will display the division, or input card address assignment that this stop is to be associated with. Change this division or assignment with **keys 2 & 3**. Qualify key divisions with **key 5** for chromatic (cr), diatonic (c), diatonic (c#), or non-coupling (ncr, nc, nc#) if the key division was assigned ncX in 1. Input

Card Address Assignments. Stops1 can be qualified with (cv) for chime volume. AtoD is qualified with the channel number, use **key 5** to change the channel number. When correct, '**enter**' with **key 8**.

Use **keys 2 & 3** to set the lkey (low key) or linp (low input) of the input group, and '**enter**' with **key 8**.

Set the hkey (high key) or hinp (high input) of the input group with **keys 2 & 3**, then '**enter**' with **key 8**.

Select the ocaddr or dipswitch address of the output card to which the output group is wired to with **keys 2 & 3**, '**enter**' with **key 8**.

Use **keys 2 & 3** to select the lpin (low pin) of the output group that is to align with the low key or input of the input group, and '**enter**' with **key 8**. This will finish the level, cancel the selected stop if one was on, and increment to the next level number.

When all levels have either been programmed or say clear, '**escape**' or exit with **key 1**, the LCD will auto increment to 8. MIDI.

NOTE: Two levels are required for straight chest stops, one level for the stop action (stop **not** turned on) and one level for the key primaries (stop turned on).

NOTE: Any level that is not used must be cleared using the **key 6** choice, and when clear, the word "**clear**" will be displayed next to the level number.

NOTE: Do not exceed 39 programming levels per Output card, memory space is finite.

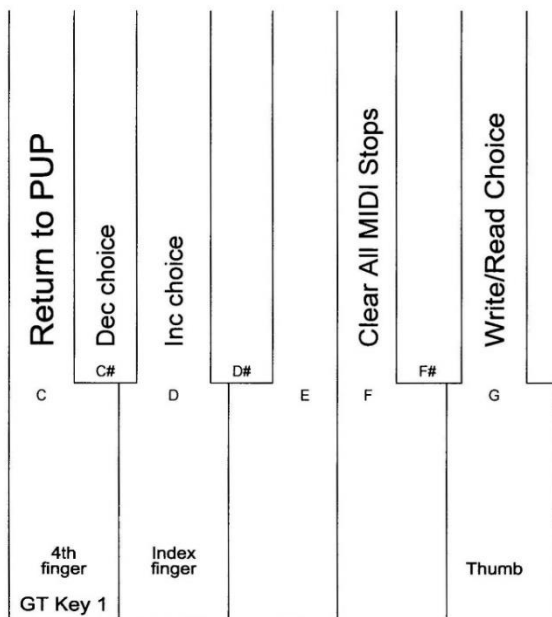
8. MIDI

CPx

Musical Instrument Digital Interface is embedded in the system utilizing MIDI stops, MIDI couplers, and MIDI volume. MIDI stops will be memorized in this sequence.

The system scans all of the possible MIDI stop input pins from Stops1, 2, & 3 Input card address assignments, as described in the wiring outline. If turned on, the definition choice selected on the LCD will be written into memory or defined for this input pin. Every other pin that is not used for MIDI stops must remain undefined in this sequence.

Invoke the **Power Up Programming** sequence as instructed in the **Power Up Programming Overview**, then 'Increment' with key 3 to **8. MIDI** and 'enter' with **key 8**. The LCD will display "Define MIDI Stps" and "write to memory".



Key 3 toggles between the two choices, either "MIDI Stop" or "undefined".

Turn on a MIDI stop to program this definition into the input pin's memory. The LCD will go blank and return to MIDI Stop when the stop is turned off.

Toggle **key 8** to change the LCD from "Write to Memory" to "Read from Memory". This allows the definition in memory to be displayed on the LCD when a MIDI stop is turned on, thus checking that the definition in memory matches.

'Escape' or exit with **key 1**. The LCD will auto increment to 9. CA Fields.

NOTE: "Read from Memory" all stops, couplers, and pistons that are wired to Stops1, 2, & 3 Input card address assignments, they must say undefined.

NOTE: **Key 6** will clear or erase or "undefine" all possible MIDI stop input pins.

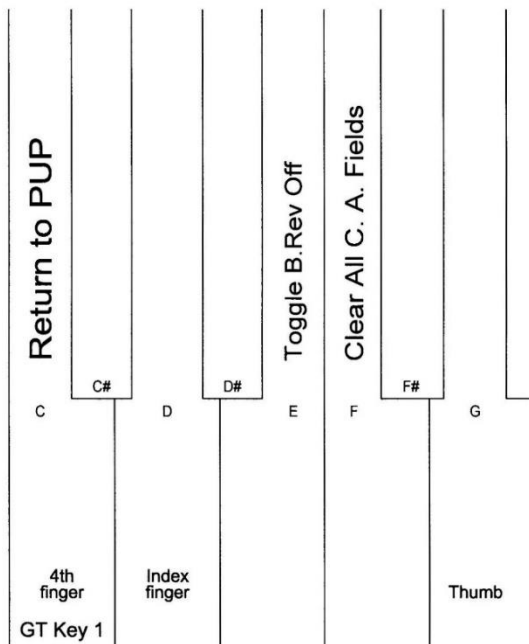
9. C.A. Fields

CPx

Pistons can act on any or all of the input pins that have been programmed as couplers, stops, and MIDI stops in the previous PUP sequences, 6. Define Couplers, 7. Stop Programming, and 8. MIDI. The pistons now need to be told which of these inputs to act on. Other names for this process include: scope, range, mask, or subset. This sequence defines a 'general' or 'divisional' piston (pistons 1-128) as well as what will reverse with a 'reversible' and what will cancel with a 'programmable cancel'.

In this routine the pistons and stop actions act as a 'capture' combination action, just as they do in ML1.

Invoke the **Power Up Programming** sequence as instructed in the **Power Up Programming Overview**, then 'Increment' with key 3 to **9. C.A. Fields** and 'enter' with **key 8**. The LCD will display "C.A. Fields". "Set and Test:" **Gen.**(erals), **Div.**(isionals), **P.**(rogrammable) **Can.**(cels).



The LCD is not interactive in this sequence.

Hit any piston to physically display the field in memory, the stop actions will move.

Capture a field by hand registering the field, hold the Set piston in and hit the desired piston.

Cancel all stop actions with the General Cancel.

When setting a reversible, there are two aspects to this process, setting the 'On' side and setting the 'Off' side. This is indicated on the bottom line of the LCD. By default, the 'Off' side is set at the same time as setting the 'On' side. If additional stops actions are desired on the 'Off' side, toggle **key 5** to access the B. Rev. Off side as indicated on the LCD. Now 'capture' the 'Off' side, the 'On' side will not change.

'Escape' or exit with **key 1**, the LCD will return to 10. Memory Configuration.

NOTE: Use key 6 to clear all combination action fields.

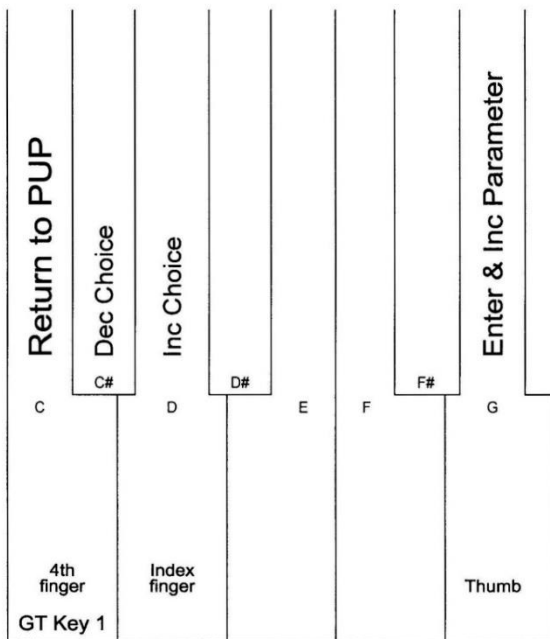
NOTE: Reversibles to not reverse, they only show what will reverse when returning to ML1.

10. Memory Configuration

CPx

System memory and configurations are set in this routine: LCD format, P/G split, special function pistons to work with keys on or all off, FFF display word, access to extended programming levels, virtual MIDI address, and memory backup.

Invoke the **Power Up Programming** sequence as instructed in the **Power Up Programming Overview**, then **'Increment'** with key 3 to **10. Memory Config** and **'enter'** with key 8. The LCD will display **"Memory Config"** and **"LCD Format"**.



Select choices with **keys 2&3** and **'enter'** with **key 8**.

Again use **keys 2&3** to set the configuration and **key 8** to enter this new configuration into memory.

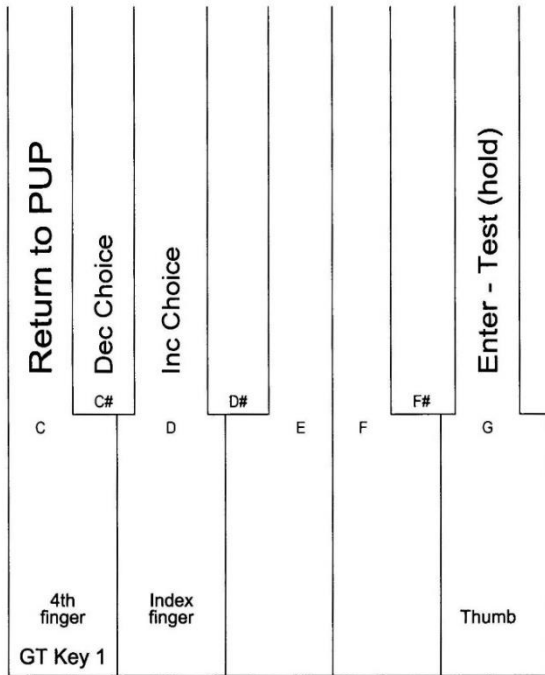
'Escape' with **key 1** and the LCD will return with 11. Hardware Tests.

11. Hardware Tests

CPx

System memory and hardware interfaces can be tested here for diagnostics and verification: LCD display, SRAM, and flash drive speed. All routines are self explanatory.

Invoke the **Power Up Programming** sequence as instructed in the **Power Up Programming Overview**, then 'Increment' with key 3 to **11. Hardware Tests** and 'enter' with key 8. The LCD will display "Hardware Tests" and "LCD".



Keys 2&3 are used to select, **key 8** will enter.

If LCD test, a form of all blocks on and all blocks off should cycle for a visual test.

If SRAM, hold **key 8** until Pass/Fail appears.

If Flash Drive Speed, files will be written and read from the flash drive, the time will be indicated as well as a plus (+) for acceptable, and a minus (-) for not acceptable. These files will be deleted after they are read from.

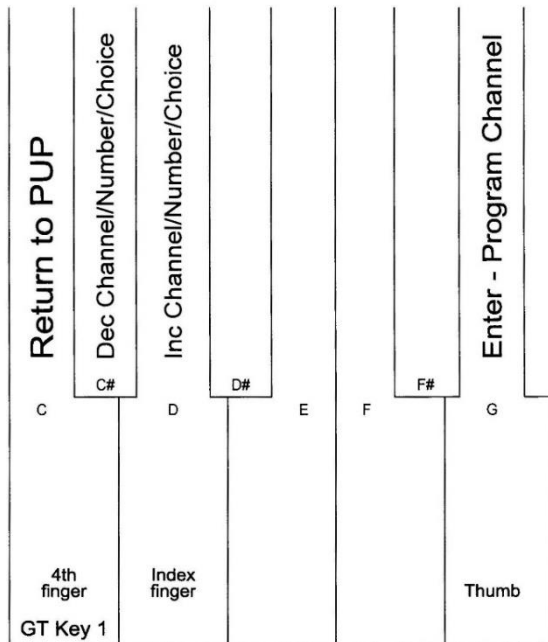
'Escape' or exit with **key 1**, the LCD will return with 12. A to D.

12. A to D

CPx

Analog to Digital is the interface whereby a potentiometer is used to measure an expression pedal position (analog) so that this variable voltage reading can be converted to a number (digital) for communication to the CPx card firmware. Each pedal is connected to its own potentiometer, and each potentiometer is wired to a unique channel number. These channel numbers are further defined by use, low number (closed position), high number (open position), and number of contacts (as if a discreet contact roller). When defined as the crescendo, each 'virtual' contact is treated as a general piston.

Invoke the **Power Up Programming** sequence as instructed in the **Power Up Programming Overview**, then 'Increment' with key 3 to **12. A to D** and 'enter' with key 8. The LCD will display "AtoD" and "CH1" with the memory contents for Channel 1 displayed.



Key 3 will increment and display the memory contents of each channel from 1 to 7.

To program the current channel displayed, 'enter' with **key 8** and a blinking block will appear at the first letter of the channel definition. 'Increment' with **key 3** to choose the definition and 'enter' with **key 8**. The blinking block will move to the low position number.

Move the corresponding expression pedal to the closed or full off position and 'enter' with **key 8**. The blinking block will move to the high position number.

Move the expression pedal to the open or full on position and 'enter' with **key 8**. The blinking block will move to the # of contacts number.

Select with **key 3** the number of contacts to mimic and 'enter' with **key 8**. The blinking block will disappear, the channel number will increment, and settings in memory for this next channel will display on the LCD.

Program all channels and 'Escape' or exit with **key 1**, the LCD will return with 1. Input Card Address Assignments.

NOTE: When entering the number (#) of contacts for the crescendo pedal definition, you will have the choice with key 8 to clear the combination action memory of the cres/full organ or skip this with key 7.

NOTE: The difference between the high number and the low number must be greater than 4 times the number of contacts. If less, move potentiometer attachment point on expression pedal further from the center of pivot and reprogram the channel.