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XLO-5CP

Control Panel for Five Channel Color Light Organ

Rev 1.15

An Optional accessory for the Xkitz XLO-5 or XLO-5DC 5 Channel Color Light Organs

Introduction

This kit contains all the electronics you will need to build a remote control panel for the Xkitz 5 channel light organs. It allows you to relocate the band level control pots and indicator LED's to a front panel location for easy access.

Features

- 5 Green LED tipped slide pots, one each for band level control, the slider tip LED's are the channel indicators – giving good visual feedback for adjusting your band levels
- 1 Red LED tipped slide pot for main input level control, the Red LED is the main power indicator.
- Slide switch that allows you to set all lamp circuits to stay ON
- Rocker switch to control the main XLO power
- Three signal input options:
    - Condenser microphone
    - Audio line-level input from an iPod, computer, mixer, etc.
    - Speaker input
- Compatible with Xkitz light organs XLO-5 and XLO-5DC, Rev 4.0 and beyond.
- Plugs into the 34 pin expansion connector on the XLO circuit boards
- This is an intermediate kit with about 20 components, and can be assembled in about 30 minutes.
- Front panel dimensions: 4.25" x 2.5", 1" deep
- Designed and packaged in the USA

Unpacking Your Kit

Carefully unpack and take stock of the components in your kit. The electronic components are packed in 1 bag labeled 'Bag A'. See Table 1 and Table 2 for a complete listing of your components.

Assembly Instructions

It is very important that you read and understand all of the following instructions before you start your assembly so that you don't make any mistakes that might be difficult to recover from. The assembly should be done in the order listed in Table 1 and Table 2 or you may have difficulty physically accessing components for soldering.

What you'll need

- Soldering iron with small or medium tip
- Damp sponge for tip cleaning
- Solder
- Solder wick or solder sucker in case of solder bridging (stranded wire could substitute)
- Small needle nose pliers.
- Small wire cutters
- Small Phillips screwdriver
- Stripper / Crimper tool
- Magnifying glass to read the markings on the tiny components

General Assembly Guidelines

- **Take your time!!** Most mistakes are made when rushing through the assembly. Taking the time to double check every step will pay off with a first-time functional device.
- In cases where it is necessary to re-form the leads on components (such as resistors and diodes), be very careful not to put stress where the lead enters the component itself. The physical attachment of the lead to the component can sometimes be very fragile and the lead may break off if too much force is applied. Reforming the leads can be done by gripping the lead with small needle-nose pliers at the base of the component while bending the lead on the other side of the pliers.
- Use as little heat and solder as necessary to affix the components to the PCB (printed circuit board). Many of the parts in this kit are temperature sensitive. Overheating may damage them.
- Always clean the soldering iron tip on the damp sponge prior to every solder joint. Re-tin whenever the tip gets a little dull. (tinning is the application of fresh solder to the tip of the iron until its shiny, wipe excess on a damp sponge).
- When clipping the excess leads of the through-hole parts, don't try to clip too close to the PCB. Clip just above the solder joint to avoid fracturing the solder joint, which could lead to device failure sometime in the future.
- Carefully inspect each solder joint to make sure you didn't accidentally form a 'solder bridge', or connect two adjacent pads together. Remove solder bridges by using solder wick or a solder sucker. If the bridge is small you may be able to remove it by just reheating the joint and sliding the soldering iron across the bridge. If not, see the next step.
- If you need to remove solder from a hole (or a solder bridge) and you don't have solder wick or a solder sucker, you can use stripped stranded wire in place of solder wick. Place the stranded wire across the hole and touch the soldering iron to the wire, above the hole. As the wire heats it will melt the solder in the hole, and the melted solder will tend to wick up into the stranded wire. When the wire fills up with solder, move a clean part of the wire over the hole and repeat until the hole is clear of solder.

Inner/Outer Circuit Board Assembly

You're ready to begin assembling your light organ control panel. This kit comes with 2 printed circuit boards; the larger one is the outer decorative front panel board, the smaller one is the inner board which contains most of the soldered components.

Assemble the boards in the order listed in Table 1 followed by Table 2. Use the install check boxes on the right side to track your progress. The 'Install Notes' column will alert you to any special instructions on the following page for each of the components. Refer to Figure 1 parts placement diagrams to see these more clearly.

Table 1. Inner Circuit Board Parts List

Pack √	Device	Value	Marking	Qty	Reference Designators	Install Notes	Install √
	INNER CIRCUIT BOARD (PCB)	REV 1.1	XLO-5CP	1			
	DIODE	1N914	1N914	5	D1,D2,D3,D4,D5	1	
	RESISTOR	10K	BRN-BLK-ORA	2		10	
	RESISTOR	33K or 100K	ORA-ORA-ORA BRN-BLK-YEL	1	R2	2	
	RESISTOR	1K	BRN-BLK-RED	1	R4		
	SLIDE POT, GREEN	50K	50K	5	VR1,VR2,VR3,VR4,VR5	3	
	SLIDE POT, RED	50K	50K	1	VR6	3	
	DPDT SLIDE SWITCH			1	SW1		
	SURFACE MOUNT CONNECTOR	34 PIN		1	J1	4	
	NO PARTS GO HERE				R1,R3		

Table 2. Outer Circuit Board Parts List

Pack √	Device	Value	Marking	Qty	Reference Designators	Install Notes	Install √
	OUTER CIRCUIT BOARD (PCB)	REV 1.0	XLO-5CP_O	1			
	MICROPHONE			1		5	
	ROCKER SWITCH			1		6	
	2 CONDUCTOR WIRE			1		7	
	SCREWS, M2, BLACK			4		8	
	34 PIN CONNECTOR			1		9	

Inner/Outer Circuit Board Component Installation Notes:

1. Diodes are polarized devices. A solid bar on one end of the diode marks the cathode. The cathode goes in the square pad hole on the PCB.
2. Resistor R2 is installed differently depending on your selected input mode:
    - For microphone input: Leave R2 empty
    - For line-in: install a 33K in R2.
    - For speaker input: install a 100K in R2. Solder your audio transformer in position T1 (not included in the kit by default, contact Xkitz for info on the transformer) Transformer primary should connect to the square pad pin 1
3. Carefully install the slider pots. Note there is one with a Red LED on the tip, and 5 with Green LEDs on the tips. Make sure you put them in their correct locations. These must be installed very flat to the PCB to allow the two boards to fit together properly and to make sure the slider handles all point in the right direction (parallel!). You'll need to trim the leads on the diodes and resistors opposite the slide pots very close to the board surface to allow the slide pots to rest closely against the PCB. Insert the slide pots into the proper holes and just tack solder them to start with, check the alignment is good before soldering all the pins.

4. The 34 pin ribbon cable connector is a surface mount type, which means the pins don't go through holes on the PCB. Instead the pins are soldered onto the back surface of the PCB. Be sure to align the pin 1 marker on the connector (a diamond shape molded into the plastic shroud) with pin 1 on the PCB (marked with a big white dot near the 'J1' marker). The best way to solder this in place is to pre-tin pin 1 on the PCB. Then, while holding the connecter in position, re-flow the solder on that pin to hold the connector in place. Now check the connecter is aligned on all 34 pins and all the connector pins are flush against the PCB surface. Now flow solder on all the remaining pins. Now look closely at all the soldered connector pins, double check that they all have good solid solder joints and there are no solder bridges.
5. If you want to use microphone input mode, then you should install the microphone on the outer circuit board. The microphone is a polarized device, so the orientation is important. The terminals of the microphone are slightly offset from the center line of the microphone housing. This device should be mounted on the front of the control panel outer PCB so it is exposed to exterior sounds. It should be installed matching the circle pattern on the board. Solder the microphone terminals on the back of the PCB.
6. Snap rocker switch into large rectangular hole, with the two terminals downward (toward the bottom of the outer PCB) so that the unit is ON when the top of the rocker switch is pressed.
7. The short length of 2-conductor wire is for connecting the microphone circuit to the inner PCB. If you're using mic input, strip about 1/8" from both conductors on both ends of the wire and solder from the (+) and (-) pads on the outer board to the 'MIC' (+) and (-) pads on the inner circuit board. If you're using line-in or speaker-in mode then you can leave this wire off.
8. Now attach the two board assemblies together. Insert the slide pot handles from the back through the slots in the outer PCB. Insert and thread the small black screws from the front, through the outer PCB, and into threaded holes in the outer-most two slide pots. Be careful not to scratch the outer finish on the decorative outer PCB.
9. Solder the remaining 34 pin ribbon cable connector into the expansion connector on the XLO light organ main PCB (either the XLO-5 or XLO-5DC, Rev 4.0 or above). Match the small diamond shape on the connector housing to the square pad on PCB.
10. Two 10K resistors are included to allow you to make a stereo to mono mixer to drive the line level input. See Figure 3 below.

Connecting the Control Panel to the XLO Expansion Connector

The XLO-5CP Control Panel connects to either the XLO-5 or the XLO-5CP via a 34 pin ribbon cable.

Before connecting the Control Panel to the main board, make sure that your have removed (or didn't install) the components made redundant by the Control Panel: Five of the 50K trimpots and the LEDs. If these components are left in place on the main board then they will end up being wired in parallel with the matching parts on the Control Panel, and this won't work properly.

- On the XLO-5 remove the following: LEDs D1-D5 and trimpots VR1, VR3, VR5, VR7 and VR9
- On the XLO-5DC remove the following: LEDs D3-D7 and trimpots VR1, VR3, VR5, VR7 and VR9

Note: leave the Center Frequency adjustment pots on the main PCB: VR2, VR4, VR6, VR8 and VR10. These are not controlled from the front panel.

One last thing to check before connecting the boards: make sure one last time that the 34 pin connectors on both the boards are installed the right way around; if these are backward then things could blow up. Pin 1 on the PCBs is always either a square pad and/or it is marked by a white dot. Pin 1 on the connectors is marked by a small diamond shape molded into the plastic housing.

Now go ahead and connect the two boards using the 34-pin ribbon cable assembly. The red stripe on the ribbon cable marks pin 1, make sure the red stripe points to pin 1 on both boards (the connectors are keyed, so you really can't plug them backwards). The included cable assembly is about 8" long to allow some flexibility in mounting the boards. If you need more distance between the boards, you can use a slightly longer cable, but longer cables may not work as well due to noise, added inductance, etc. So you may need to experiment.

Note: you won't need to connect anything to the 'MIC/LINE/SPKR' 3 pin terminal block on the main board. When using the Control Panel circuit board, the audio signal comes though the ribbon cable.

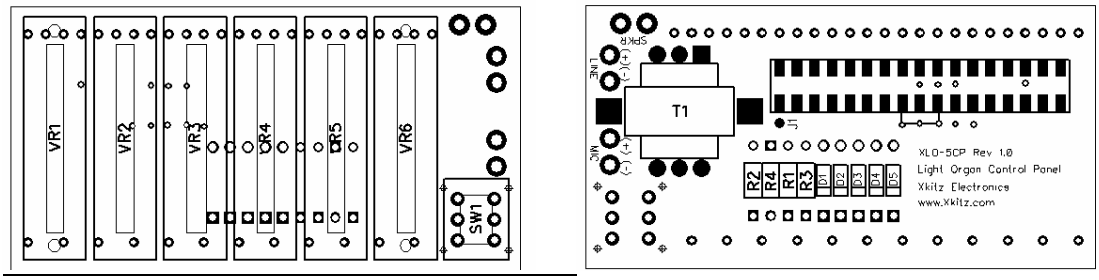

Figure 1. Parts Placement Diagram (Inner PCB, Front and Back)

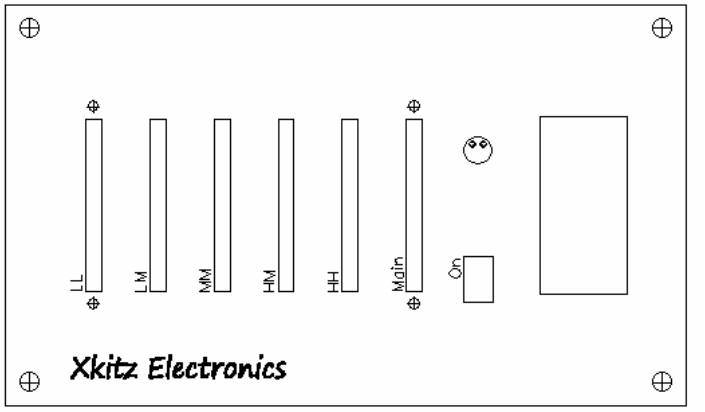

Figure 2. Front Panel Diagram (4.25" x 2.5")

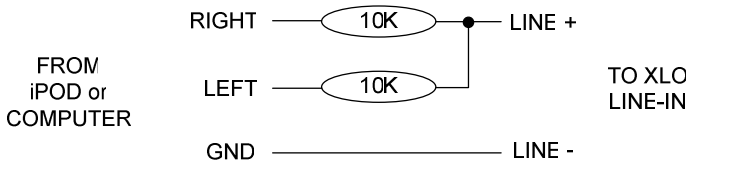

Figure 3. Optional Stereo-to-Mono Mixer

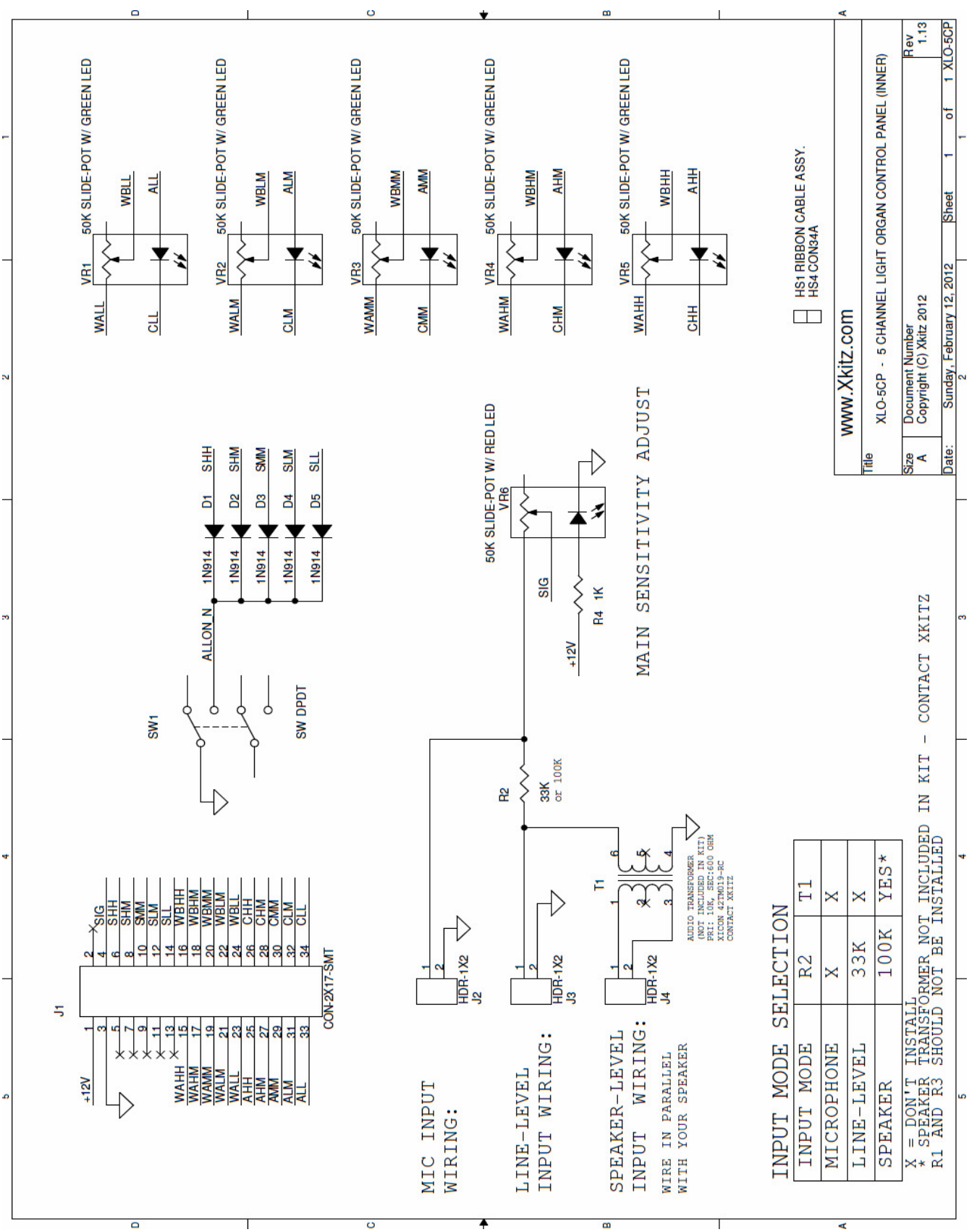

Figure 4. XLO-5CP Control Panel Board Schematic Diagram