Set-up and Use of your Wilson F/X Launch System

Your Wilson F/X systems components will come to you pre-programmed and ready to use. Your pad-boxes will already be programmed to your specified designations.

All hardwired connections between the controller and pad-boxes are thru 16/3 outdoor extension cords. It is recommended that "BANK-A" be the first bank connected closest to your LCU-64 or LCU-128 controller. Unless your system is completely "wireless" your "BANK-A" powers your LCU controller. And it powers the controller thru the "ground-plug" of the 16/3 extension cord, so it too must be intact. (for Wireless users, see below)

Connect all of your hardwired pad-boxes to your controller BEFORE you connect any of your pad-boxes to their batteries at the pads. If you don't you are likely to blow a fuse in at least one of your pad-boxes and/or your controller.

Connect your pad-boxes to your controller using only 16/3 outdoor extension cords that are in good condition with the "ground-plug" intact. If a ground-plug is missing, replace the 16/3 extension-cord communications line immediately. The whole system will not operate if the communications polarity is reversed at any connection. No permanent damage will be done with reversed polarity, but the system will not operate with reversed polarity.

Reversing the polarity can blow the 2 amp mini-fuse inside each pad-box or in the LCU-64 controller. Replace only with another 2 amp mini-fuse. They can be purchased at any auto-parts store. I get mine from Digikey. The Digikey part number is: F986-ND and last I checked they are about $.25 cents each. Do not replace with any other sized mini-fuse. Use only a 2 amp minifuse.

Using your LCU-64 or LCU-128 Launch Controller *(standard controller)*

Your LCU-64 or LCU-128 controller is clearly labeled for ease of use. There is a removable Key-switch which is labeled ON and OFF. The Key is only removable in the OFF position.

Along the bottom of the controller are 8 pad select switches with the numbers 1 thru 8, in RED. You may launch one pad at a time or any combination of the 8 pads of any single bank, or even all 8 pads at the same time with enough available battery power.

Along the top edge of the controller are the 8 bank select switches (16 of them if you have an LCU-128) labeled in BLUE. The Bank select switches are used to select a single bank of pads at a time. If you accidentally select two or more banks of pads at a time, the Wilson F/X launch system will sit there and ignore all commands until you deselect all but a single bank of pads at a time. If your system stops working, check to make sure you only have ONE bank selected at a time.

When you have selected a single bank of pads and a single pad on that bank, the controller will automatically do a "continuity check" of that bank/pad designation. If that bank/pad has good continuity then the controller's LED will be on with a steady light. If there is no continuity then the controller's LED will blink a fast blink, blink, blink, blink, (etcetera) that indicates that there is no continuity. When doing drag races it is best to first select each pad separately in order to determine if all the igniters in the drag race have continuity before you go on to select the pads on that bank for the actual drag race. When multiple pads are selected, the controller's LED will blink out a slow blink, blink, blink, blink, (etcetera) to indicate that multiple pads are selected.

There is a momentary-on "FIRE" button which is used to launch rockets. It will close the relays in the one selected bank of pads pad-box and fire all the pads on any one bank of pads that you have selected. It will continue to close each selected pad's relay for as long as you hold the button down.

The last switch is another toggle switch which is labeled "TEACH" and "VOLTS." This is a three position toggle switch with two momentary-on positions, one for putting the controller into "teach-mode" and the other for doing a "remote voltage reading" of any bank of pads that you have connected to your controller.

That's the basic layout and instructions for use of your standard W-F/X LCU-64 or LCU-128 controller.

There are really only two operations done with a W-F/X controller that need more than a cursory explanation. Those operations are "teach-mode" and "remote-voltage-reading." You can read about that a little further on in this document.

<u>GOING WIRELESS</u>

If you are using WRU-c wireless units along with or instead of going hardwired, a few additional instructions need to be taken into account. Pad-boxes are available with built in wireless units. But separate plug-n-play wireless units are also available for those who are augmenting WFX pad-boxes without built in wireless units. The following instructions are mostly aimed at these non-built in unit users.

Current WRU-c wireless units are all identical. Each unit is both a transmitter and a receiver. So unless you have some of the very early WFX wireless units, each of them has a female 16/3 extension cord communications line coming out of it.

Carefully screw the antennae onto the WRU-c unit. The antennae is adjustable so that it is easily set in the vertical position. It has a 90 degree hinge that allows for vertical placement.

The WRU-c at the pad-box is the easiest to "hook-up" because all you have to do is plug it in to the single 16/3 male extension cord coming out of the pad-box. That single 16/3 male extension cord coming out of the pad box is the communications line coming out of it which is the communications connection to your WFX LCU unit hardwired or wireless. Plug your WRU-c into the pad-box BEFORE you connect the pad-box to its battery at the pads. When you "power up" the pad-box, the wireless unit will light up all four of its LED's, then the three green LEDs will turn off. The red light is a simple blinking power-on indicator. The three green LEDs are for showing your relative signal strength. The greens at the pad box only turn on when the LCU controller is sending out commands. Otherwise the unit remains in a dormant listening mode waiting for commands from the controller.

If your system is partly hardwired and partly wireless, you will have a simple two line Communications Adapter that consists of a small aluminum housing with two 16/3 male extension cord ends coming out of it. Plug one end of this into a 16/3 triple block at the controller where the communications line comes from your first hardwired pad-box and the other end into your WRU-c that you're using at the LCO table on your LCU-64 (or 128). This wireless unit will automatically transmit

and receive communications from and to your controller. This cord also powers both the LCU-64(128) and the WRU-c at the controller using power from the first bank of pads that is hardwired to your controller thru its male 16/3 extension cord which carries both communications and power for controllers and/or wireless units.

If your system is completely wireless, you have a three-way Power Adapter with a small three-way aluminum housing with three cords coming out of it. Two of them are the same 16/3 male connectors as the simple two-way adapter in the previous paragraph, one of which is plugged into your LCU-64 (128) and the other directly into your WRU-c at the controller. The third cord coming out of the Power adapter is divided into two power connections for the battery at the controller. Connect the **RED** "+" battery clip to the "+" positive side of your 12v battery at the controller and the **BLACK** "-" battery clip to the "-" negative side of your 12V battery at the controller.

REMOTE VOLTAGE READING *– (standard controller)*

Doing the Remote Voltage Reading (RVR) from the LCU-64 or the LCU-128 of any bank of pads is very simple. But the pad-box of which you want to do a remote voltage reading must be powered up, connected to the controller hardwired or wireless, and the pad-box must be capable of doing Voltage Reading and Remote voltage reading. If it has a push button labeled VOLT then it is capable. It makes no difference if it is connected by hardwire or wireless. The operation is identical. If the battery you are trying to "read" has no voltage, then this operation will not work for all the obvious reasons. I have gotten readings from batteries with as little as 7.2 volts, but that was not enough volts to fire an igniter, but it was at least enough to report its low voltage back to the controller.

To remotely read the voltage of the battery at a bank of pads that is powered-up and connected to your controller….
{1} You start out with all the pad and bank select switches on your controller, in the off position.
{2} Then you turn your launch controller on (Key switch).
{3} Next on your controller, you turn on the bank select switch of the bank of pads whose battery you want to check. DO NOT SELECT ANY PADS. Only turn on the Bank Select switch of the bank of pads that you want to do check.
{4} Lastly, you find the TEACH/VOLTS toggle switch, and toggle it towards the VOLTS side holding it in the VOLTS position. The LED on your controller will blink out the reported volts in the battery at the bank you have selected in the exact same manner as the volt switch on the pad-box itself. For instance, if your battery at the pads has 12.5 volts, the LED will blink 1 time, followed by a brief pause.

Then it will blink 2 times followed by a brief pause. Then it will blink 5 times followed by a longer pause, it will continuously blink out the voltage at the selected bank of pads until you release the "volts" switch on the controller.

TEACH MODE

All of your pad-boxes will be shipped to you already pre-programmed to your specifications. But occasionally, you may wish to change your layout. As your pad-boxes will remember their bank and pad designations until somebody reprograms them to a different bank and pad designations, this process is not used very often. There are 9 steps to Teach mode. You may exit "teach-mode" at any time by simply turning off your selected pad switch, your selected bank switch, and finally turning off your controller's key switch.

{Step 1} Connect your LCU-64 or LCU-128 controller to the pad-box that you wish to re-designate as a different bank of pads (hardwired or wireless). Make sure to connect ONLY pad boxes that you want "taught" by your controller to a new designation. And this works for both hardwired and wireless pad-boxes connected by hardwire or wireless to your controller. Any pad-box connected to your controller when it is in "teach mode" can be "retaught" with new bank/pad designations. So be careful to only connect pad-boxes you want "taught." The easiest and safest way to do this is to ONLY plug directly into your controller, those pad-boxes you want to "teach."

If you have a "pre-2014 W-F/X system," you may need to connect your "Bank-A" with the "red cross" power supply indicator sticker on top. During the earlier years of Wilson F/X systems only Bank-A was internally configured to power the controller thru the communications cord. With all current systems, all W-F/X pad-boxes now send power thru the "comms-plug" of the 16/3 communications line for powering controllers and wireless units. So for these earlier systems you will need to connect your Bank-A to power your controller as well as connect whichever bank of pads you wish to re-designate.

You may connect and power up as many other pad-boxes to the LCU-64 as you would like to reprogram. They just need to be powered up and have their communication lines connected to the controller. But again, for those with earlier systems, a pad box with the red cross sticker MUST be the first pad box connected to the controller in however long of a string of pad boxes as you'd like, because in those early systems, a pad box with the red cross sticker is required to send power back to the controller.

{Step 2} Make sure all the pad select switches, bank select switches, and your key-switch on the controller are ALL in the off position.

{Step 3} While you hold the teach/volts toggle switch in the teach position, turn on the power key-switch on top of your LCU-64 or LCU-128 controller. Hold the teach switch in the "on" position for a second or two and then release it. The controller's LED will blink a double-blink followed by a second or two of no light followed by the double blink etcetera. It's visually like a heartbeat. As long as the double-beep is still blinking, your controller is in "teach-mode."

{Step 4} If you do not see the double blink then you are not in "*teach mode*." Turn the key-switch power off again and recheck to see to it that all your bank and pad select switches are in the off position. The controller will not go into "*teach mode*" if any of the bank or pad select switches are in the "on" position. If after following these steps, for some reason you cannot get your controller into "teach mode," contact me A.S.A.P., because there's something wrong that needs fixing.

{Step 5} Now that the controller is in teach mode, (with its double-blink heartbeat) select the bank that you wish to program by turning on that bank select switch designated with the bank designation for which you want to program a pad box. For instance, let's say you want to reprogram bank F to become bank C. With the controller in "*teach mode*" you select the bank C switch on the controller. The system will continue to do its heartbeat double tap. That's as it should be. You are now ready to program your new bank "C."

{Step 6} With the controller in teach mode and bank "C" selected, next select pad-1 on the controller, the Controller is now basically sending out the question to all connected pad-boxes asking "Who wants to be designated as Pad-1 of Bank-C? You now push down the pad-one continuity switch button on your new bank "C" bank-of pads pad-box and hold it down for a couple of seconds. When you hold the #1 continuity switch down on the pad box, the controller teaches it who it is. The controller's LED will turn on a solid light once that bank/pad selection has been learned by the pad box. Let go of the now "taught" pad-one-bank C continuity switch on the pad box. It is now bank C pad #1. It will remain bank-C pad-1 till somebody reprograms it to something else.   The controller is still in "teach-mode" and the double-blink on the controller's LED will return after you let go of the pad-box continuity button you just pushed.

{Step 7} Turn off the #1 pad select switch on the controller.

   A note to think about at this point: if you only teach pad one that it is now pad one of bank C, the rest of the pads on that bank which was bank F will still respond to the controller as bank F. You have not yet taught the rest of the pad-box anything new, so they remain with their old designation till somebody teaches them otherwise.

{Step 8} It is normal to program all the pads on a given bank/pad-box with the same bank designation. So without changing anything else, turn on the pad select switch on the controller designated as pad #2. The controller is still in teach mode and still has bank C selected, and now with pad #2 of Bank C selected on the controller, you push the continuity switch on bank-C pad #2 for a few seconds and the controller's LED will once again give that solid light again to indicate that it has reprogrammed what was F-2 to its new designation as C-2. Let go of the continuity button on the pad box and turn off the controller pad select switch #2 and repeat the process one at a time for pads #3 thru #8 of your newly reprogrammed bank C pads 1 thru 8 and you are done reprogramming bank C, pads #1 thru #8. Don't forget to change the Bank designation on the Pad-box itself or users will still think its bank F.

        Another note to think about: At this point you have completely reprogrammed your old bank F to become your new bank C. But if you had a former bank C, and it is still connected to your launch controller, it still thinks it is bank C and it will respond to the controller as bank C until someone reprograms it as a different bank designation.

        That happened at the beginning of MWP-11; we somehow had two bank C's connected to the controller at the same time. They both worked as bank C and each gave continuity reports back to the controller as soon as bank C and any given pad was designated. I discovered the problem and using this exact process reprogrammed one of the bank "C" pad-boxes to an unused bank designation.

        You may follow these teach mode instructions to re-teach any Wilson F/X pad-box to become any bank/pad selection you want it to be. You may select a different bank box and teach it to be bank F, pads #1 thru #8 to replace the pad box that you just re-designated as pad C. Or you could reprogram every single pad in your system to the exact same bank and pad designation. You could teach all of your banks and pads to be bank C, pad 4, which might be a popular bank and pad number if you know what I mean.   Of course every time you select pad C-4 every pad in your system would say "here I am" to your controller and every one of your pads would fire if you pushed fire on bank C pad #4. If you want to do a mass drag

race I would suggest that you use an ARM Armageddon Switch instead. It's a lot easier than reprogramming all the banks to the same bank and pad designation.

{Step 9} Turning OFF the Controller's Teach Mode. If you are done "teaching" your bank of pads igniter leads/continuity switches who they are, merely turn off all of your pad select switches and your bank select switch, followed by turning off the key-switch on your controller. Your controller is now off and it has exited "teach mode."

Programming PBU-1's and PBU-4's.

The process for programming a single-pad pad-box, a PBU-1, is identical to the process for the PBU-8. The only difference is that you only have to program the one bank/pad selection into the PBU-1 pad-box. The same goes for a PBU-4, except for the fact that it has four pads.

Voltage Reading at the Pads

Built in Voltage Reading as a feature of Wilson F/X systems is a recent addition to multi-pad pad-boxes and LCU-64/128 controllers. This feature may be added to most older PBU-8 pad-boxes and LCU-64 controllers. Brand new single-pad controllers and single-pad pad-boxes are just coming off my assembly line (April-2016) with this capability. The older versions of the LCU-1 and the PBU-1 do not have this capability and it cannot be added to them.

I've already talked about how to remotely read the voltage of a pad box from the controller, but now I will describe the process of reading a voltage at the pads. It is a very simple process. With the pad-box connected to either its wireless unit or the communications line to the controller, power it by connecting it to its battery. The Pad-box will automatically read its battery's voltage as soon as it is powered up. To do subsequent voltage readings, all you have to do is push the "volt" button on top of the pad-box and listen for the sequence of beeps. Reading the voltage sequence is identical to reading the voltage blinking/beeping sequence at the controller. One-beep, followed by 3 beeps, followed by 5 beeps, means you have 13.5 volts in the battery connected to that pad-box.

Reading Continuity at the Pads

To get a read on the continuity of your igniter at the pads is also a very simple and safe thing to do. Hook up your igniter to the igniter lead's alligator clips just like you are ready to fly your rocket. Make sure your alligator clips are not touching or you'll get a false positive reading of continuity where it may not actually exist. Follow your igniter lead back to its pad-box and push the continuity

button of your igniter lead. Don't be afraid. Go ahead and push the continuity button down. You can even check an old-style "flash-bulb" igniter safely with Wilson F/X technology. WFX continuity check uses a max of only 1.5 milli-amps of power. So test away! If you have good continuity when you push the continuity button, the piezo of the pad-box will give a solid tone. If you get no solid tone with a commercial igniter, then you probably have a "bad" igniter and need to replace it.

But you may also need to check your igniter leads at the pads by connecting the alligator clips together and pushing the continuity switch on the pad-box. The piezo should give off a solid tone. If there is no solid tone with the alligator clips touching, make sure the battery is connected at the bank of pads you are at. If it is connected correctly "+ to +" and "- to -" and you still get nothing check the battery voltage. If the battery has a charge, but you still get no continuity thru the connected alligator clips, then probably one of the zip cords has become disconnected between the alligator clips and the rest of the igniter lead. It may be necessary to replace a bad igniter lead or at least replace a bad alligator clip.

Using the new LCU-64x or LCU-128x Wilson F/X Custom Controller

Using your custom LCU-64x or LCU-128x controller is, as far as the various functions are concerned, the same as using one of our standard Launch Control Units. The earlier instruction are quite good. The differences are mostly in the area of how the unit reports the various status reports from the various functions of which the controller is capable. The controller has RGB-LEDs capable of giving you the status of a switch's command by the color that the switch's RGB-LED is indicating.

When you turn on your controller with the key switch, the key switch's LED turns RED. The red LED color is used to give the user the warning that the controller itself has be turned on and is now capable of actions.

When the controller is first turned on, the LCD screen reports the voltage of whatever battery is powering the controller. When you select a single bank and then toggle the Remote Voltage switch, the LCD screen will report the voltage from the selected bank of pad's battery. The LED for the selected bank will turn green as soon as it is selected. If however, you select a bank of pads that is not connected to the controller, the LED for that bank will be red indicating that nothing is connected to that bank. If you try to get a voltage reading from that bank, the LCD screen will flash the words "NO READ," again to indicate that there is no bank that matches that designation connected to the controller. Remote Voltage Reading works whether the selected bank of pads is hardwired or wirelessly connected to the controller. If the voltage is below the minimum, 7.2 volts, the remote voltage reading will not operate.

When the LCO wants to fire a pad, the LCO will need to select a single bank of pads and from 1 to 8 pads on that single bank of pads. If you select two banks at once, the two bank LEDs will both turn red. If however, the LCO selects one bank and a single pad then both the bank LED and the pad LED will light up to indicate the status of that particular bank and pad. If there is a good igniter on the igniter leads of the pad/bank selected then both the selected bank LED and the selected pad LED will light up green to indicate that all is good to go. The pad-box will also light up its warning light and its piezo to warn people that this particular bank of pads has been armed. The LED of each selected pad (up to 8 of them) will be shown in case there's a drag race or the user is using the multi-pad pad-box as a cluster box.

The operator puts the controller into TEACH mode in the exact same way as the standard W-F/X Launch Control Unit. But when you first turn on the key switch with the TEACH toggle held on, the Key switch's LED will turn GREEN to indicate that the controller is on and receiving a teach mode command. When you let go of the teach toggle switch, the key switch's LED will turn a pale blue color indicating that the controller is now in TEACH MODE. If your controller has a piezo buzzer and you have it turned on, it will also be beeping out the standard double-tap heart-beat of teach mode.

If you have any questions contact me at rocketrev@wilsonfx.com for further information.

In emergencies, I may be contacted by cell phone at 630-254-3953

Well there you have it. Enjoy your Wilson F/X launch system.

Brad, the "Rocket Rev.," Wilson

PS: This document was last updated on   03-16-2019