

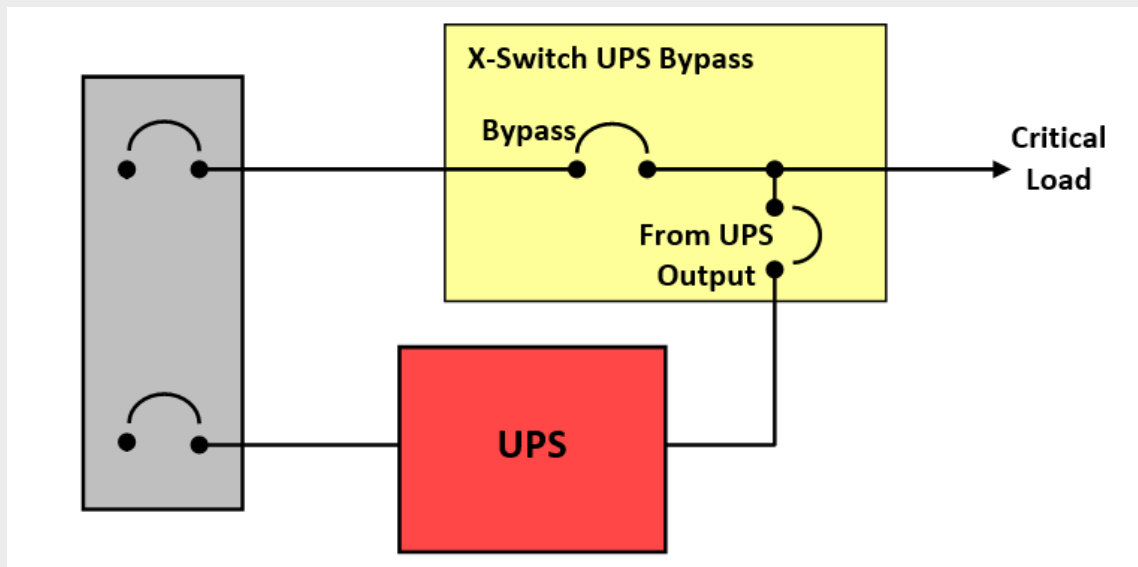
Why Do Electrical Engineers love the X-Switch UPS Bypass?

This is a tutorial about your UPS Bypass Switch. It's long! To see the 3 minute video instead, just [click here](#).

Most UPS people hate to touch their UPS Bypass Switch! Instead of holding monthly or quarterly practice sessions like they should, they never touch their bypass switch if they can help it. It's very emotional - you could blow up the UPS, drop the data center, and lose your job. No one wants to do it!

There's a great reason for their angst - UPS bypass switches are generally misleading, confusing, and dangerous. No wonder people don't like them!

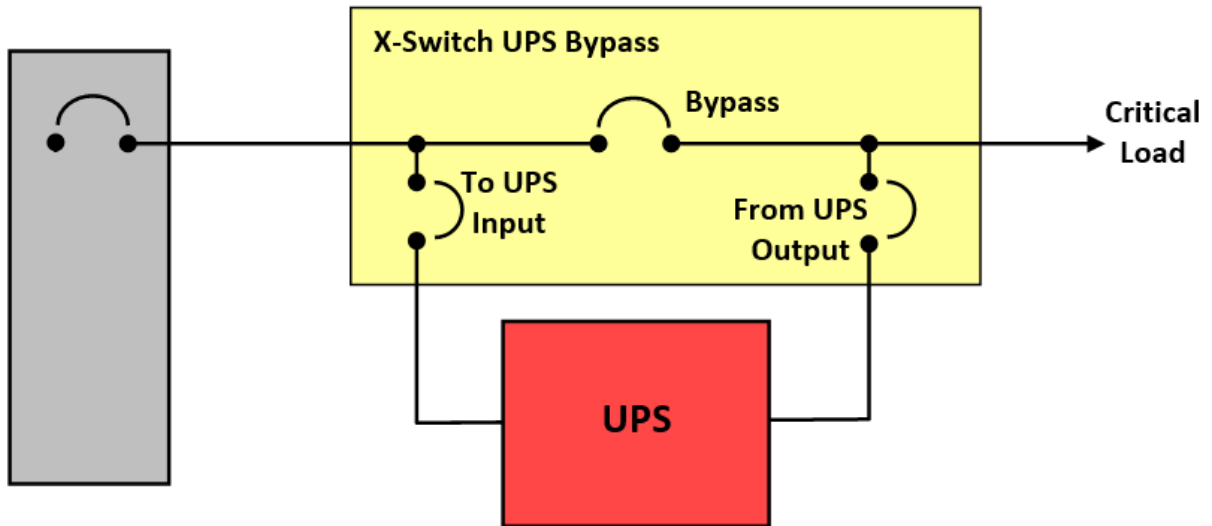
Here's a diagram of the simplest UPS bypass, using 2 breakers:



Power normally flows through the UPS, then through the "From UPS Output" breaker (often called the MIS or MIB), then to your critical load.

When you need to service or replace the UPS you can send power to the critical load through the second path, the Bypass Breaker. You can switch from one power path to the other without dropping the critical load *if you operate the breakers in the right order*. Great!

Most people use the 3 breaker version, which is easier to use because the "To UPS Input" breaker and the "From UPS Output" breaker are close to each other, and close to the UPS, in the bypass panel.



Several things make it hard to understand most UPS Bypass Panels:

- a. The breaker labels are cryptic: RIB, MBP, and MIS instead of plain words.
- b. Some of the breakers work sideways and some work vertically. In a panic, it's easy to confuse which way is on and which is off.
- c. The instructions are too generic - they try to cover several different models with one-size-fits-all. We also see missing instructions and wrong instructions. That's always exciting!

Here's the worst feature of virtually all UPS Bypass Switches: If you have Kirk Keys and/or an SKRU (Solenoid Release Key Unit), the very presence of the keys makes you feel like you're protected against switching in the wrong order, and it's absolutely not true. It's very easy to switch in the wrong order!

If you have a UPS Bypass with Kirk Keys, I invite you to go look at it. What you'll see is actually fairly embarrassing for the whole bypass switch industry.

- a. If you have Kirk Keys but no SKRU you can easily turn on the Bypass Breaker without ever putting the UPS into internal bypass or using any keys. This can blow up the UPS and drop the load.
- b. If you have the SKRU with Kirk Keys, you can easily turn off the From UPS Output Breaker (MIS or MIB) and drop the load, without ever putting the UPS into internal bypass or operating any of the keys.

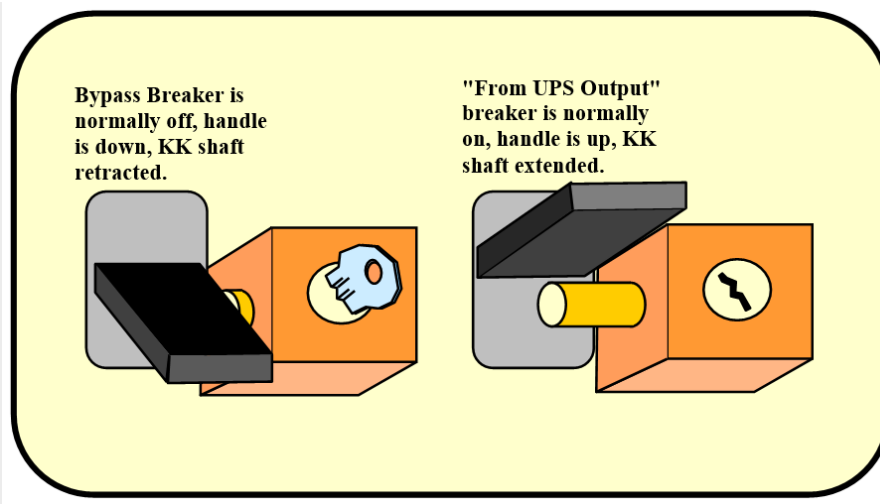
This is so dangerous! The keys make you think you're protected from operating the breakers in the wrong order, but it's very easy to just walk up and switch the wrong breaker. It happens way too often!

Bypass Switches are usually offered with two main safety options: Kirk Keys alone, or Kirk Keys with an SKRU. Everyone assumes that you get one safety feature with Kirk Keys alone, and you get two safety features with Kirk Keys and the SKRU. This assumption is completely wrong! You get one safety feature with Kirk Keys, and *the other* safety feature with Kirk Keys + SKRU, but never both. I'm going to explain why this is the painful truth.

There are two different disasters we're trying to prevent with the safety options:

- A. If you open the "From UPS Output" breaker too soon, you drop the critical load.
- B. If you close the Bypass breaker too soon, you short Utility Power to UPS Inverter Power. If the two power sources aren't in sync, your equipment can be severely damaged *and* you drop the load.

It's easier to understand what the keys do if I show the breakers operating vertically, but if your breakers work sideways, the same principles apply.



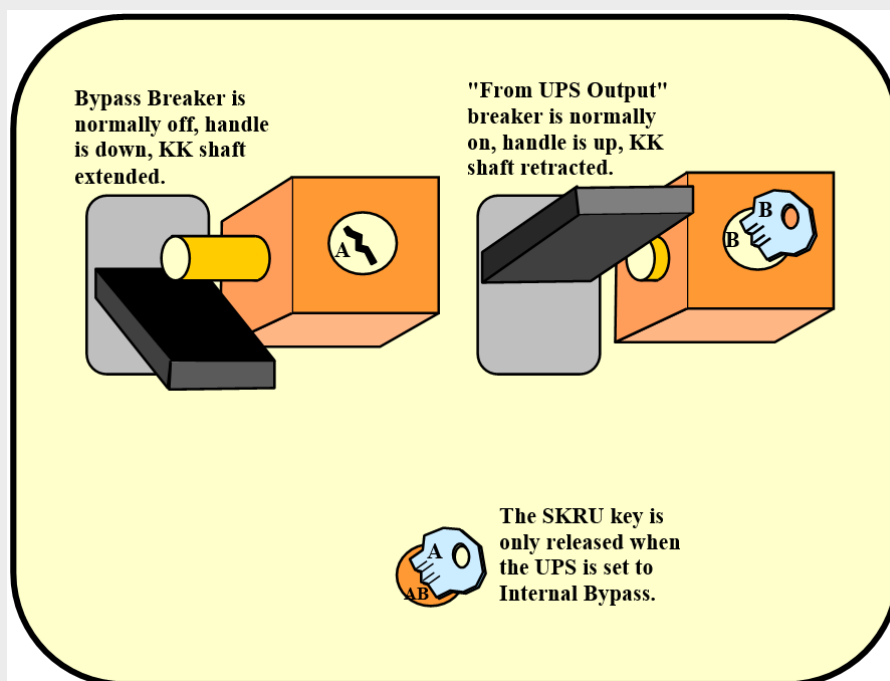
If you have Kirk Keys without the SKRU, the keys get installed *under* the breaker handles, as shown above. This prevents Disaster A - you can't turn off the "From UPS Output" breaker until you turn on the Bypass breaker, rotate the key and extend the shaft, then remove the key and use it to retract the shaft of the "From UPS Output" breaker. Then you can turn off the "From UPS Output" breaker.

With this safety configuration, you force Make-Before-Break operation to keep you from accidentally dropping the load. The exact opposite happens when you go back to normal UPS operation - the keys again keep you from dropping the load.

But this doesn't protect against Disaster B - anyone can turn on the Bypass Breaker at any time, without remembering to set the UPS to Internal Bypass mode. You can just turn it on - no keys needed, no nothing!

When you get a UPS Bypass Switch with Kirk Keys *and* SKRU, everyone assumes you'll still get the first safety feature, since there are still Kirk Keys in place. Here's the great misunderstanding - the Kirk Keys are now mounted in a different position and you don't get protection against Disaster A.

Here's what it looks like - the Kirk Keys mount *above* the breaker handles, and you have a Solenoid Key Release Unit (SKRU). When you set the UPS to Internal Bypass, the SKRU releases its key, which you insert into the Bypass KK slot A, retract the shaft, and turn on the Bypass breaker. Now you turn off the "From UPS Output" breaker and extend the KK shaft to lock it off, pull out Key B and store it in the SKRU key slot for later use. To return to normal UPS operation, you reverse the sequence.



This is great! It prevents Disaster B: you can't turn on the Bypass breaker while the UPS is still running on inverter, so you don't short UPS power to the utility.

BUT!! This scheme doesn't prevent Disaster A. Look at the "From UPS Output" breaker - it's naked! Anyone can just walk up and turn it off, without using any keys or following any instructions, or anything else. Someone trying to bypass in a hurry or in a panic can just drop the critical load, without using the keys!

We take these shortcomings seriously at Tech Connect Systems. We build **X-Switch**, the Premium UPS Bypass Switch, with these excellent features:

- Premium X-Switch safety systems prevent both Disasters A and B.

- Breakers operate up and down - so much more intuitive!
- Breakers are behind a closed door, not exposed to accidental or mischievous touching.
- Labels are plain to understand, like "Bypass" instead of MBP, and "From UPS Output" instead of MIS.
- Instructions are clear and correct, each different version of the X-Switch has its own instruction set.
- We post a one line diagram, to help you understand how it works with your UPS.

X-Switch is the best! It takes the panic out of bypassing your UPS system. It's safer, friendlier, and more fool-proof than any other UPS bypass switch.

Engineers love the X-Switch because it really works right, and protects against both disasters. They also love our ability to add custom features. They've asked us for lots of variations including:

Transformers

Load Bank Breaker

Output Distribution Breakers

Dual Source selection switch

Auxiliary Contacts

High kAIC ratings

Double Lugs

Different Language instructions

Et cetera, et cetera. We can do every possible custom adaptation!

New Feature coming soon: Guiding Lights. LED's show you which breaker to operate next. Nice!

New product, now available: Rotary Bypass Switch - prevents both disasters, and is much simpler to operate. Smaller, too, and costs less!

Even newer product, now available: Isolation Bypass X-Switch for your existing ATS, wall mountable.

Call us for additional information - we're really friendly!

Thanks for reading - feedback is invited.

Ray Ward

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