No-volt Release Switch for Jet 1014 Mini Lathe

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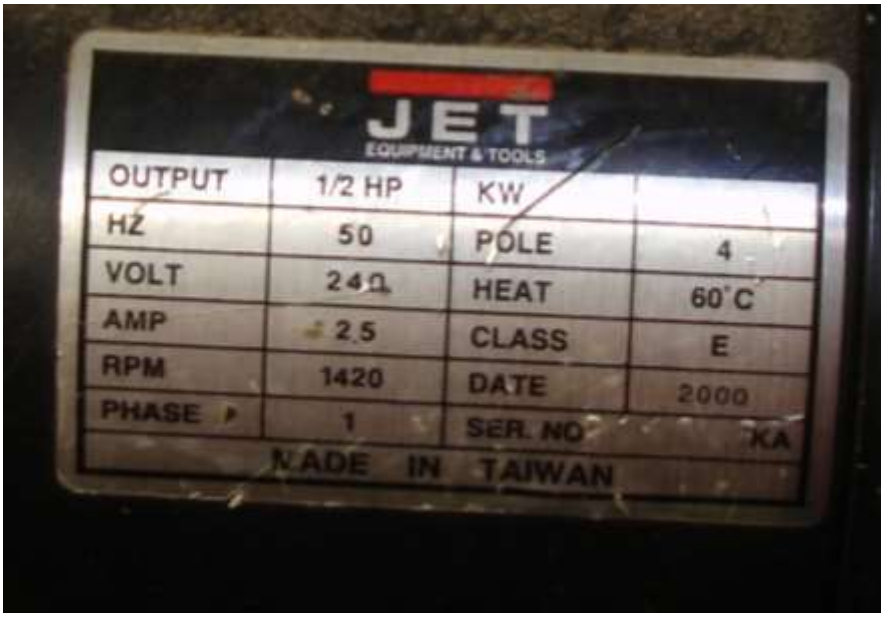
The power switch on the WWA Jet 1014 mini lathe was damaged in the move or subsequently at MiW, so the lathe could not be used. Due to the limited spare parts carried by Jet in SA, it was decided to replace the switch with a **No-Volt-Release** (NVR) motor starter switch. This was a comparatively simple process, which I have recorded here in case you wish to undertake something similar.

The OEM switch was a simple toggle switch, with a removeable key to prevent unauthorised use of the lathe if desired. The picture shows the switch partly removed. You can see the damage to the sides of the switch.



A **No-Volt-Release** motor starter is an electromagnetic relay for starting and stopping a machine. When selecting a motor starter, it is important that the starter is correctly rated for motor power. This is because induction motors directly connected to the supply at start-up draw a much higher current than listed on the nameplate until they get up to speed, and the starter contacts need to be rated to supply this.

When an induction motor is connected to an AC supply, the initial starting current is limited only by the DC resistance of the windings, and can be many multiples of the full-load rated current. As the motor runs up to speed, the interaction of the stator and rotor windings create an impedance that reduces the current to the steady state.
Consulting the name-plate of the motor will give you the information you need. The motor is rated at ½ horsepower = 375 W, so with a 230V AC supply, this gives a rated steady state current of 375 W / 230 V = 1.6 A.
The nameplate states 2.5 A which is probably a peak value, indicating a reasonable setting for overload protection, should there be any.

The starter switch rating is 15A as per the nameplate on the relay shown below. So, it is between 6 and 9 times over-rated for the steady-state current draw and can be expected to cope with the starting in-rush current draw of the motor.

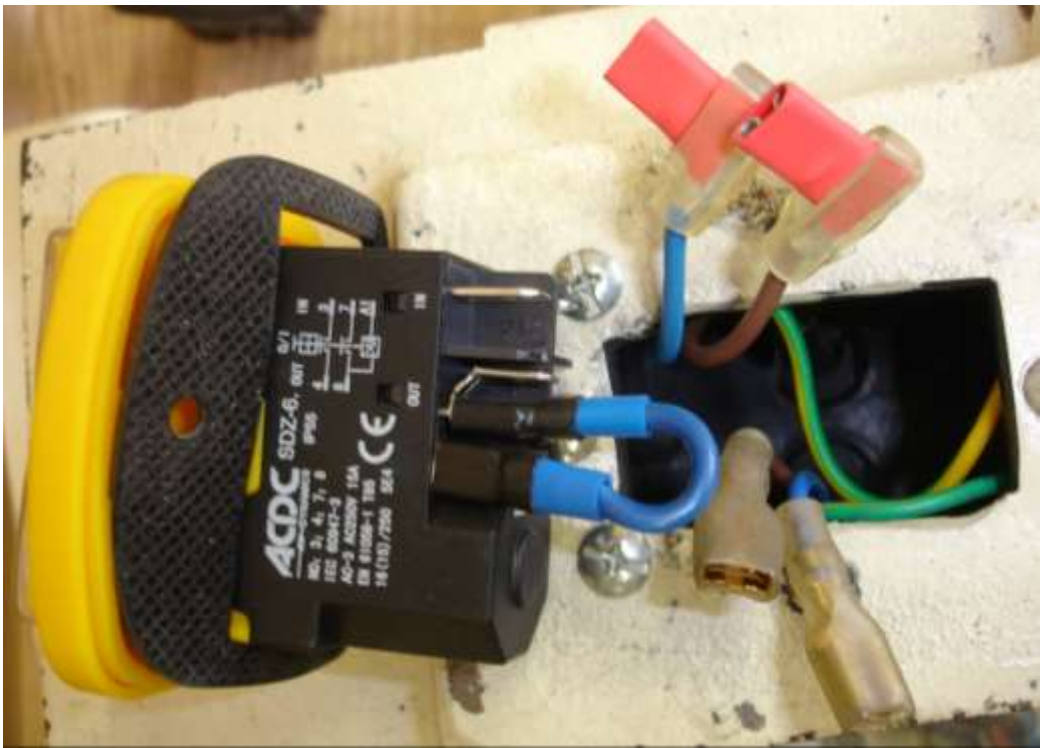
The wiring diagram for the starter is also shown on the side of body. It is a conventional NVR starter, except the holding coil is connected separately to pin A1. This type of NVR starter has contacts that are mechanically closed by pushing the green button, and mechanically opened

by pushing the red button. In between starting and stopping, to keep the motor running, the holding coil is energised to keep the contacts closed. In order to provide the option of an additional emergency stop or some sort of safety interlock, one side of the coil is brought out to Pin A1. In this case, we do not need an additional emergency stop or safety interlock, so A1 is connected to Pin 4 by the blue wire link as shown. This was made up using pre-insulated lugs with additional black heatshrink to improve touch safety.

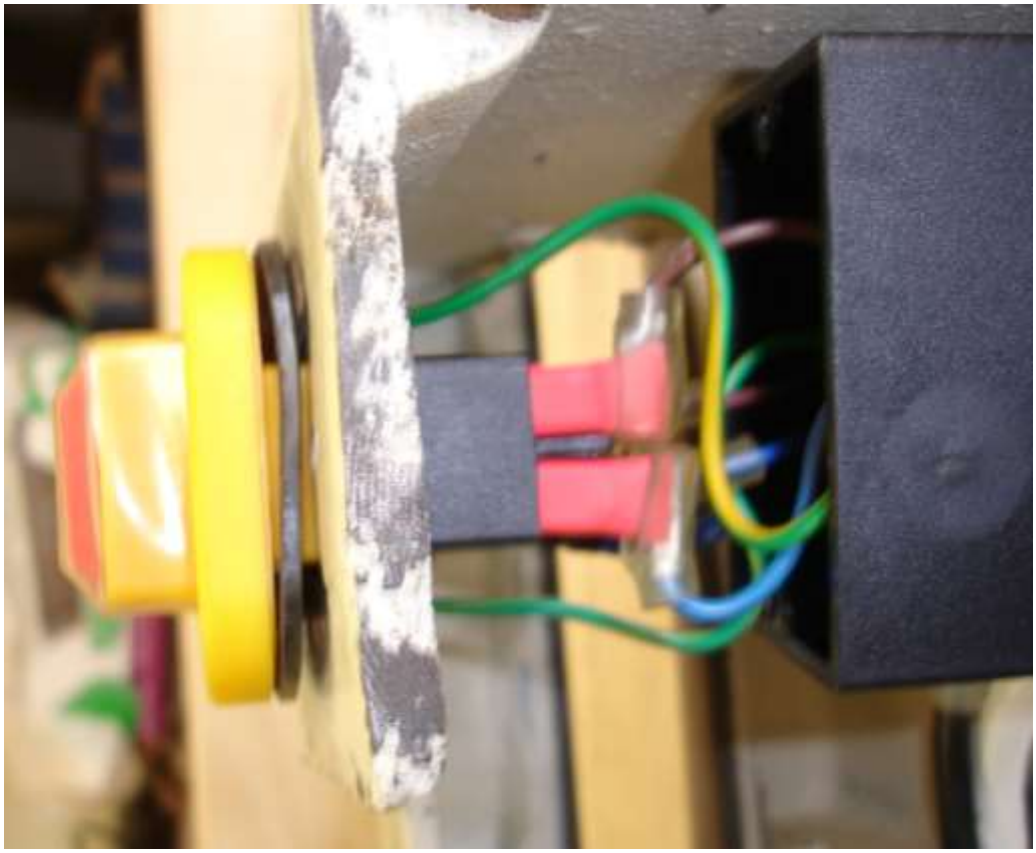
An NVR starter is so named because if the power is interrupted, then the relay drops out, and when the power returns, the motor will not restart until the start button is pushed again. This is an important safety feature, particularly given our history of power interruptions in South Africa.

Should you wish to add an emergency stop or safety interlock to this starter, this would be of the type that interrupts the circuit when you wish the motor to stop. Then the holding coil will be no longer energised and the contacts drop out, removing power to the motor. You should replace the blue wire with a circuit that includes the emergency stop or interlocks. The type of interlocks you may wish to include could be a microswitch on a door or cover for a belt or a blade such for a bandsaw. On this very simple lathe, the manufacturer did not think it necessary to add any such options.
As an example, my bandsaw has switches on the blade access covers. It also has two emergency stop buttons, which are wired in series, so if any doors are open or either emergency stop button is pushed, the circuit energising the coil is opened and the starter drops out, removing power to the motor.

Upon removing the existing OEM Jet switch, there was a rather ragged hole in the casting. This proved to be slightly too small for the replacement starter, so some filing was required to allow it to fit neatly. The wiring was simply reconnected using the same spade



connectors as shown in the photograph. Red heatshrink was added to the incoming connectors to provide an extra degree of touch safety.



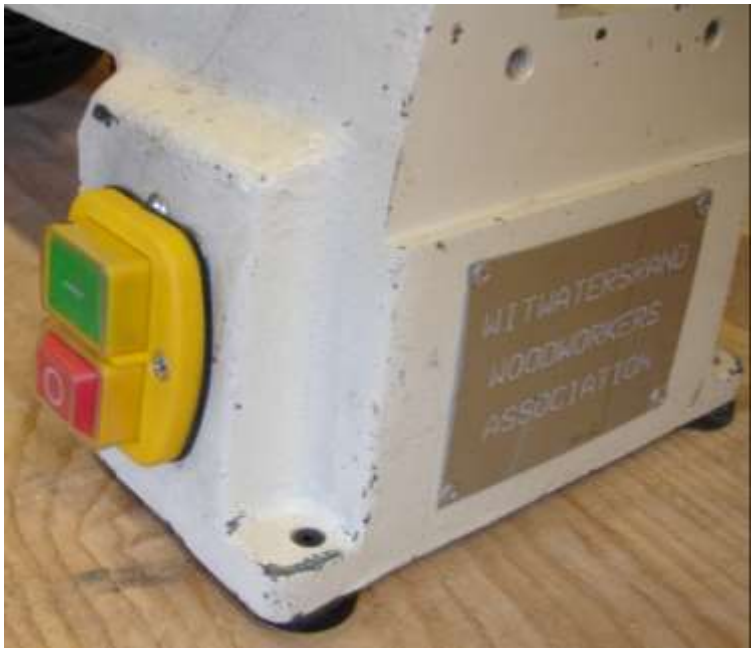
The lower picture shows the new starter switch in place with the connections made. Red incoming go to the IN terminals, Brown (Live) to Pin 7 and Blue (Neutral) to Pin 3. The motor side goes to Pin 8 Brown (Live) and Pin 4 Neutral (Blue).

The two Green/Yellow Safety Earth wires are connected to the two earth terminals on either side of the switch as before.

The space is quite tight, so the order of assembly is important. Once all the wires were connected, the black cover, on the right of the picture, had to be screwed down before the starter switch could be attached from the front.

An insulation check was done between the live parts and earth, with 4.6 GΩ at 533V being recorded. This included the motor, which is excellent.

The final installation is neat and doesn't protrude more than the original.



As you may have noticed from the motor nameplate, the date of 2000 suggests the lathe is about 20 years old.

The NVR starter was bought from ***AC/DC Express*** under part number SDZ-6B. It retails for about R300-.