How To Install a 2-Speed Motor and a T106 Timer

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★★★☆☆ 3.07 OUT OF 5 STARS ON 14 RATINGS

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With the cost of electricity continuing to increase, it is a good idea to replace a single speed motor with a more energy efficient 2-speed motor. This guide will explain how to install a 2-speed motor as well as add an Intermatic T-106 timer to control the high and low speeds. Although this guide is specific to replacing a Sta-Rite Dura-Glas motor, most of the steps can be applied to other models of pumps.

Step by Step

Top

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Step 1

Make sure that the power to the pump and timer is turned OFF. For maximum safety turn off the power off at the circuit breaker.

Step 2

The first steps will involve installing the T106 timer next to an existing T104 timer.

Step 3

Locate an area on the wall near the existing timer for the T106. Locate the timer out of reach of the sprinklers or drainage spouts.

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Step 4

Mark the locations for the three mounting screws. One is located on top of the timer box and two are located inside the timer box towards the bottom.

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Step 5

Drill three holes where the mounting screws will be installed. Note: We used a special 3/16" carbide drill bit to drill into the concrete.

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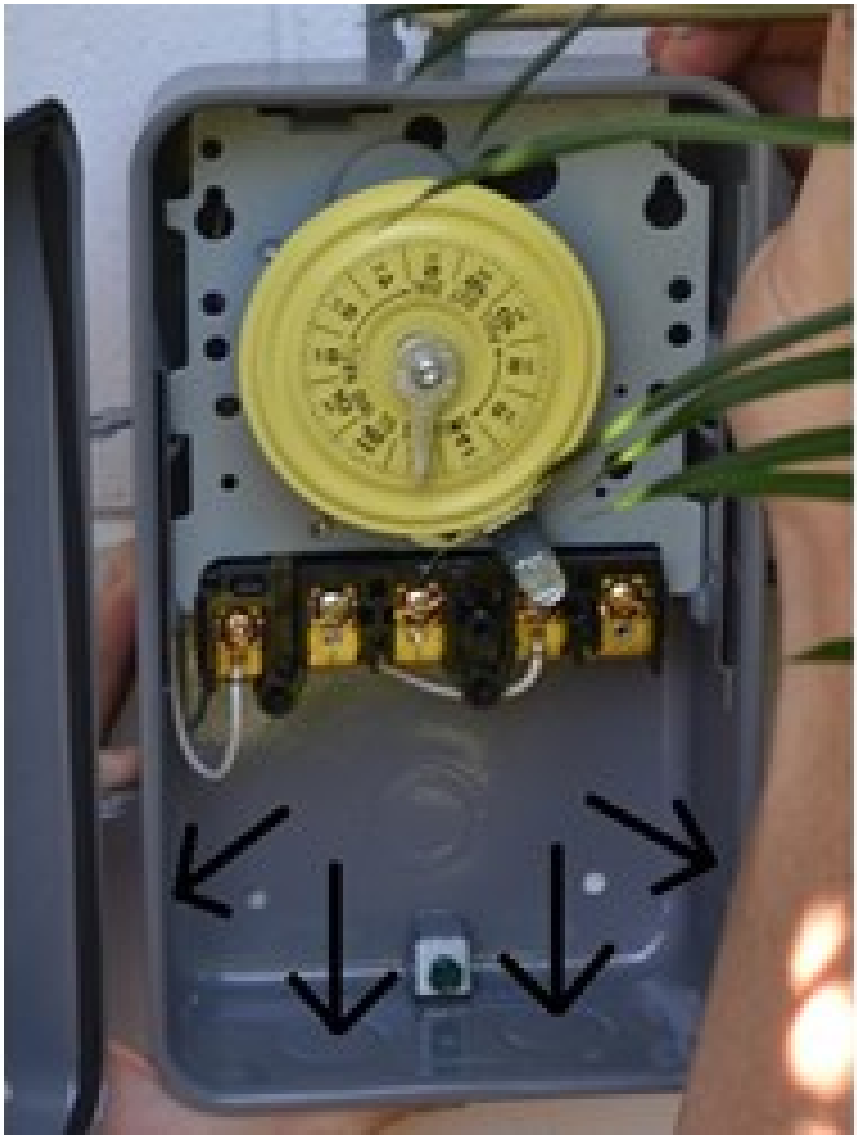
Step 6

Install screws (or other hardware appropriate for the mounting surface) through the mounting holes of the Intermatic T106 timer box. Note: We used 1/4" x 1-1/4" hex head concrete anchors. Hex head anchors are recommended for better traction when installing into concrete.



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Step 7

Remove two of the knockouts from the timer box. One knockout will lead to the existing T104 timer and the other will lead to the pool pump.

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Step 8

Thread two conduit adpaters into the Intermatic T106 timer.

Step 9

At this point the T106 is installed onto the wall. We will now replace the motor on the pool pump. After the motor is installed we will return to the timers to complete the wiring part of the installation.

Step 10

The next steps will involve removing the old motor from the pump and installing the new 2-speed motor.

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Step 11

The first step in removing the motor from the Sta-Rite Dura-Glas pump is to loosen the clamp knob and remove the metal clamp.

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Step 12

Once the clamp is removed, slide the motor back and away from the front part of the pump.

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Step 13

Unfasten the external ground cable from the boding lug located on top of the motor.

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Step 14

With a 1/4" socket, remove the two screws from the back of the motor cap.

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Step 15

Remove the end cap and disconnect the three cables coming into the motor from the conduit.

Step 16

The motor is now completely disconneccted and can be lifted out to be worked on in a more convenient area.

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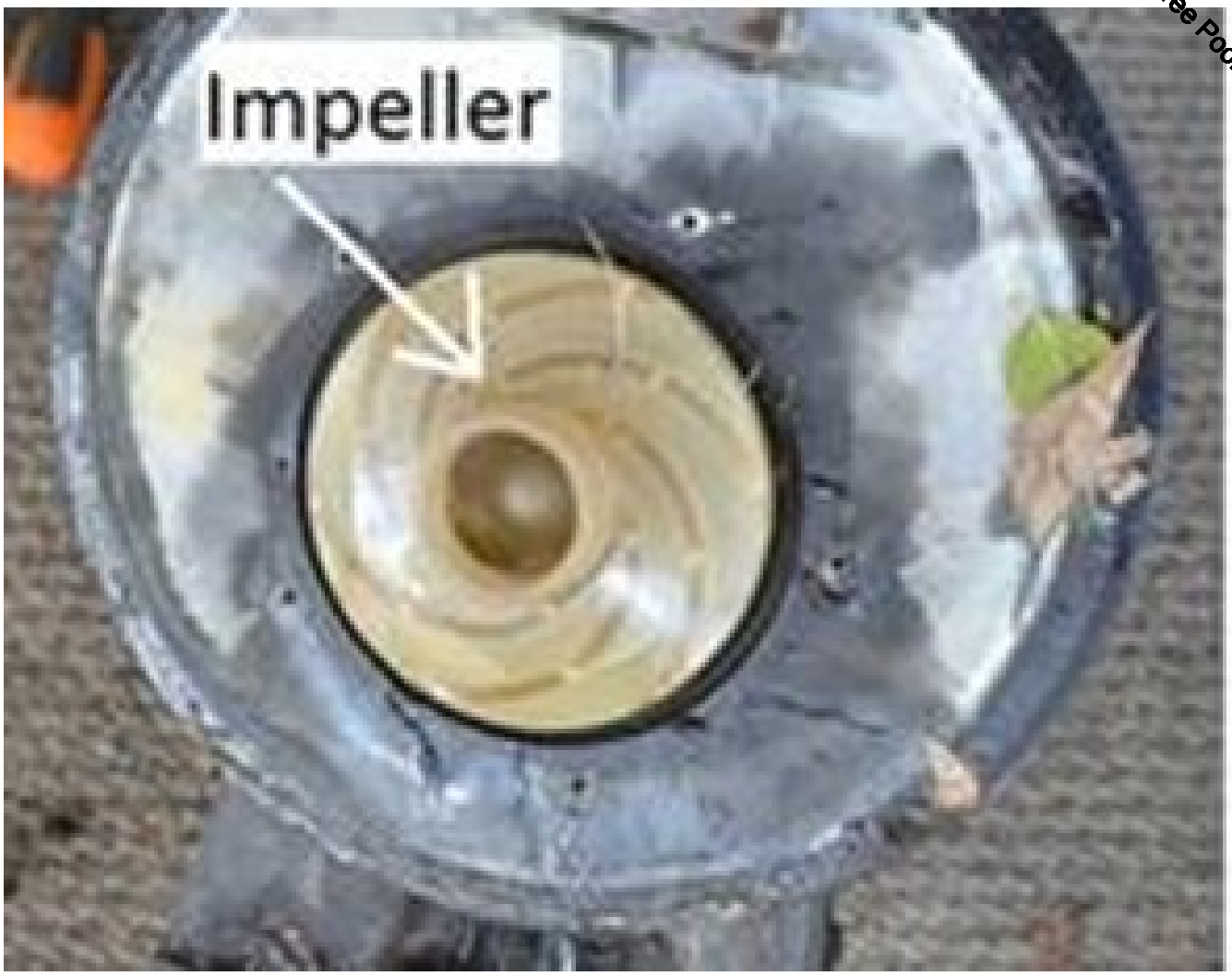
Step 17

Locate the diffuser at the front of the pump and remove the five screws. After the screws are removed, pull off the diffuser.



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Step 18

In order to remove the impeller, the shaft of the motor will need to be stabilized.

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Step 19

In order to stabilize the shaft, the thermal protector will need to be removed from the back of the motor. Unscrew the single screw that holds the thermal protector in place. There is no need to remove the thermal protector from the leads.

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Step 20

Place a 7/16" wrench on the flat side of the motor shaft to secure the shaft from rotating.

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Step 21

While holding the wrench at the back of the motor, spin the impeller off counter clockwise. A strap wrench may be needed if the impeller cannot be removed by hand.

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Step 22

The next step will be to reomve the seal plate.

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Step 23

The four bolts will need to be removed that connect the motor to the seal plate. The bolts can be removed by using a 9/16" socket.

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Step 24

With the four bolts removed, pull the seal plate off of the motor.

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Step 25

Take the old shaft seal out of the seal plate. The shaft seal is a two part seal. The first piece is a spring and the second piece is a white ceramic part which is pressed into the seal plate.

Step 26

The next steps will involve installing the new motor onto the existing Sta-Rite Dura-Glas pump. Every part will be reused from the old pump except for the new shaft seal and o-rings. All o-rings and shaft seals should be replaced whenever a new motor is installed.

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Step 27

Find the new white ceramic piece of the shaft seal. Press it into the seal plate with the white side facing out. Gently wipe the polished face of the ceramic seal with a soft clean cotton cloth. There should be no fingerprints on the ceramic piece.

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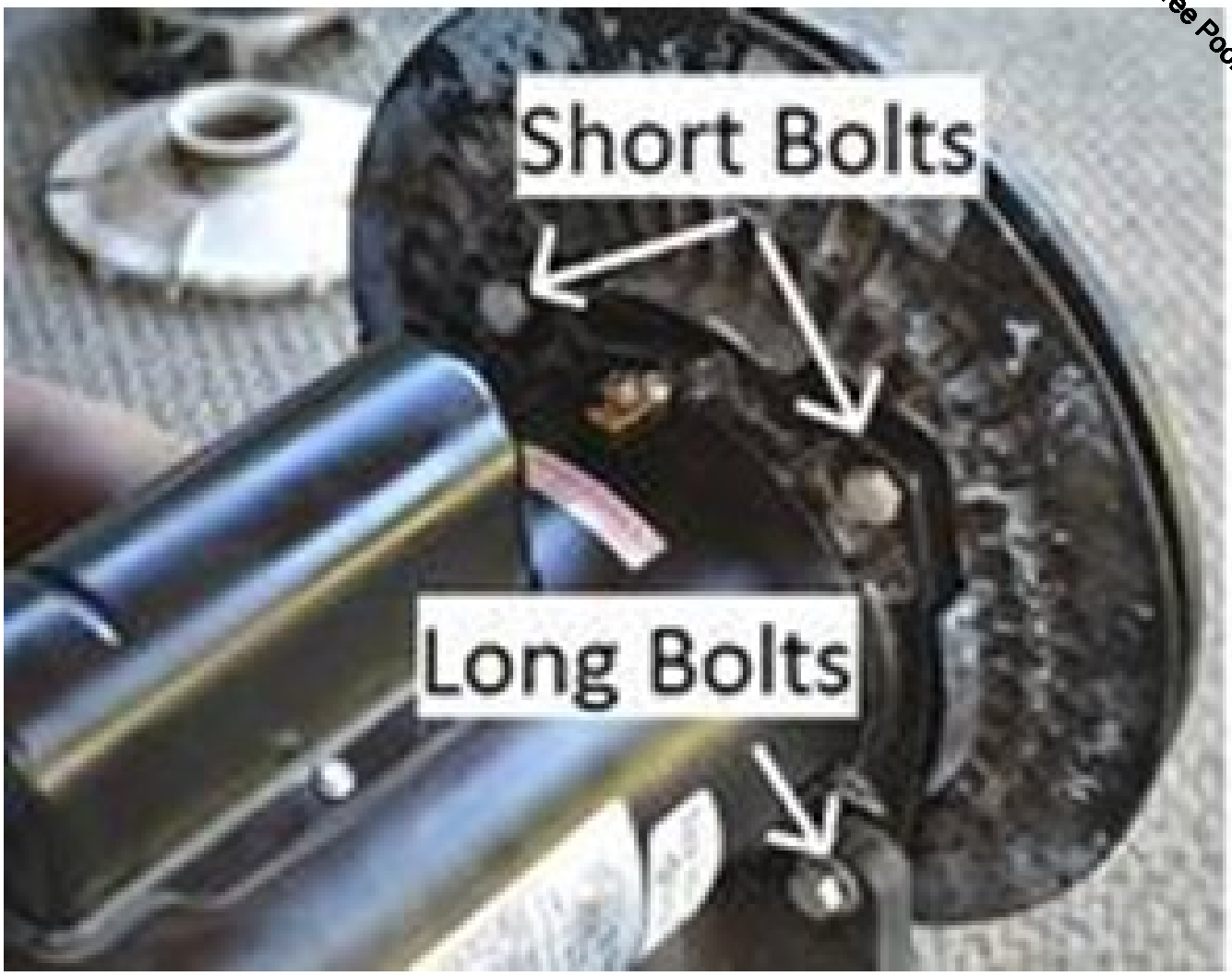
Step 28

Slip the seal plate onto the motor. Then place the motor and seal plate onto the motor base.



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Step 29

Attach the motor to the seal plate with the four existing motor bolts. Use a 9/16" socket to tighten the bolts. Note: Make sure you feed the two longer bolts through the motor base and then into the seal plate. The seal plate will be damaged if the two longer bolts are installed without the motor base in place.

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Step 30

Locate the spring part of the shaft seal. Press the spring portion onto the shaft of the motor. The shiny black side of the spring portion should be touching the white ceramic piece.

Step 31

Unscrew the two screws that hold the cover over the back end of the motor. Remove the cover to expose the electrical connectors.

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Step 32

To reinstall the impeller, place a 7/16" wrench on the flat side of the motor shaft to secure the shaft from rotating.

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Step 33

Screw the impeller on clockwise while holding the back of the motor shaft with a wrench. The impeller does not need to be overtightened.

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Step 34

Lubricate the diffuser o-ring with silicone or teflon lubricant and reinstall the o-ring on the diffuser.

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Step 35

Place diffuser onto the seal plate and tighten the 5 screws.

Step 36

Thread a 1/2" conduit adapter into the hole near the back of the motor.

Step 37

The next steps will involve connecting the cables to the new motor.

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Step 38

A 2 speed motor requires what is called a three-wire cable. There are actually four wires within the cable; two hot wires, one common wire, and the ground wire. For this installation we used a 14-3 cable. Make sure there is enough cable to run from the pump to the furthest timer.

Step 39

Note: It is easier to connect the wires to the motor before the motor is connected to the pump.

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Step 40

Locate the terminal board at the back of the motor. This will be labeled for the correct location of the wires. L2 is the common, L1 is the high speed, A is the low speed, and the green screw is the ground.

Step 41

With a wire stripper, strip away approximately 1/2"-3/4" of the colored insulation from the red, black, and white wires.

Step 42

Feed all four wires through the conduit adapter that was threaded into the motor.

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Step 43

Connect the black wire to "L1" terminal. This will be the "hi speed" line. Connect the white wire to to the "L2" terminal. This will be the "common" line. Connect the red wire to the "A" terminal. This will be the "low speed" line. Finally, connect the exposed copper or green line to the green screw. This is the "ground" line.

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Step 44

Place the black end cap back on the motor and tighten the screws.

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Step 45

At this point, the motor assembly can be reinstalled onto the rest of the pump. Put the black end cap back on the motor and slide the motor assembly into place and connect the metal clamp.

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Step 46

Measure the distance from the 2-speed motor to the T106 timer. Cut a piece of 1/2" electrical conduit to the correct distance.

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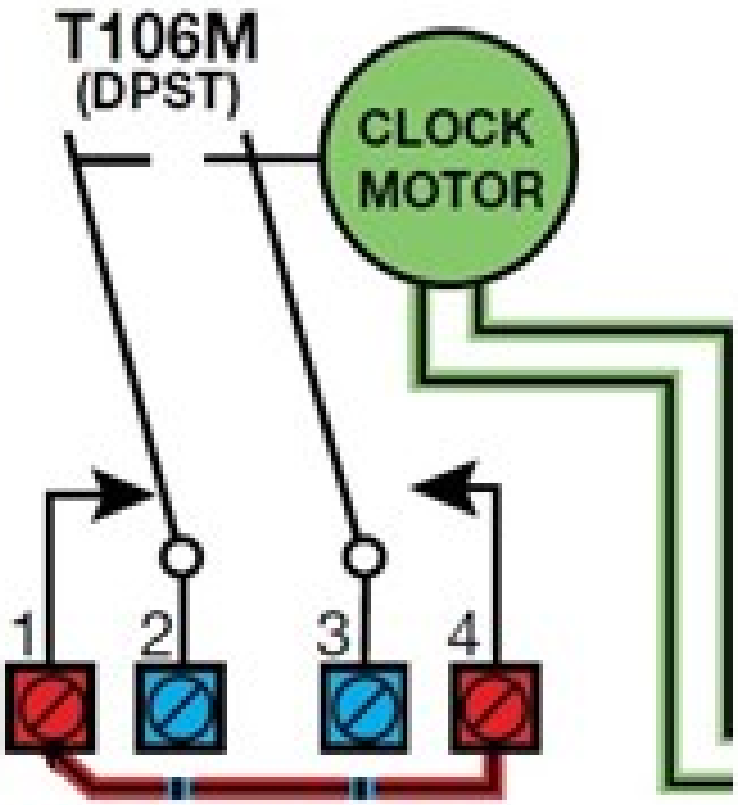
Step 47

Feed the cable from the 2-speed motor through the 1/2" conduit. Push the one end of the conduit into the conduit adapter on the motor. Note: We recommend using a little bit of dish soap to lubricate the cable. This will make it much easier to feed it through the conduit.

Step 48

The next steps will involve wiring the pump to the timers and the T106 to the T104.



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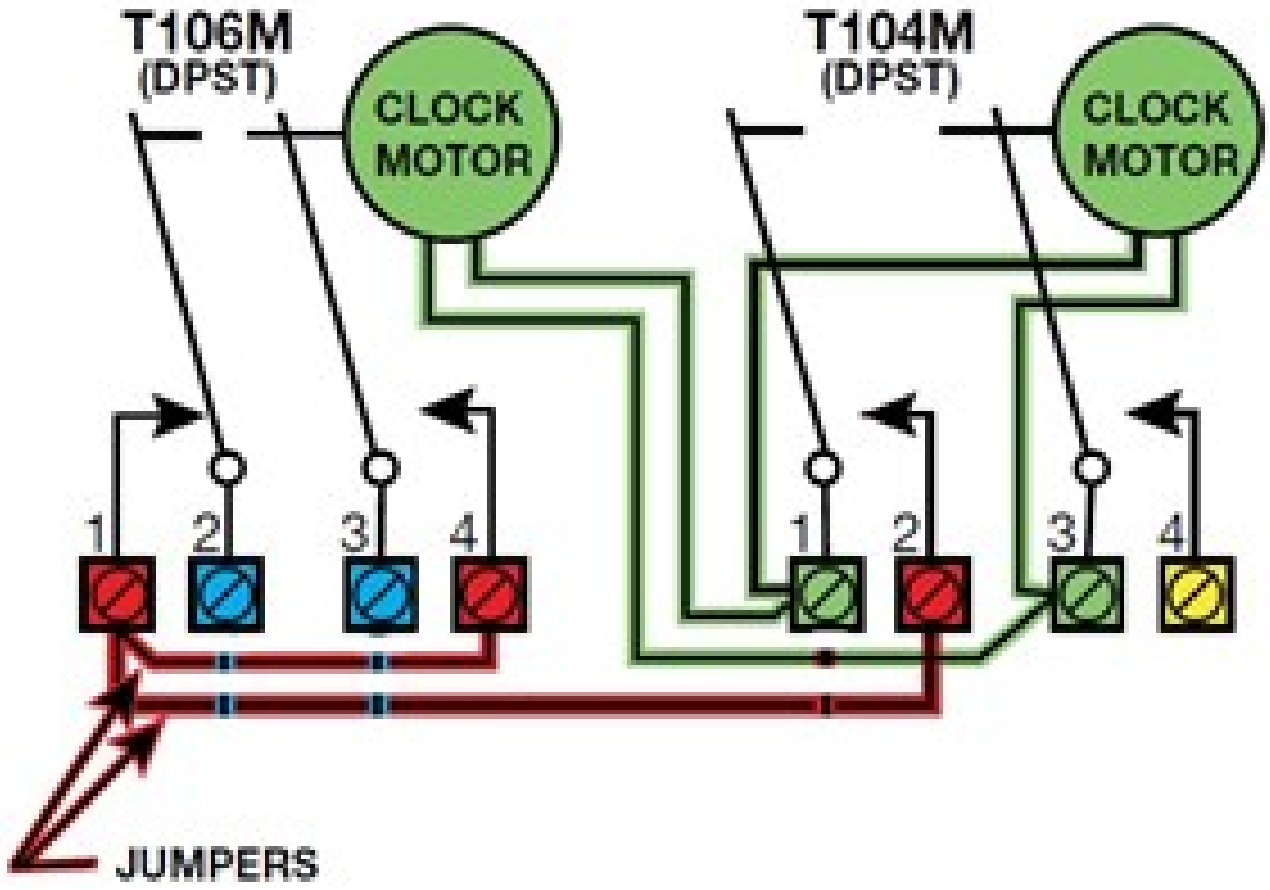
Step 49

A jumper will need to be installed in order to connect terminals 1 and 4 in the T106 timer. A jumper is basically a small cable that connects the terminals. You can use a small piece of cable from the 14-3 cable. It does not matter what color. Strip a 1/2" from either end. Connect one end to terminal 1 and the other to terminal 4. This is displayed in the picture with a red cable.



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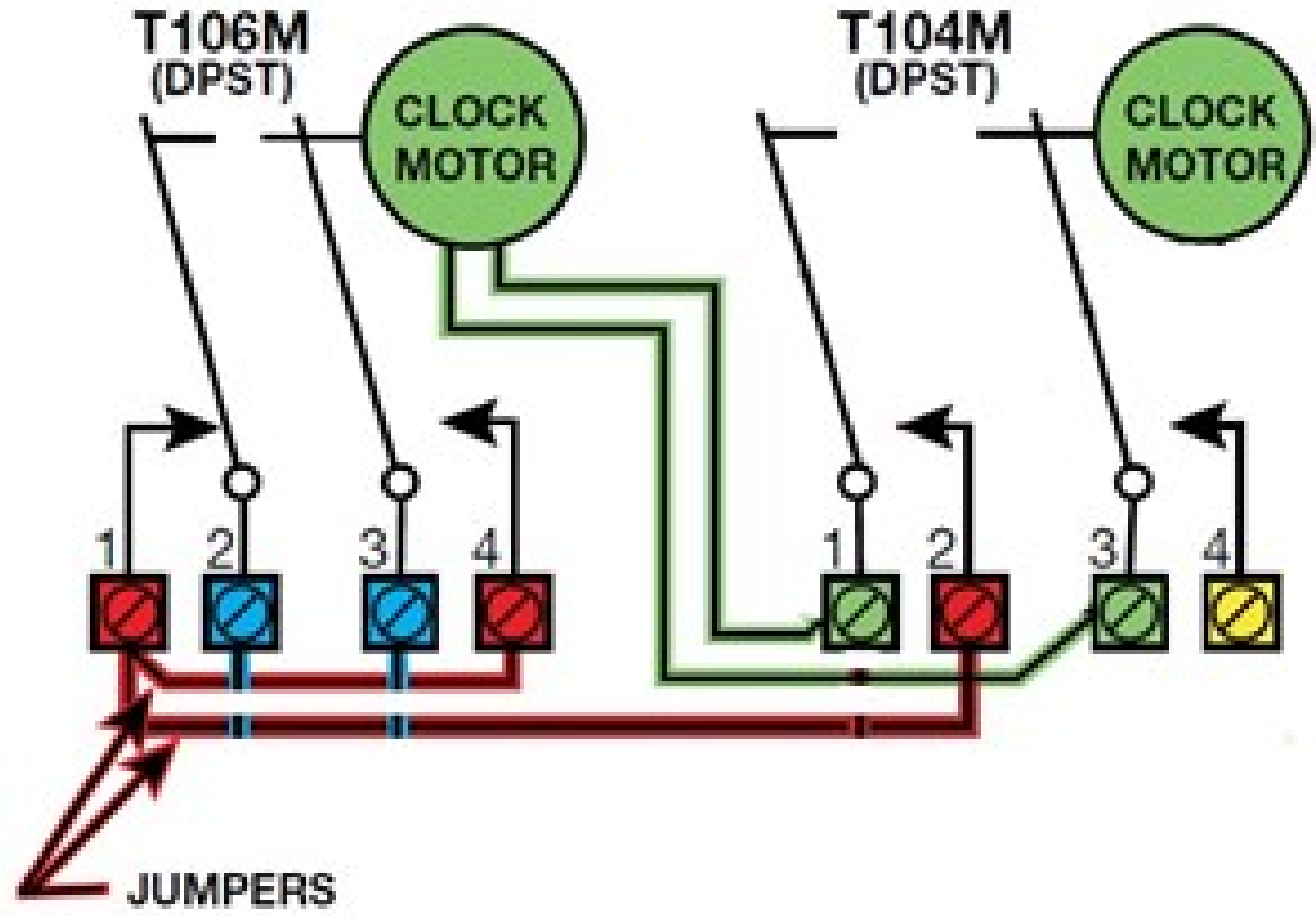
Step 50

In this step you will need to measure and cut another jumper. This jumper will have to be long enough to run from terminal 1 in the T106 timer to terminal 2 in the T104 timer. This will be diplayed in the picture by a red cable running underneath the first jumper. At this point, one end of the jumper can be connected to terminal 1 in the T106 timer. In a later step we will feed this jumper through a conduit to terminal 2 in the T104 timer.



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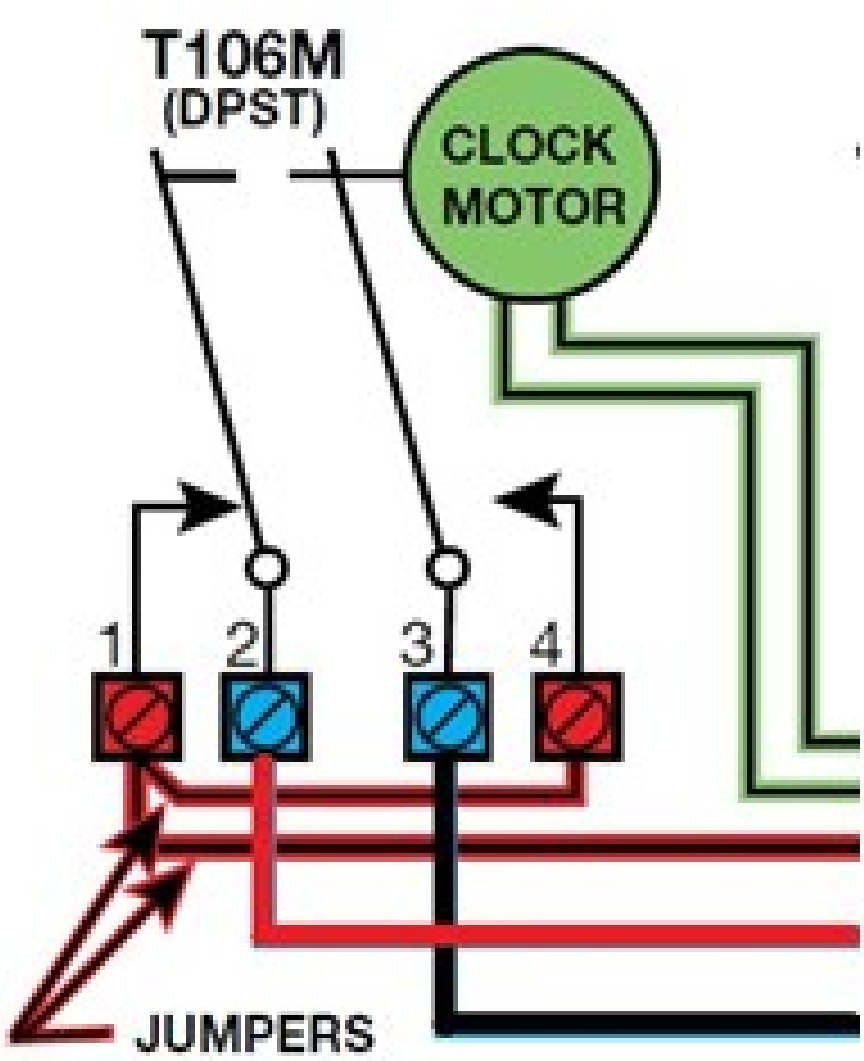
Step 51

The next cables to be measured and cut will be the cables that connect the motor from the T106 to terminals 1 and 3 on the T104 timer. Remove the T106 white motor cables terminals A and 3. Remove the metal ends from the motor cables. Measure and cut 2 cables long enough to reach from the T106 timer to terminals 1 and 3 in the T104 timer. Using wire nuts, connect one cable to each of the motor cables. Eventually these lines will be fed through a conduit to the T104 timer. The motor cables are represented with green lines in the picture.

Step 52

Feed the cables running from the pool motor and feed them through the conduit adapter and into the T106 timer.



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Step 53

Strip 1/2" of the colored insulation off the black wire and red wire that were just fed into the T106. Connect the black wire (hi speed) to terminal 3. Connect the red wire (low speed) to terminal 2.

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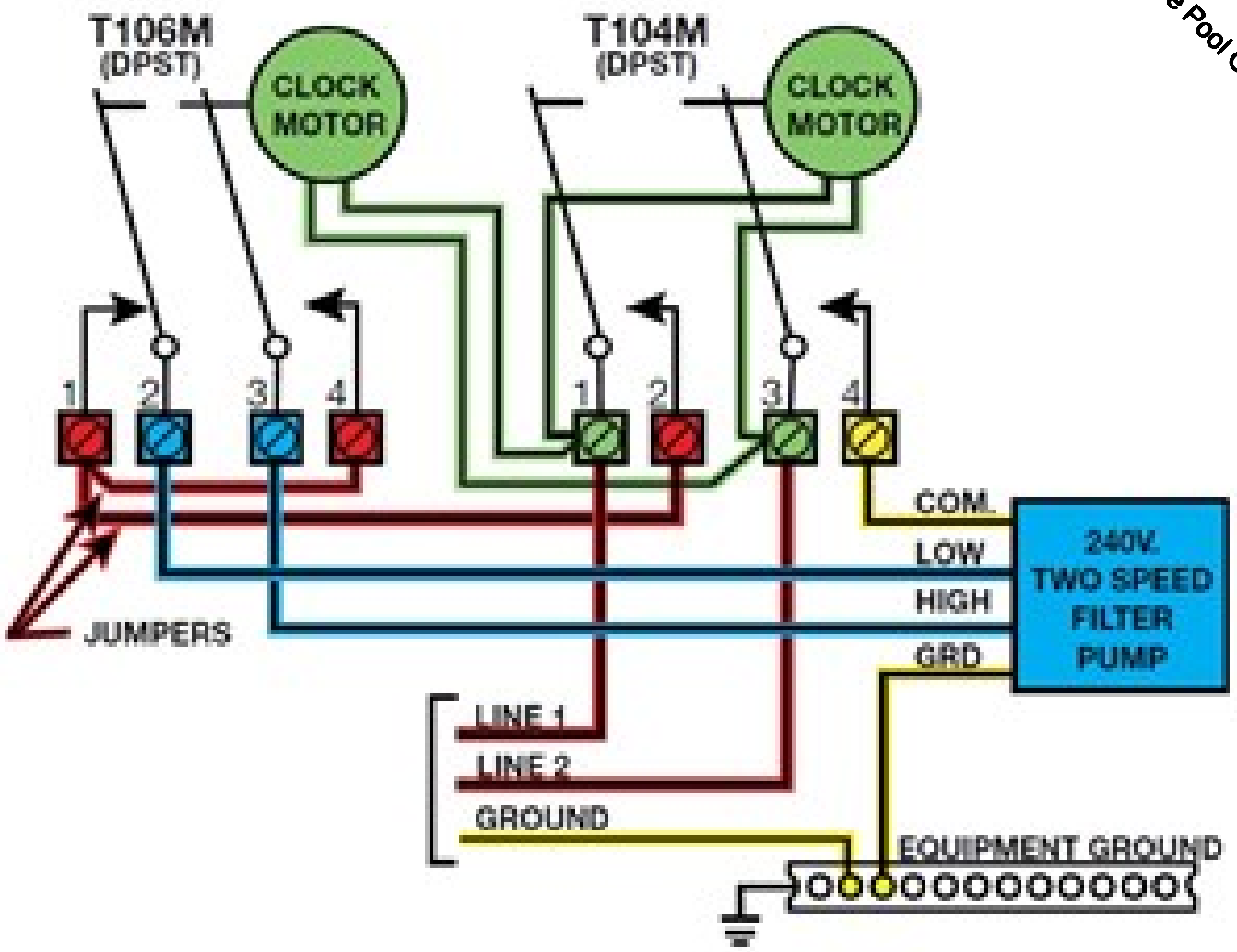
Step 54

Loosen the green screw at the bottom of the T106 timer. Loop the green ground wire around the screw and tighten the screw. Make sure that the piece of ground wire that loops the ground screw has been stripped so the copper is exposed. This same ground line will be fed through the conduit to the T104 timer in the next few steps. This will ground the pump, T106, and T104 together.

Step 55

Feed the white common line from the pump, the second jumper, the 2 timer motor wire leads, and the ground line through conduit to the T104 timer.



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Step 56

Connect the 2nd jumper line from terminal 1 in the T106 timer to terminal 2 in the T104 timer. Connect the T106 motor leads to terminals 1 and 3 in the T104 timer. Connect the white common line from the pump to terminal 4 in the T104 timer. Lastly, connect the green ground line to the ground screw inside the T104 timer box. The diagram will show what the completed connection should look like. Click on the image to enlarge.

Step 57

The T106 timer should now be successfully connected to the T104 timer. The T104 will now control the low speed when the T104 is in the ON position. We will now set the trippers on the both timers. This will control when the pump turns on and when it will switch to the high speed.

Step 58

The T104 timer should be set first. The T104 will control the low speed of the timer. We recommend running the low speed the majority of the day. You may use the low speed the entire day if you only require the high speed to manually vacuum the pool or backwash the filter.

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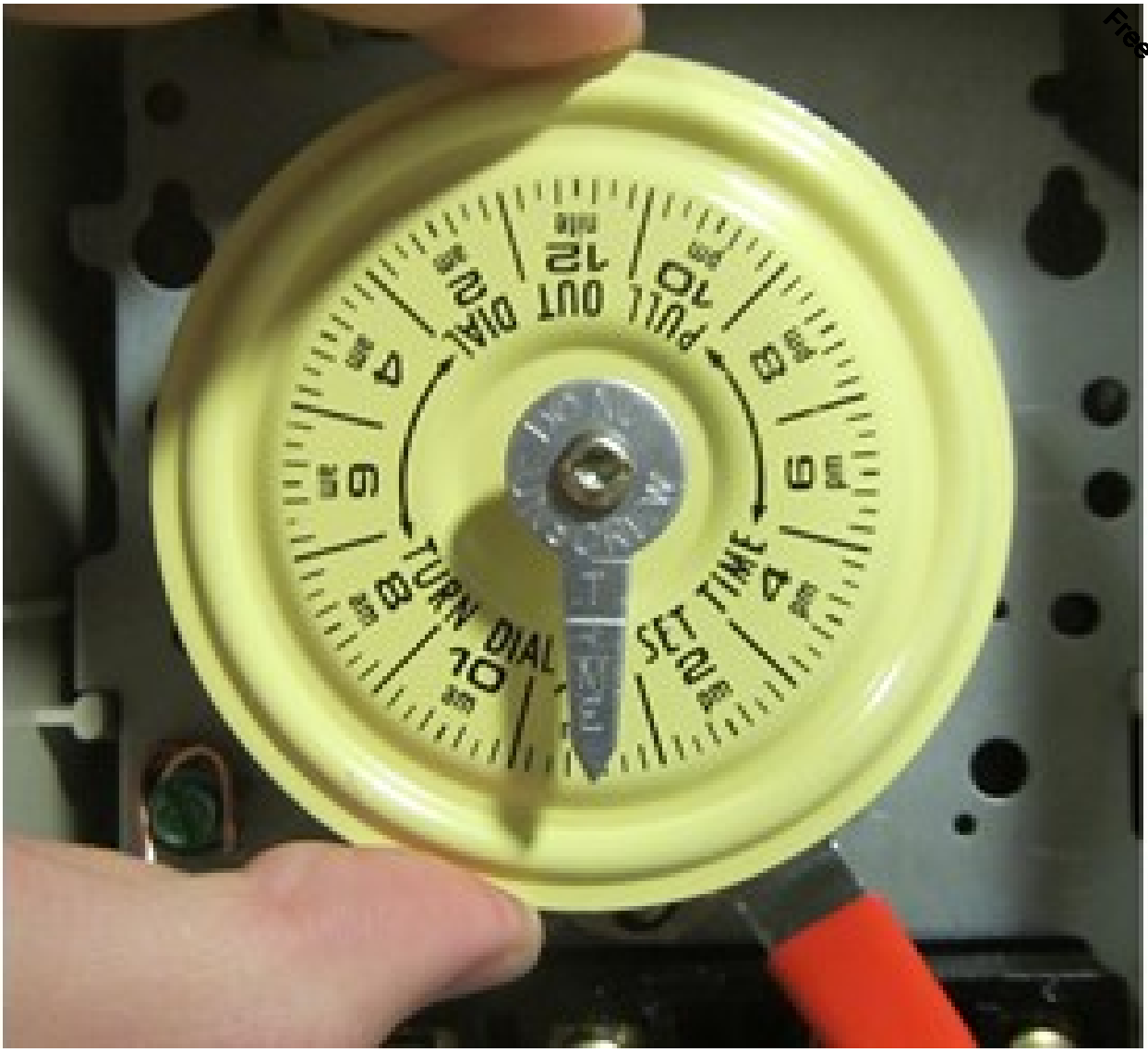
Step 59

To set the T104 timer, the time will need to be selected. There is a silver Time Pointer on the Clock-Dial. This Time Pointer will point directly to the current time.



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Step 60

To set the time, pull the Intermatic Clock-Dial outward. Turn the dial in either direction and align the exact time of day on the Clock-Dial to the Time Pointer. The picture displays the timer set to 12:00 pm.

Step 61

The next steps will demonstrate how to set the trippers. The trippers will determine when the equipment will turn on and off.

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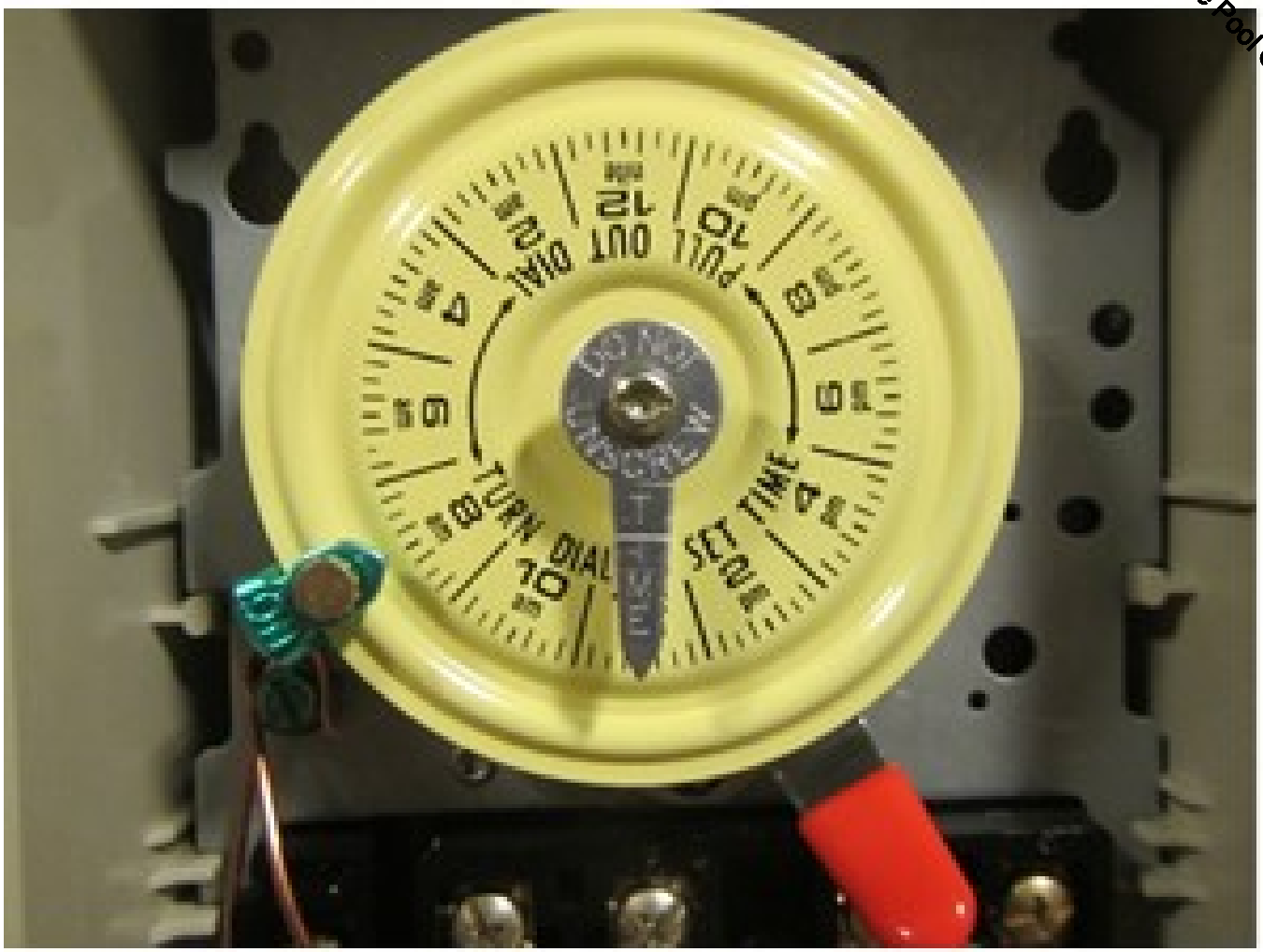
Step 62

Locate the "On" tripper. The "On" tripper is typically green and will be labeled "On".



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Step 63

To set the "On" tripper, hold the tripper against the desired time and tighten the tripper screw firmly. The picture displays the "On" tripper set at 8:00 am.

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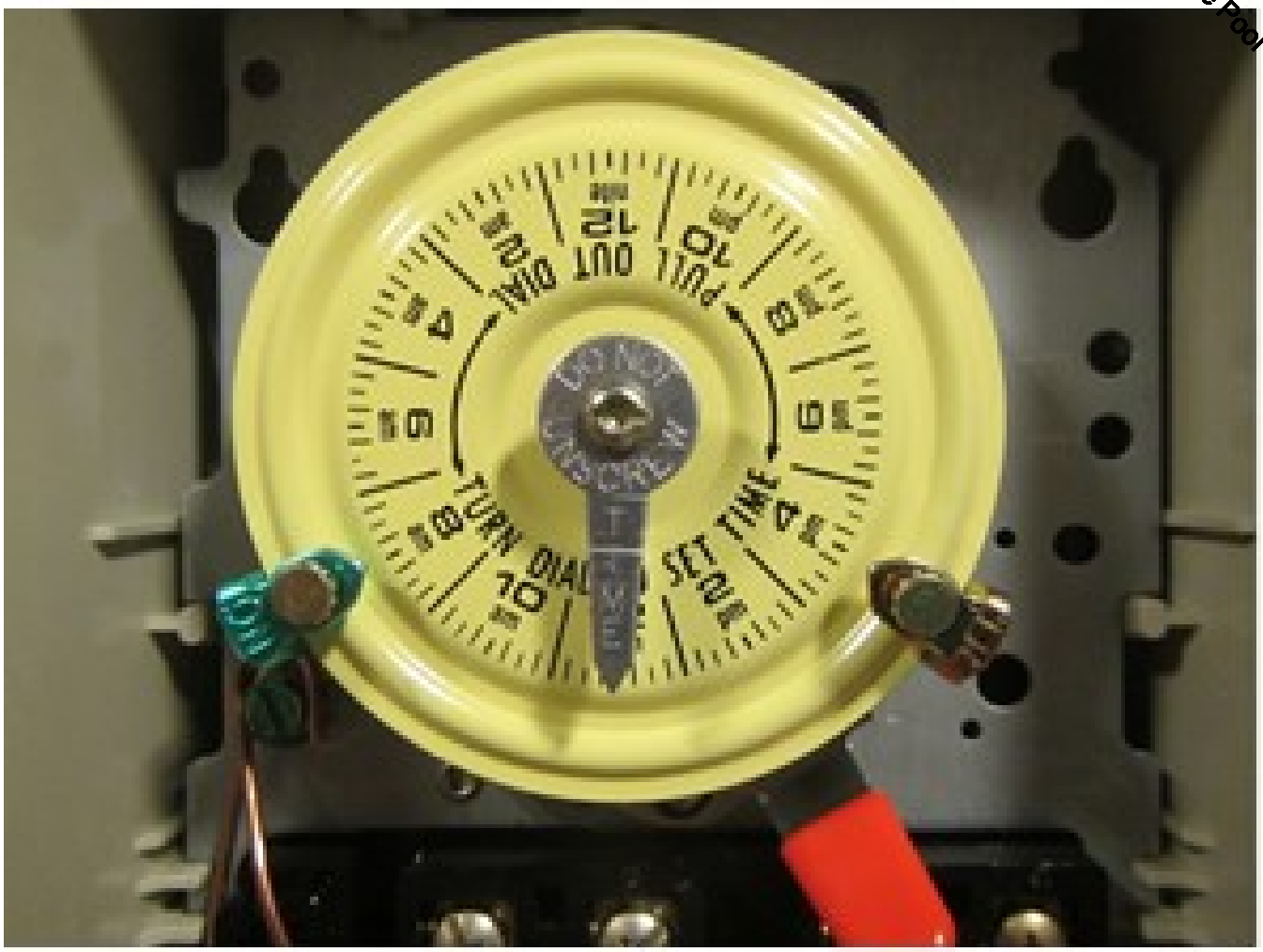
Step 64

Locate the "Off" tripper. The "Off" tripper is typically gold and will be labeled "Off".



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Step 65

To set the "Off" tripper, hold the tripper against the desired time and tighten the tripper screw firmly. The picture displays the "Off" tripper set at 4:00 pm.

Step 66

The Intermatic T104 Series Timer is now programmed. Next you will need to set the T106 timer. Again, The T106 will turn the high speed on and off. You will want to set the high speed to run while the T104 is on. Example: If the T104 turns the low speed on at 8am and off at 4pm, the T106 should be set to turn on at 12pm to 2pm (each pool is different so set the schedule to your preference). To set the T106 timer, repeat steps 59-65.

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Step 67

Both timers should now be set. The power can now be turned back on at the breaker. The Intermatic T106 and the 2-speed motor have now been installed correctly. Enjoy the sunstantial energy savings of a 2-speed pump and timer.