

STA01 Installation Instructions

Contents

Introduction.....	1
Attention.....	1
Making a good crimp.....	1
Installation kit for Coleman Mach	2
Mach 1, 3, 3+, 10, 15 high profile models.....	3
Wiring diagram.....	3
Mounting locations.....	4
Routing the wire.....	4
Identifying the wires.....	5
Making the connections.....	5
Brown wire.....	5
White wire.....	6
Orange wire.....	6
Black wire.....	7
Removing existing start components.....	8
Mach 8 low profile models.....	9
Model identification and wiring diagrams.....	9
Style 1.....	9
Style 2.....	11
Mounting location.....	12
Identifying the wires (Style 1 and Style 2).....	13
Routing the wire.....	13
Making the connections.....	14
Style 2.....	14
Style 1.....	16
Other Models.....	18

Polar Cub #1.....	19
Outdoor Temp Board Only.....	19
Pressure Switch Relay – with or without components on Pin 7.....	21
Polar Cub #2.....	23
TSR Mach 3.....	24
High efficiency two ton.....	25
Units with Freeze Switch on Compressor.....	26
Learn process.....	27
QA.....	28
How do I know I installed it correctly?.....	28
Nothing works, not even the fan.....	28
The fan runs but it won't start on utility power.....	28
My air conditioner runs great on commercial electric power but will not start on my generator.....	28
My air conditioner shuts off early on generator. What can be wrong?.....	28

Introduction

Air conditioners are used throughout the RV industry for many years.

STA01 is a great companion to achieve low current starts on these units.

The information contained in this manual can be used to install **STA01** on most brand air conditioning units. Similar models are grouped together as the installation is very comparable for these units.

Attention

Follow standard electrical safety guidelines for your locality when working with your air conditioner. If you are uncomfortable working on your air conditioner, please seek professional help from RV dealers, electricians or HVAC service installers to complete the installation of this product.

The air conditioner is a high-voltage AC equipment, which can cause electric shock. If handled improperly, the internal voltage may cause serious injury or death. Before operating the air conditioner, always ensure that the entire RV or boat is disconnected from power.

Many air conditioners are installed on the top of RV's where there is a significant risk of falling.

Be sure to mitigate that risk where ever possible and use safety equipment and assistance where required.

Making a good crimp

Good crimps are essential for a long-lasting, reliable installation. There are many informative guides, videos, and tool recommendations on the internet. Please consult this if you are unfamiliar with crimping connectors or need to purchase tools.

Moderately pull the crimp fitting after crimping to ensure the fitting is correct. If the wire is easily pulled out, the connector is not connected properly and must be reconnected. During the installation process, you need to test the perfect installation and connection of each connector to avoid other potential safety hazards.

Mach 1, 3, 3+, 10, 15

Installation kit for Coleman Mach



① Snap bushing

② Quick short wire terminal connectors WAGO-2

③ Quick short wire terminal connectors WAGO-3

④ Disposable disinfection cotton

⑤ Cable ties

⑥ 3M film

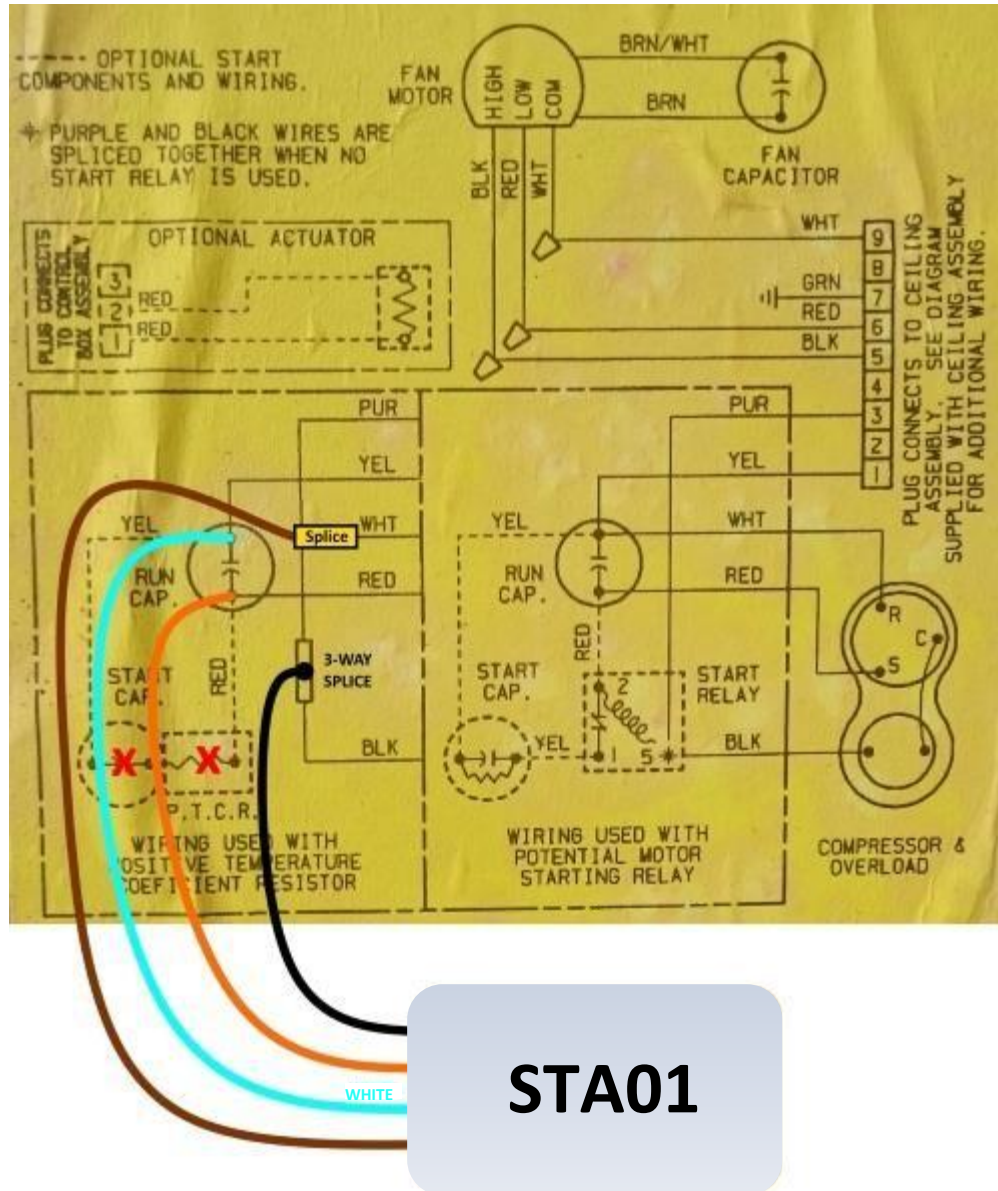
⑦ 720mm Black wire AWG 2 square

⑧ Self-tapping screws

⑨ Wire depending connector 6.3mm

Mach 1, 3, 3+, 10, 15 high profile models

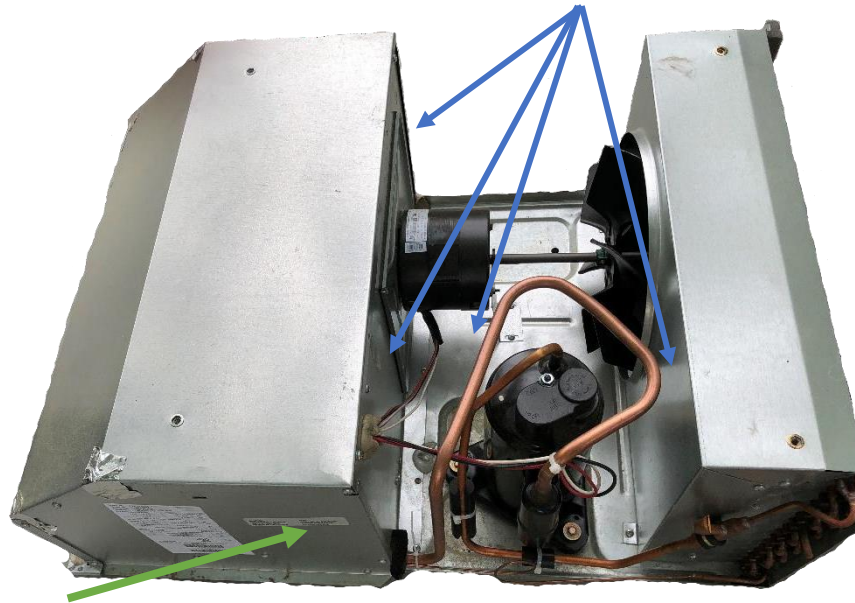
Wiring diagram



A Coleman AC may be factory configured four different ways as shown in the factory diagram above. The dash outlined block on the left where STA01 is connected shows a PTCR and start capacitor. The right dashed block shows a start relay configuration. The dashed components inside each block show that those components may not be installed in either configuration. There may be 2 or 3 capacitors inside of the electric box.

STA01 installs the same way regardless of the configuration used in your air conditioner. Follow the instructions in this manual to correctly install STA01.

Mounting locations



Picture 1

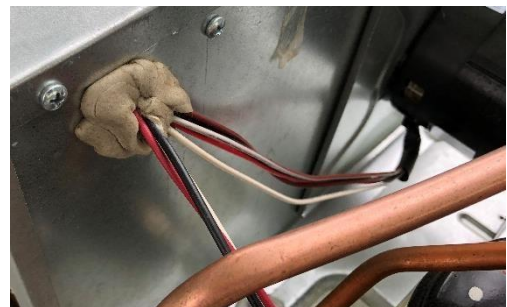
The blue arrows in Picture 1 above show possible mounting locations. This can vary depending on how the tubing is run in this part of the air conditioner. Use the double-sided tape included in the optional installation kit to secure STA01 to the Air Conditioner. The wire exit should be pointing down or the box should be mounted parallel to the bottom of the cabinet.

Clean and dry the selected mounting area. Use double sided foam tape to secure the enclosure to the air conditioner in one of the identified areas.

The green arrow in Picture 1 shows the location or the door for the electric box. Remove the screws to gain access to the inside of the box.

Routing the wire

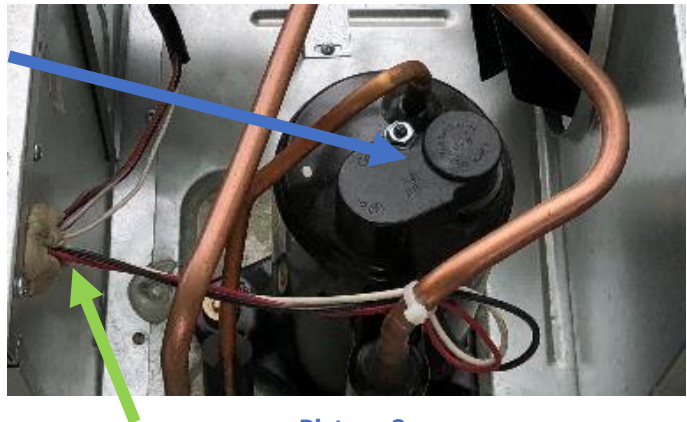
The electrical box wire entry is sealed with a putty as shown in Picture 2. Pull back the putty and push through the STA01 wiring harness. Replace the putty by pressing it around all the wires. Leave the black sleeve around the wires intact where they enter the electrical box. Neatly secure the wires using wire ties.



Picture 2

Identifying the wires

The blue arrow to the left points to the top of the compressor. Three wires exit this cap colored BLACK, WHITE, and RED shown entering the electric box by the green arrow.



Picture 3

Making the connections

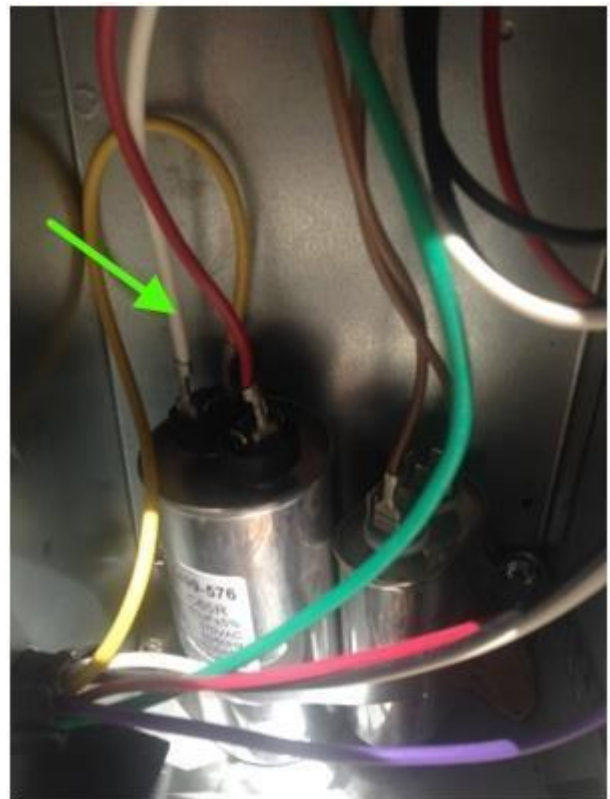
Use only end splice or jacketed spade connectors for connecting one wire to another. Wire nuts can come off in this high vibration environment and automotive connectors are not rated for line voltage.

Brown wire

Follow the white wire from the compressor into the electric box to the top of the run capacitor as indicated by the green arrow in Picture 4. Disconnect the white wire and cut off the connector on the end. Strip about ½ inch (1.27cm) of insulation from the white wire and from the BROWN wire from STA01. Twist both wires together and crimp them with an end splice connector as shown in Picture 5.



Picture 5



Pictur 4

Note: Some installations will have multiple wires on the terminal group along with the white and yellow wires shown in Picture 4. Be sure to follow the white wire from the compressor completely back to the capacitor to be sure you have the correct wire.

White wire

Place a quick-connect terminal on the WHITE wire from STA01 and crimp tightly. Connect the WHITE wire from STA01 to the run capacitor on the same terminal group as the yellow wire indicated by the yellow arrow in Picture 6.



Picture 6

Orange wire

Place a quick-connect terminal on the ORANGE wire from STA01 and crimp it tightly. Connect the ORANGE wire to the red wire terminal group on the run capacitor shown by the orange arrow in Picture 7. Be sure the crimped plastic ends completely cover the bare wire.

It is not necessary or recommended to rely on electrical tape on the connections as shown in Picture 7.



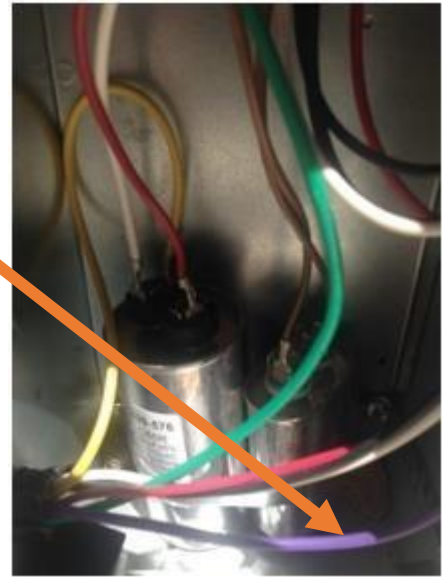
Picture 7

Black wire

Follow the black wire from the compressor into the electrical box to where it connects to the purple wire pointed to by the orange arrow in Picture 8. There is an end splice connector located at the junction of these two wires. Cut off this end splice connector. Strip about ½ inch (1.27cm) of insulation from both the black and purple wires. Strip ½ inch (1.27cm) from the BLACK wire from STA01 and twist the three wires together. Securely crimp the three wires together using a new end splice as shown in Picture 9.



Picture
9



NOTE: Some air conditioners have a freeze switch similar to Picture 9A. The black wire from the compressor goes to this switch and only an orange and a brown wire go back into the electric box. The purple power wire will connect with the brown wire that comes from the switch in these systems. Make your connection either at the junction of the brown and purple wire or anywhere convenient in the brown wire from the switch.

NOTE: Some air conditioners have a small freeze sensor board inside the electric box so the purple power wire and the black wire from the compressor do not join as shown above.

Splice the STA01 BLACK wire to the black wire from the compressor in these systems.



Picture 9A

Removing existing start components

Some systems may use a start cap (orange arrow in Picture 10) and PTCR (green arrow in Picture 10). Previous owners may have also installed a hard start kit that replaces these components. These components form a circuit that connect from the yellow wire side of the run capacitor to the red wire side of the run capacitor.

Picture 7 shows a single red wire connecting to the run capacitor. If your system has only this single red wire then there are no start components in your system so skip the rest of this section.

If there is another wire connected to the red wire group on the run capacitor (other than the orange wire from STA01), remove the wire and disconnect it from the component it connects to. If the end of the wire is directly connected to the PTCR (such as a different style PTCR than shown in Picture 10), disconnect the PTCR wire on the other side of the PTCR from the start capacitor as well.



Picture 10

Mach 8 low profile models.

Model identification and wiring diagrams

Two slightly different models of low-profile air conditioner were produced. They are identified here as style 1 and style 2. Diagrams are normally installed on the electric box inside cover.

Style 1

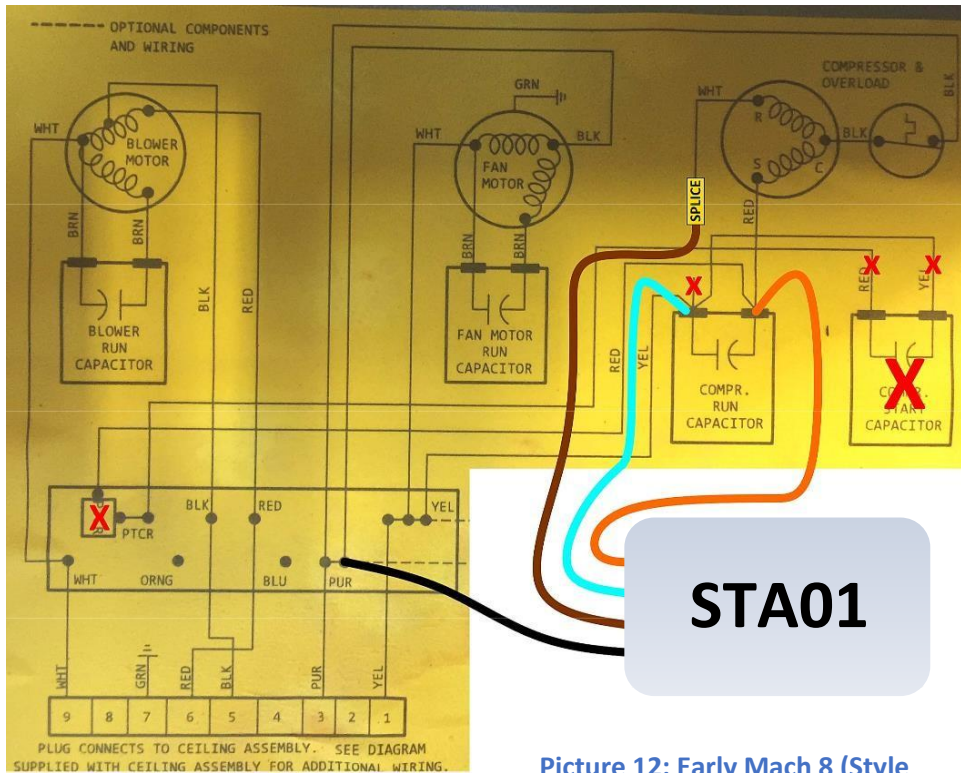
Picture 11 shows the early model low profile unit. The picture is shown with the fan removed for easier access.

Capacitors are mounted inside the metal box in the center of the AC unit. The STA01 wiring connections will all be made inside this box.



**Picture 11: Early Mach 8
(style 1) with capacitors
inside electric box**

Picture12 shows the wiring diagram shipped model. With this



Picture 12: Early Mach 8 (Style

- ✦ Remove wires with red X's (Compressor start capacitor can be left in place after disconnection)

- ✦ Verify that the compressor red wire connects to the silver run capacitor.

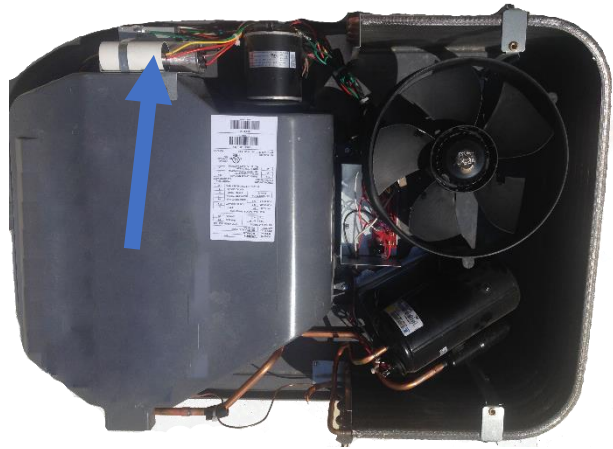
- ✦ Remove any other red wires from this connection and remove the wires. Connect the orange wire to the run capacitor next to the compressor red wire.

Mach 8

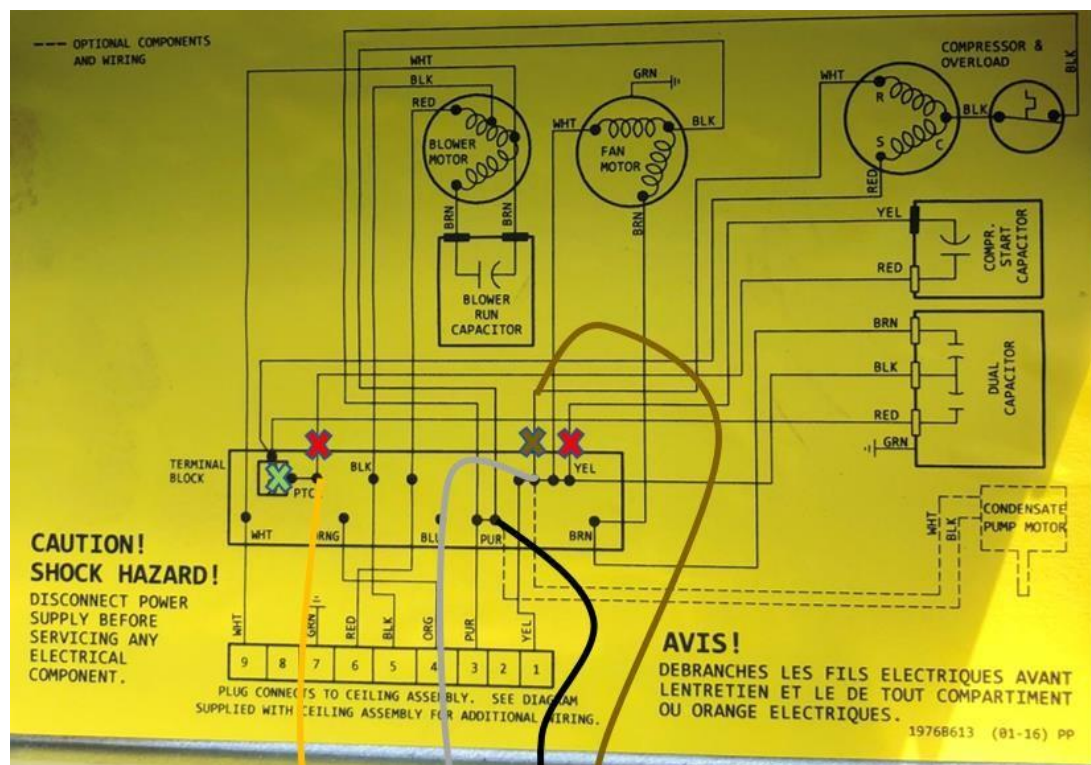
Style 2

Picture 13 shows a later low-profile unit. The capacitors are mounted outside the box as indicated by the blue arrow in the Picture. Wiring connections to STA01 will all be made inside the electric box in the center of the unit just under the fan.

Picture 14 shows the wiring diagram shipped with this unit and modified to show STA01.



**Picture 13 Later Mach 8 (Style 2)
with capacitors outside of the
electric box**



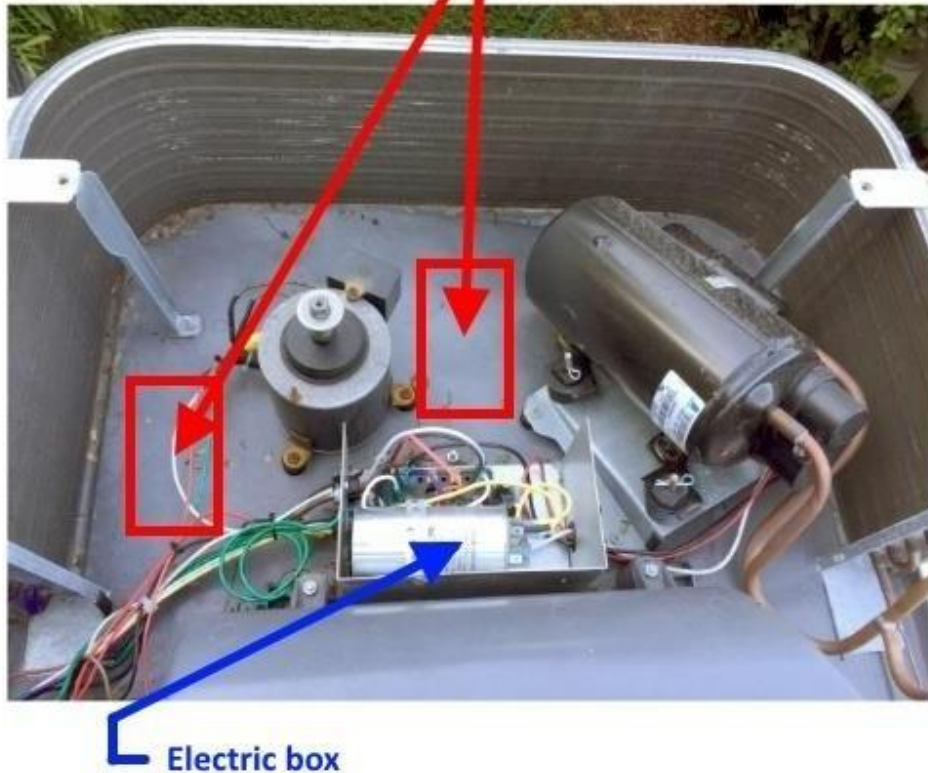
STA01

- Remove wires with red X's
- Remove PTCR (green X) and reconnect wires to board.
- Disconnect white wire to compressor (brown X) and connect to BROWN wire.

Picture 14: Later Mach 8 style (Style 2)

Coleman Mach 8

STA01 can mount in either of these two locations.



Picture 20

The red arrows in Picture 20 show suggested mounting locations. Removing the fan will give better access to wiring and mounting.

Clean and dry the selected mounting area. Use 3M film provided in the installation kit to secure the enclosure to the air conditioner in one of the identified areas.

NOTE: Before using 3M glue, please clean the area to be used with disposable disinfection cotton piece to ensure better adhesion.

Identifying the wires (Style 1 and Style 2)

The blue arrow to the left points to the top of the compressor in Picture 21. Three wires exit this cap colored BLACK, WHITE, and RED. These wires enter the electric box as shown by the green arrow in Picture 16. The connections these wires make inside the electric box will be used to connect STA01 in the next installation steps.



Picture 21 : Compressor (both styles)

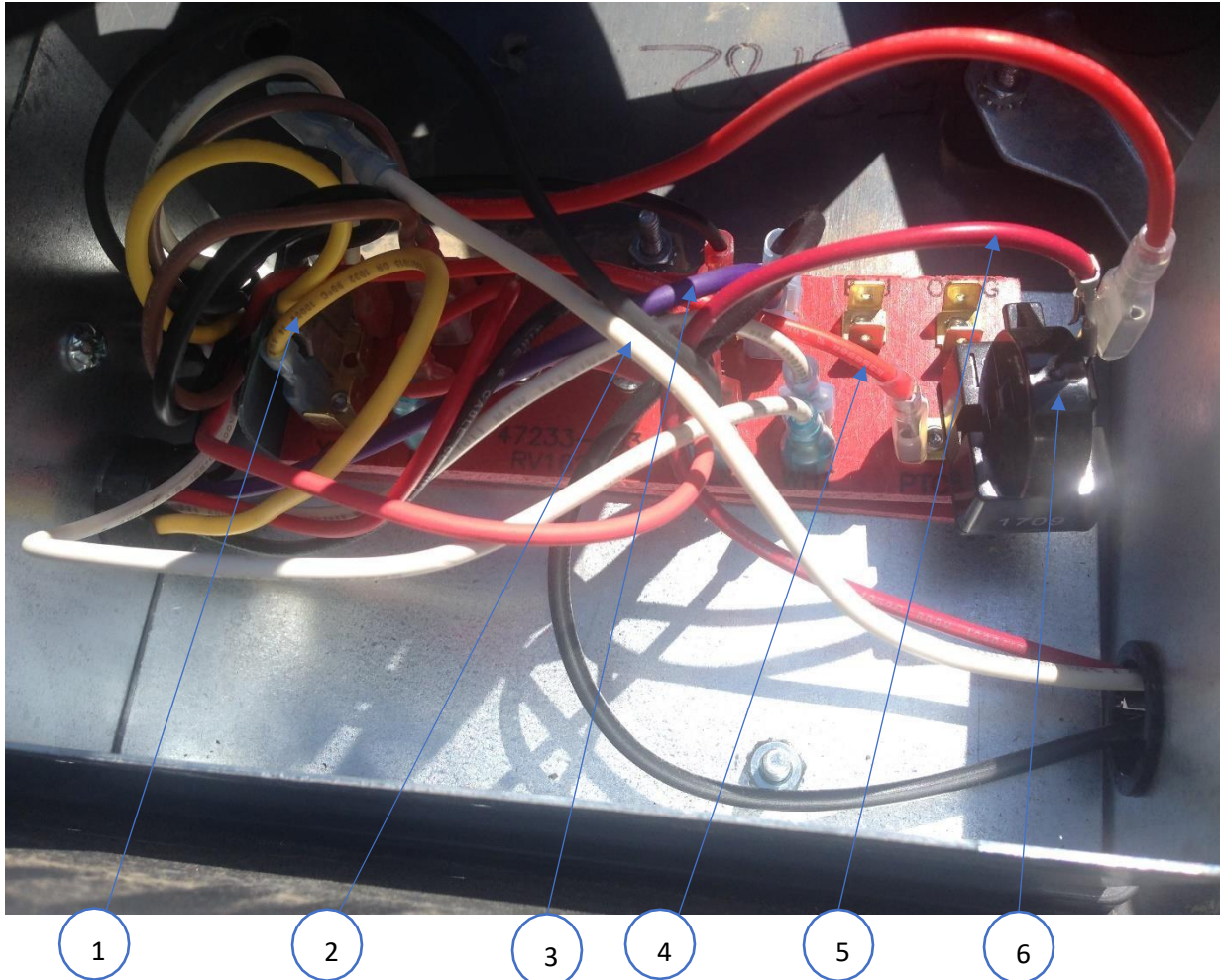
Routing the wire

Route the wires into one of the wire entries on the side of the electric box. There is usually enough room where the compressor wires enter the box to add the STA01 wires. You may need to cut off the pre-crimped connectors on the wire to route the wire through the grommet on the side of the box. Re-crimp new connectors on those wires if this is required for your installation. Secure any excess wire using the Cable ties supplies in the installation kit.

Making the connections

Use only end splice or jacketed spade connectors for connecting one wire to another. Wire nuts can come off in this high vibration environment and automotive connectors are not rated for line voltage.

Style 2



Picture 22: Style 2 electric box

Brown wire

Follow the white wire from the compressor into the electric box. Continue to follow the wire to the connector block and unplug the wire from the connector block (see arrow 2 in Picture 22). Install the quick connect on the BROWN wire from STA01 and crimp the connector. Connect the unplugged white wire into the BROWN wire from STA01.

White Wire

Place a quick-connect terminal on the WHITE wire from STA01 and crimp the connector. Connect the WHITE wire from STA01 to the empty terminal created when the white wire from the compressor was disconnected (see BROWN wire step).

Disconnect the start capacitor

If your unit has a start capacitor it must be disconnected. Not all units have start capacitors so first determine if your unit has one. Follow the red wire from the compressor into the electric box (arrow 5 in Picture 22). If this wire leads to a PTCR you have a start capacitor that must be removed. If you do not have a start capacitor, you can continue to the next step placing the orange wire.

First locate the start capacitor. There are typically two capacitors in this design, a metal case “run capacitor” and a plastic cased “start capacitor”. The plastic cased capacitor with a red and a wire connected to it is the start capacitor. Follow the red and yellow wires into the electric box. Disconnect both wires from their connections and secure the ends out of the way with a wire tie. This is pointed to by arrows 1 and 4 on Picture 22 however the wires must be traced back from the capacitor to be sure the correct wires are disconnected.

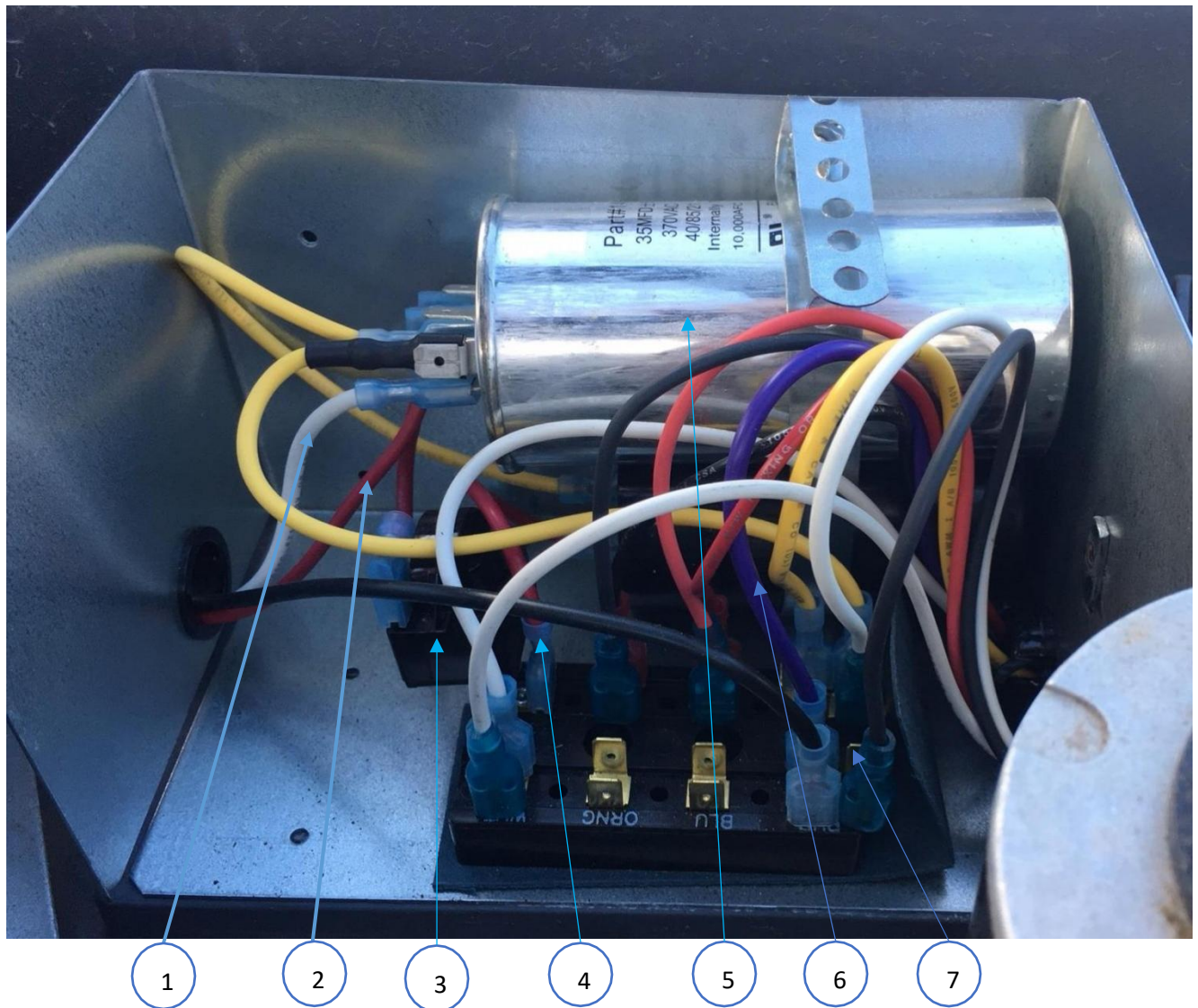
Disconnect the two remaining red wires from the compressor from the PTCR and remove the PTCR. Reconnect the red wires to the PTCR terminals on the connection block.

Orange wire

Install a piggyback quick connect on the ORANGE wire from STA01. Disconnect the red wire from the compressor. Plug the ORANGE wire from STA01 into the empty terminal created by removing the red wire from the compressor. Plug the red wire from the compressor into the orange wire’s piggy back connector end.

Black wire

Install a quick connect on the BLACK wire from STA01. Connect it to an empty terminal in the same group as the purple wire. (see Picture 22 arrow 3). The group consists of multiple connectors and although not visible in the picture, there is an extra unused terminal.



Picture 23: Style 1 electric box

Brown wire

Follow the white wire from the compressor into the electric box. Continue to follow the wire to the run capacitor (arrow 1 in Picture 23) and unplug the wire from the capacitor. Install the quick connect on the BROWN wire from STA01 and crimp the connector. Connect the unplugged white wire into the BROWN wire from STA01.

White Wire

Place a quick-connect terminal on the WHITE wire from STA01 and crimp the connector. Connect the WHITE wire from STA01 to the empty terminal on the run capacitor created when the white wire from the compressor was disconnected (see BROWN wire step).

Disconnect the start capacitor

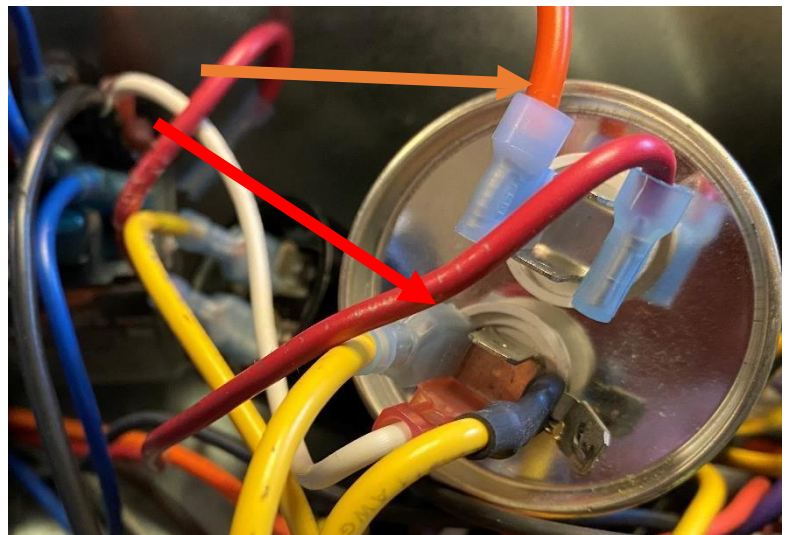
If your unit has a start capacitor it must be disconnected. Not all units have start capacitors so first determine if your unit has one. Follow the red wire from the compressor into the electric box (arrow 2 in Picture 23). If this wire leads to a PTCR (pointed to by arrow 3 in Picture 23) you have a start capacitor that must be removed. If you do not have a start capacitor, you can continue to the next step placing the orange wire.

First locate the start capacitor. There may be up to 3 capacitors in this design. The metal case capacitor (pointed to in Picture 23 arrow 5) is the “run capacitor”. If the unit has a start capacitor, it will have a red and a yellow wire connected to it. If the unit has a fan capacitor, it has two brown wires connected to it. Disconnect both red and yellow wires from the start capacitor. Follow the wires to the other end of the wire. Disconnect and remove the wires.

Disconnect any remaining red wires from the compressor from the PTCR and remove the PTCR. Reconnect the wires to the PTCR terminals on the connection block.

Orange wire

Install a quick connect on the ORANGE wire from STA01. Verify that the red wire from the compressor connects to the silver run capacitor as shown in Picture 24. If not, disconnect the compressor red wire and reconnect it to the group opposite the yellow wires as shown by the red arrow. Disconnect and remove any other red wires on this group of terminals. Connect the ORANGE STA01 wire into one of the open terminals as shown by the orange arrow in Picture 24.



Picture 24

Black wire

Install a quick connect on the BLACK wire from STA01. Connect it to an empty terminal in the same group as the purple wire. (see Picture 23 arrow 6). Picture 23 arrow 7 points to a barely visible extra terminal on the connection block where the black wire can be connected.

Other Models

There are a few other models of Coleman air conditioners we should mention. The process of wiring them is comparable to Mach 1 and similar units. Use these diagrams along with the component identification shown in the Mach 1 section to identify and connect STA01. Wiring colors are the same as all models we have come across so far. The wires from the compressor are:

- Black to the compressor overload and compressor “C” common winding
 - For ALL systems wiring STA01 BLACK to this wire is the goal
- White to the compressor “R” run winding.
- Red to the compressor “S” start winding.

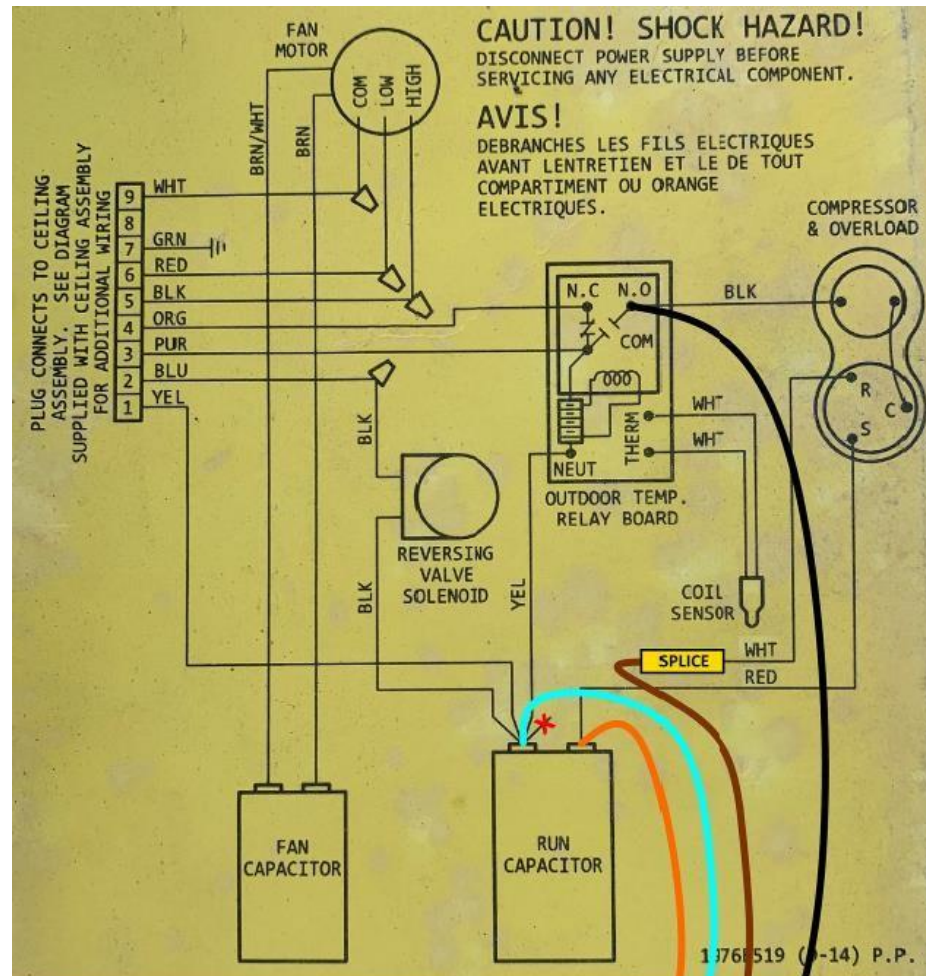
Mounting location varies for these models however it is always possible to find an appropriate location. Mount the unit with the wiring exit on the box pointing down or mount the box parallel to the ground. Never mount the box with the wires pointing up.

Polar Cub #1

Outdoor Temp Board Only

This instruction is for units without start components. If the run capacitor has more than one red wire on the run capacitor as shown below, please use Picture 33.

The red X by the run capacitor indicates the white wire is disconnected from the white/yellow wire terminal group and reconnected to the BROWN wire from STA01 using a splice joint. The white wire (shown in blue for contrast) is connected where the compressor white wire was removed.



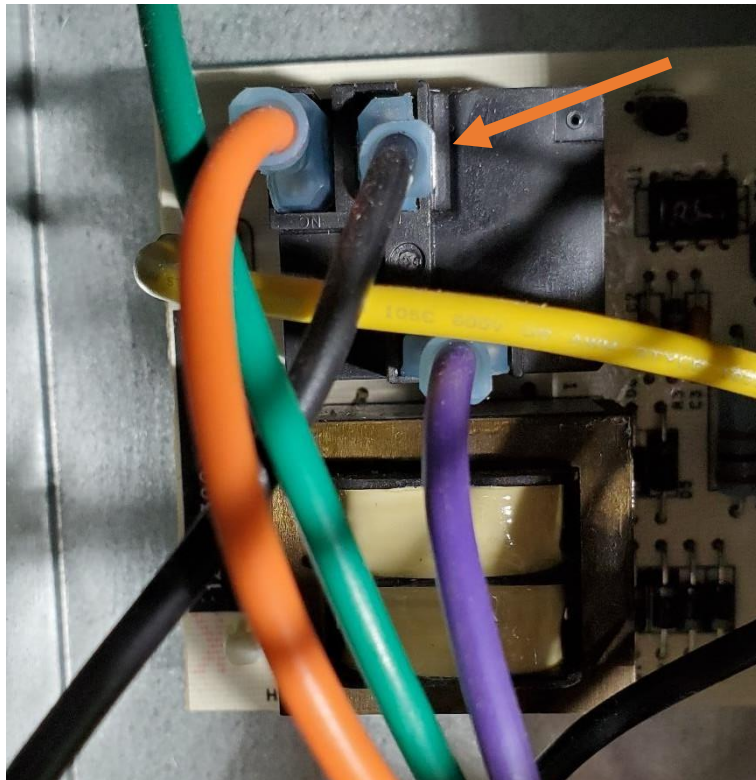
STA01

Picture 30

Other Models

Picture 31 shows the outdoor temperature relay board. The black wire on the relay shown by the orange arrow is the wire of interest on the N.O. connection in the schematic of Picture 30, to which the STA01 BLACK wire will connect. First, disconnect the black wire from the relay. If the connector on the existing black wire is unjacketed, cut it off and crimp on tightly a connector as it is in Picture 31.

Next, with 720mm Black wire AWG (included in the kit), cut two 4-5-inch wires and strip each end. Crimp a connector on one wire and a blue male on the other wire. Create a 3-wire pigtail on the end of the STA01 BLACK wire with the two new wires using an end splice as shown in Picture 32. Plug the male pigtail into the disconnected compressor black wire and the female pigtail into the N.O. relay terminal.



Picture 31



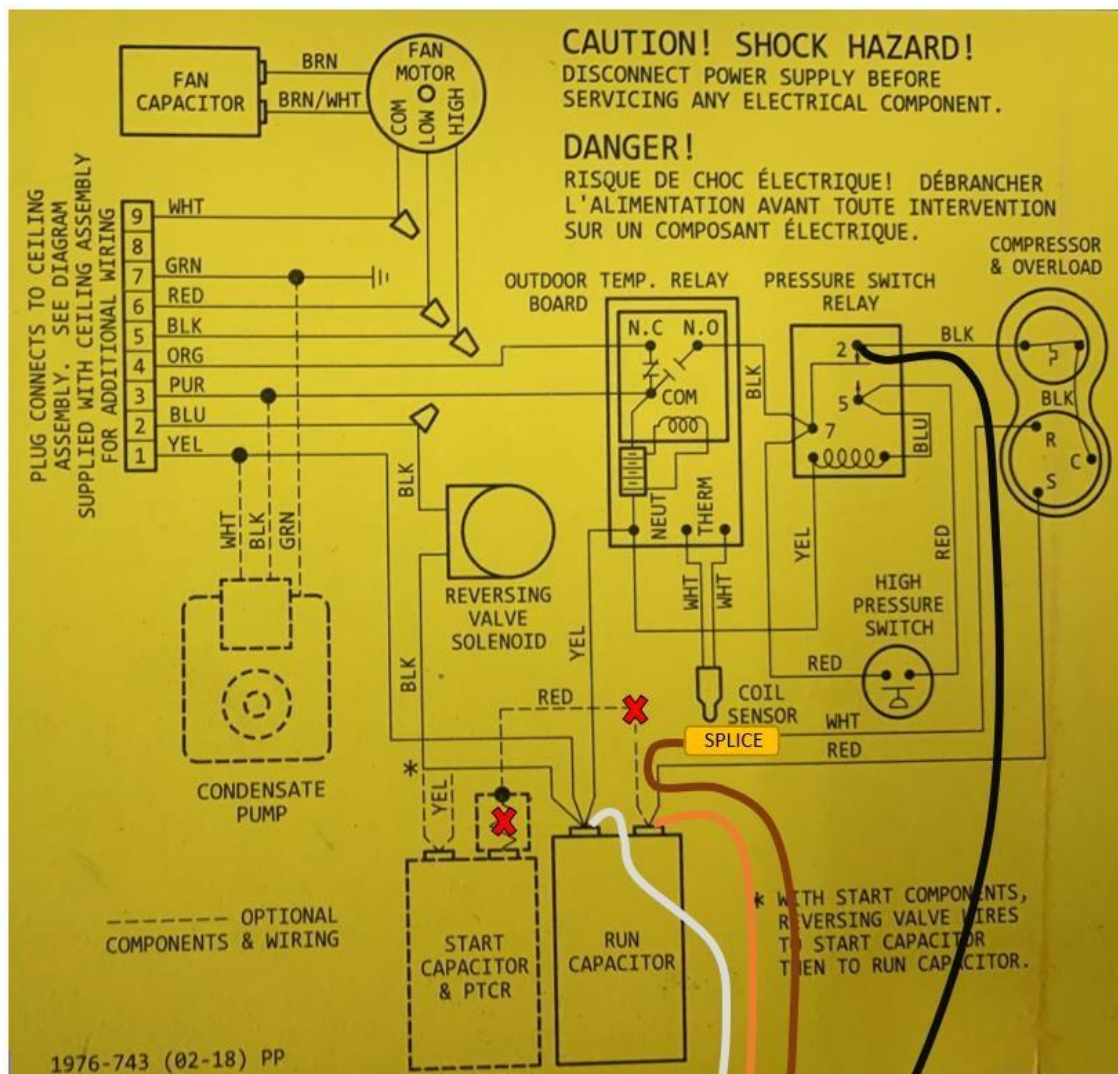
Picture 32

Other Models

Pressure Switch Relay – with or without components on Pin 7

These models have a pressure switch relay that the compressor black wire connects to. A typical schematic is shown in Picture 33.

Red X indicates wires and components that are to be removed. Not all systems have these components. If the run capacitor has only a single red wire on the terminal group opposite the white/yellow wire group then there are no start components. If there is a second red wire or small black plastic piece with red wires (Picture 10, green arrow), remove the wire at both ends.

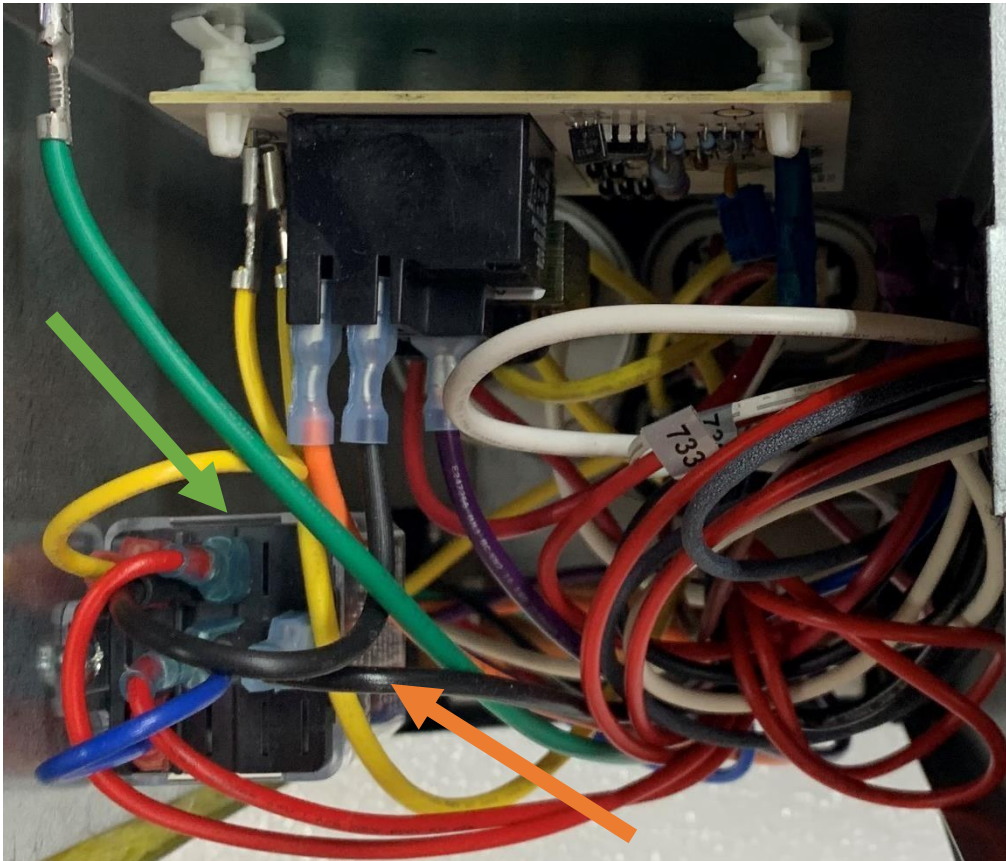


STA01

Picture 33

Other Models

Picture 34 shows the pressure switch relay by the green arrow and a different angle in Picture 35. The black wire on the relay shown by the orange arrow in Pictures 34 and 35 is the wire of interest on the Pin 2 connection in the schematic of Picture 33, to which the STA01 BLACK wire will connect. First, disconnect the black wire from the relay. If the connector on the existing black wire is unjacketed, cut it off and crimp on tightly a female connector as it is in Picture 34.



Picture 34

Next, with 720mm Black wire AWG (included in the kit), cut two 4 to 5-inch wires and strip each end. Crimp a blue female connector on one wire and a blue male on the other wire. Create a 3-wire pigtail on the end of the STA01 BLACK wire with the two new wires using an end splice as shown in Picture 36. Plug the male pigtail into the disconnected compressor black wire and the female pigtail into the Pin 2 relay terminal.



Picture 35

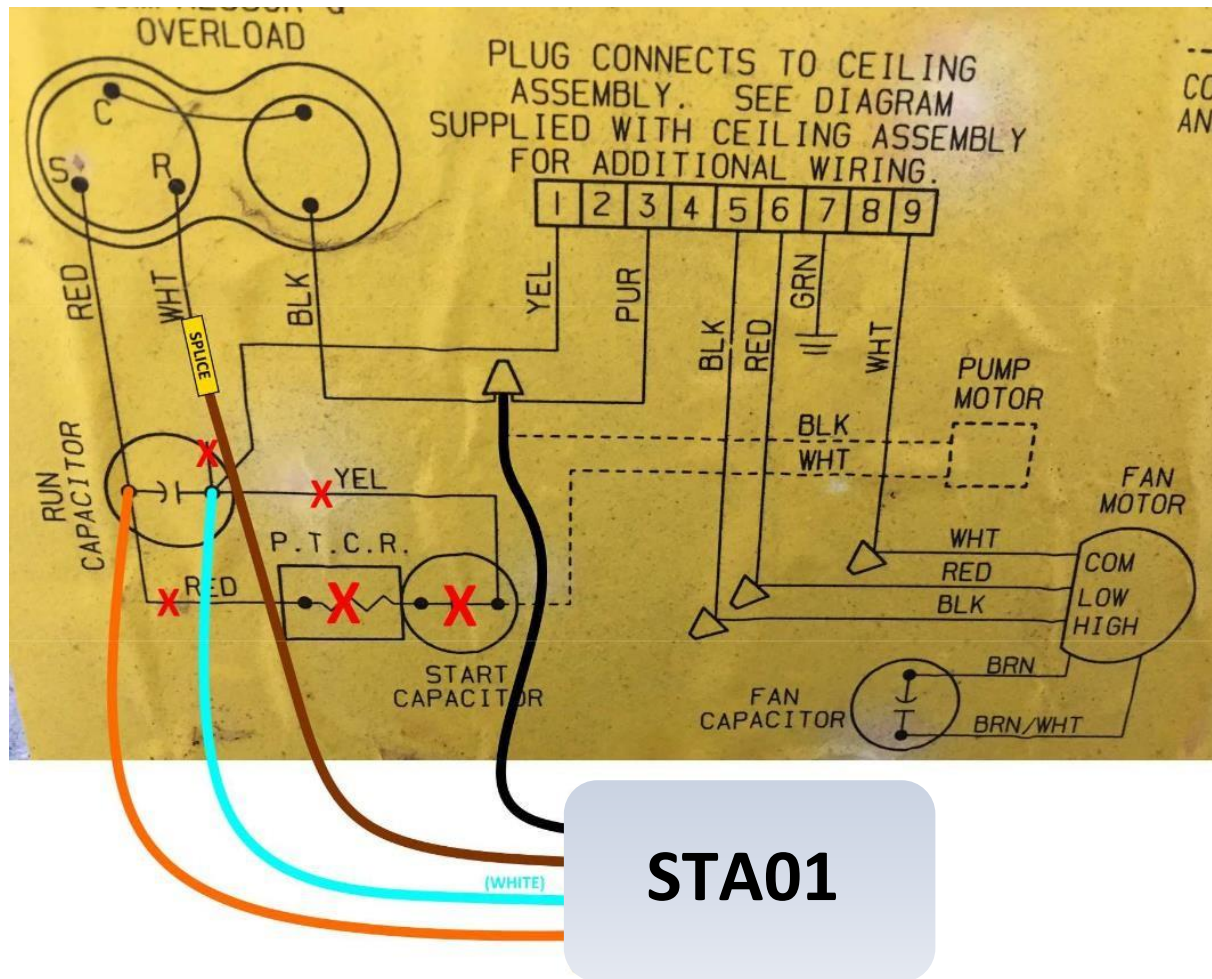


Picture 36

Polar Cub #2

This version is an alternate wiring supplied with some models. The red X's in the PTCR, start capacitor, YEL, and RED wires are all components that must be removed if they are installed. Not all systems have these components. If the run capacitor has only a single red wire on the HERM terminal or a single red wire on the terminal group opposite the white/yellow wire group then there is no start components its red X's can be ignored.

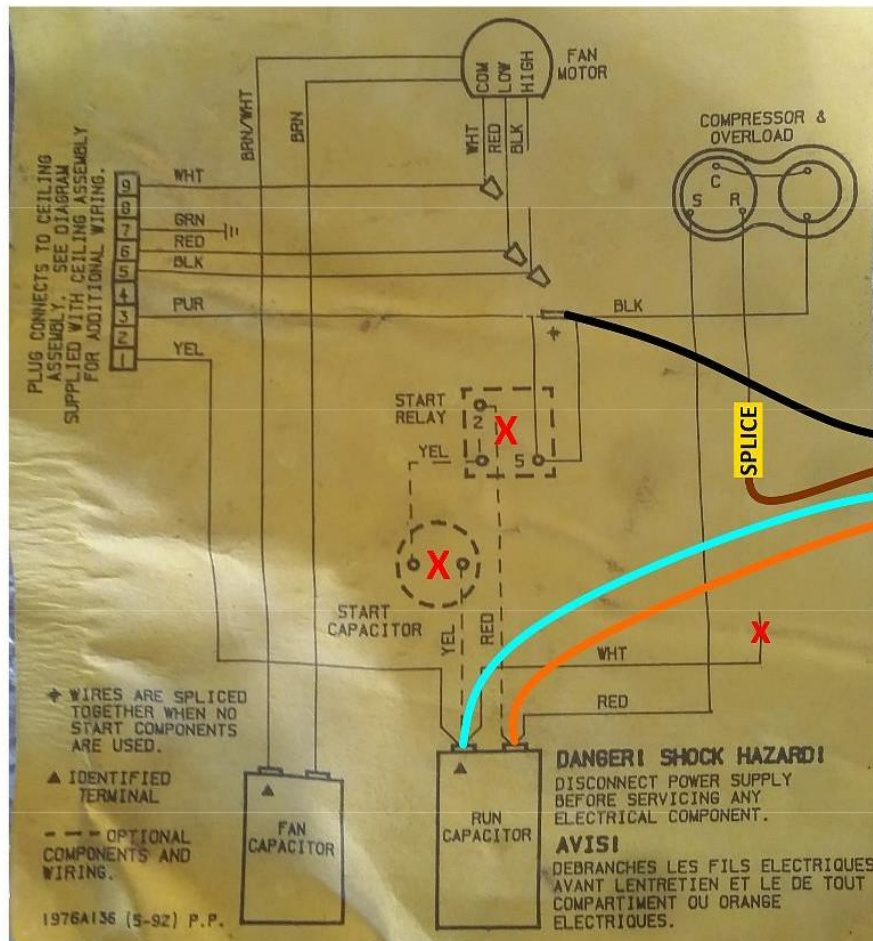
The red X by the run capacitor indicates the white wire is disconnected from the yellow wire terminal and reconnected to the BROWN wire from STA01.



Picture 36

TSR Mach 3

The TSR Mach 3 is an older model that is still similar to other models here. The diagram is included because it is drawn visibly different from the other models. The wiring is however the same.



- 1) Remove any existing start cap, start relay, & any dashed wiring shown.
- 2) Connect the BLACK wire from the ES to the same splice where the existing PUR meets the BLK.
- 3) Remove the WHT wire leading to the compressor RUN winding from the run cap, and splice it to the BROWN wire from the ES.

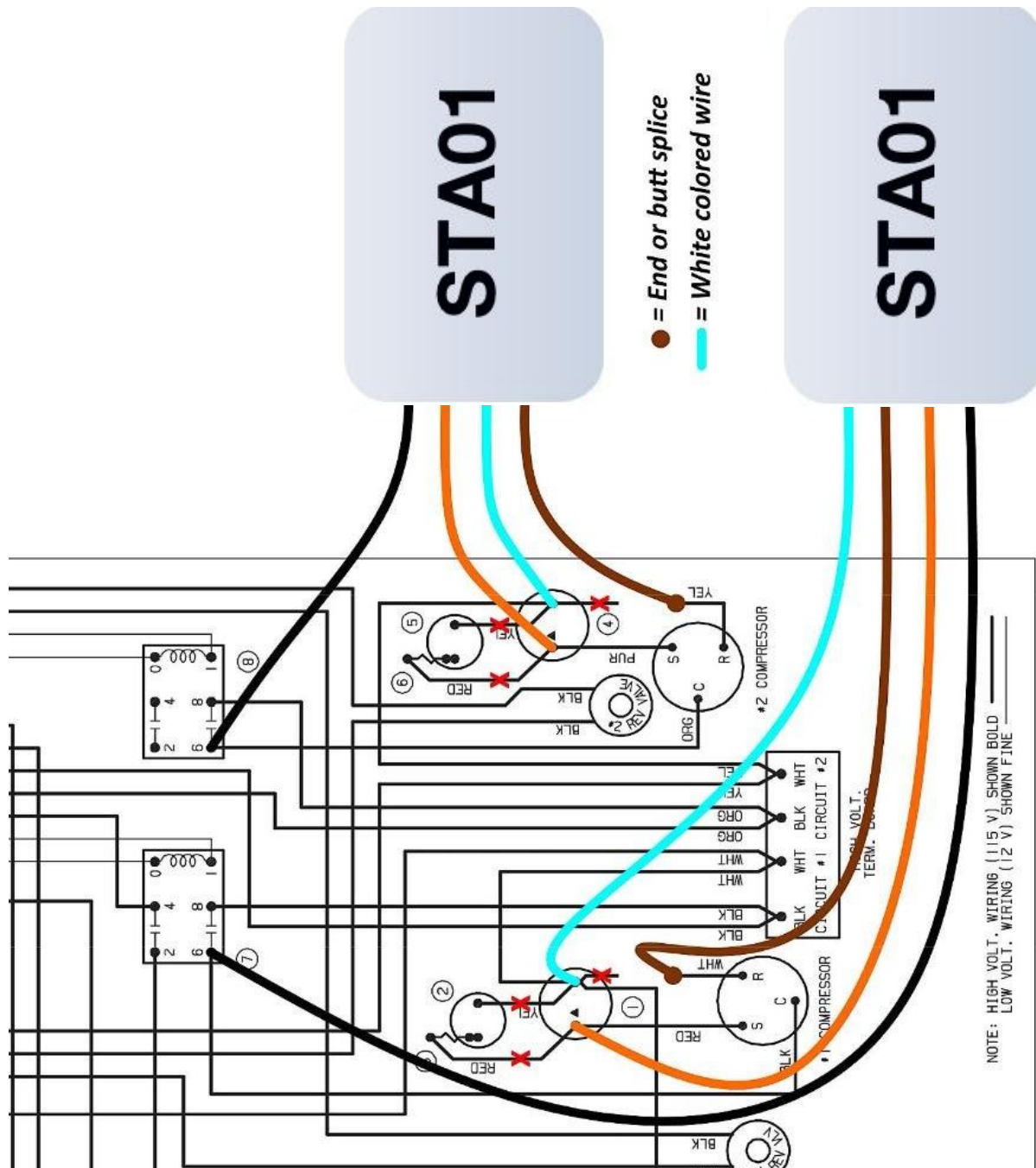
STA01

- 4) Connect the WHITE wire from the ES to run cap on the side with the existing YEL wire.
- 5) Connect the ORANGE wire from the ES to run cap on the other side with the existing RED wire.
- 6) Perform the first 5 learning startups on utility power, waiting 3 min between each.

Picture 37

High efficiency two ton

This unit is actually two compressors in one box therefore two STA01 units are required. The box is typically “basement” or under coach mounted. As with other models, start components are removed by removing the red and yellow wires from the run capacitor that go to the PTCR and start capacitor.



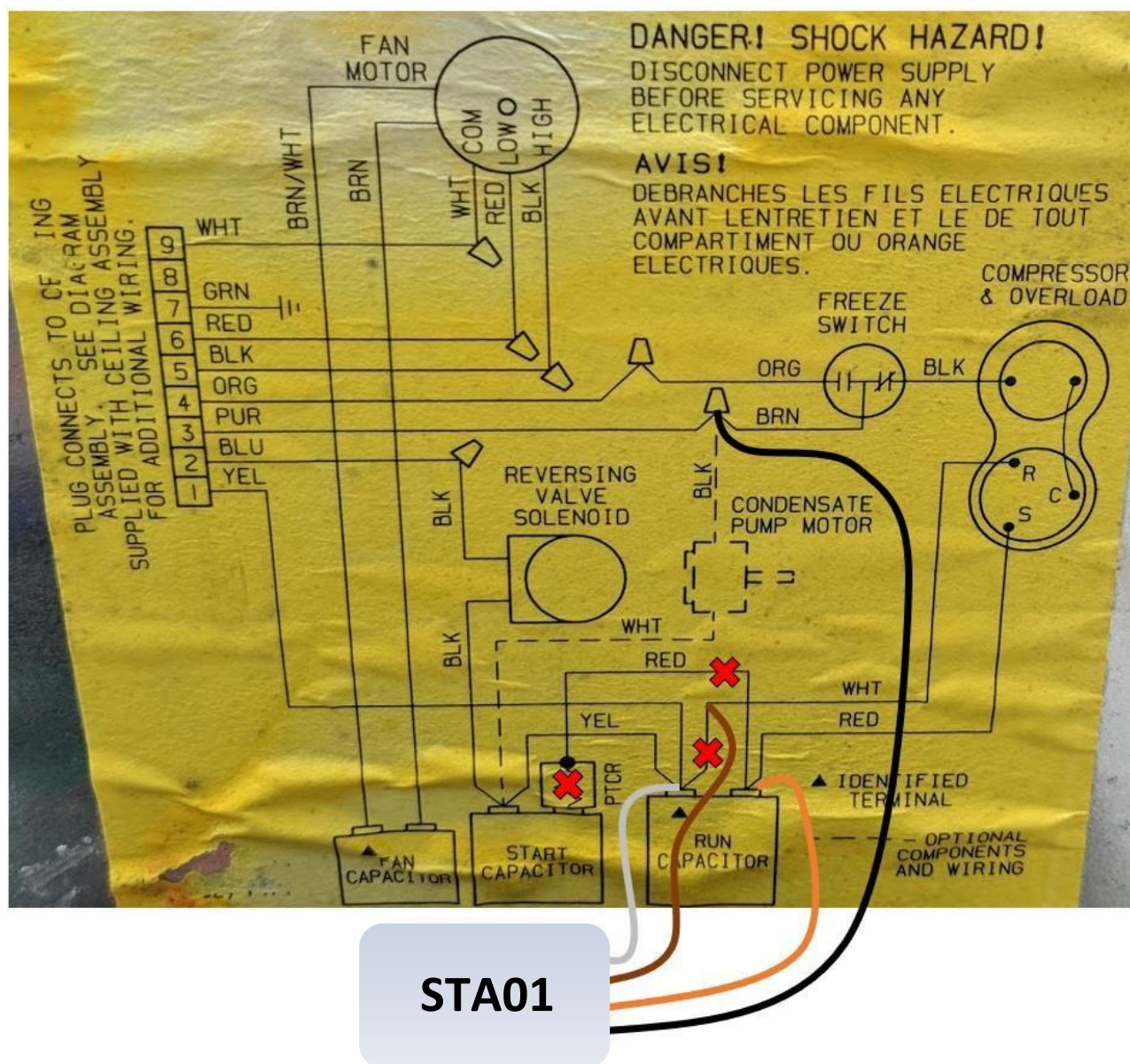
Picture 38

Units with Freeze Switch on Compressor

Picture 39 shows STA01 wiring where a freeze switch in a heat pump model is directly connected to the compressor.

Red X indicates wires and components that are to be removed. Not all systems have these components. If the run capacitor has only a single red wire on the terminal group opposite the white/yellow wire group then there are no start components. If there is a second red wire or small black plastic piece with red wires (Picture 10, green arrow), remove the wire at both ends.

The red X by the run capacitor indicates the white wire is disconnected from the yellow wire terminal and reconnected to the BROWN wire from STA01.



Picture 39

Learn process

STA01 “Learns” the start characteristic for your compressor over the **first 5 starts**. We recommend that these starts are done on a 20 amp or greater utility power source with all other loads in the RV turned off.

Installations that do not have access to utility power can do the learn process on a generator, but with some risk and it is not recommended. Generators must have a continuous rated output capable of supporting the air conditioner. Any low RPM economy or ECO mode must be switched off so the compressor can start with the maximum capacity of the generator.

1. Breaker on the air conditioning unit.
2. Set the thermostat to start the air conditioner compressor. Heat mode may be used if you are using a heat pump model.
3. The compressor will start up shortly after the fan starts. Let the compressor run for 30 seconds.
4. Set the thermostat to turn off the compressor.
5. Set the thermostat to start the compressor again.
6. STA01 will wait 3 minutes from the time the compressor stopped in step 4 to restart the compressor.
7. The compressor will start up shortly after the fan starts. Let the compressor run for 30 seconds.
8. Set the thermostat to turn off the compressor.
9. Repeat steps 5 to 8 three more times to complete the learn process.

Once the learn process is complete, STA01 does not learn again. STA01 can now be used on generators, inverters or utility power to provide low-current starts every time.

Note: *Learning can be done during regular operation. It is not necessary to start and stop the air conditioner if you are going to run it on AC mains power for a while before using an inverter or generator. Normal compressor cycling will complete this process as well.*

QA

How do I know I installed it correctly?

STA01 has a few characteristics that can help you determine that. First, the compressor should start more quietly than it did before. Lights will dim much less and if you have a volt or current meter you should see a measurable difference.

Second, if you turn off the compressor at the thermostat when it is running then turn it on right away, STA01 will prevent the compressor from starting for five minutes. If the compressor starts sooner, you have a wiring problem.

Nothing works, not even the fan.

STA01 does not affect the fan at all. If the fan does not run then most likely you connected the wrong white wire to the brown wire. Check it again and make sure the wire connected to the brown wire is the white wire that comes from the compressor.

The fan runs but it won't start on utility power.

1. Go through these directions again and verify every connection.
2. Be sure you turned on all the power you turned off. Some thermostats need DC to operate as well as AC.
3. Check the thermostat set point. If you have a digital thermostat the ambient temperature must be above the set point for the air conditioning to work. If it's a slide thermostat, it must be set for full cool.
4. Is it too cold for the compressor to start? We often get calls where a slide thermostat will not work under 70°F (21.2°C) ambient. Try heat mode if you have a heat pump and it is too cold or warm the RV with the heater first.
5. Check your line voltage when the compressor tries to start and make sure it is not dropping below 108 VAC. Some RV's have surge suppressors that cut off on low voltage.

My air conditioner runs great on commercial electric power but will not start on my generator.

Be sure all the loads are turned off in your RV. A 15K BTU air conditioner will use about 1800- 1900 watts to run leaving no additional capacity for any other loads on a 2000-watt generator. Be sure you check generator reviews before you chose a generator. Not all generators can run an air conditioner.

My air conditioner shuts off early on generator. What can be wrong?

Aside from the suggestions in the last questions, you should also test your generator output and verify the RV load.