

SUCCESS WITH Atwood® TRAINING



SWAAT

Welcome to S.W.A.T

**Atwood Furnace Part 2
Sequence of operations systems
include the following:**

- 1. Fan system**
- 2. Ignition system**
- 3. Burner System**

Presenter: Mike Williams and Chantal Hershberger

Customer Service 866-869-3118

www.askforatwood.com

Welcome to Atwood SWAT Training

These classes are to help you troubleshoot our product to reduce time and money to get the customer on the road to their next destination.

These classes are training and not a certification program for RVIA hours.

Welcome to Atwood SWAT Training



"We employ eight certified techs in our dealership. They have helped improve productivity and lower operational costs."

Rick Horsey
Parkview RV Center

"We advertise that we employ certified technicians. It helps us explain and justify the rates we charge for labor."

Gary Kraemer
Webster City RV

Become a Certified RV Service Technician

Join more than 2,200 of your peers in being recognized for your experience and knowledge. What does becoming a Certified RV Service Technician do for you?

- Signifies your individual knowledge of RV technical service
- Exemplifies your advanced capabilities
- Represents your enhanced credibility
- Showcases your commitment to your customers
- Earns money for you and your dealership, which makes you stand apart from non-certified RV technicians

Staying Certified Increases Your Value to Your Dealership and Customers

By retaining your Certification status you are showing your renewed commitment to your customers and reaffirming your elite knowledge of RV technical service.

The Certification Program

Now that we have talked about the different types of furnace and how they work we will not go into the sq of ops that when troubleshooting each of our product the sq of op will be the same for each model.

Sequence of Operation - DC Models (STANDARD ONE-STAGE)

The ON/OFF switch allows power to pass to the circuit breaker and the thermostat.



The thermostat controls the operating circuit to the furnace by reacting to room temperature. When room temperature is below the thermostat set point, the contact closes to allow current to flow to the relay.



The circuit breaker limits amperage draw of motor.



The relay allows current to pass to the motor by closing a switch within the relay. Voltage from the thermostat activates the relay to turn the fan on. This takes 1-25 seconds.



Current flows to the motor to operate the blower. One end of the motor shaft is for the circulating air wheel and the other side is for the combustion air wheel.



Circulating air blows against the sail switch and closes the contacts, completing the circuit. The sail switch is a safety device that insures air flow before ignition.



The limit switch is a safety device that protects the furnace from over heating. The contacts in the limit switch open at a given temperature setting, shutting off power to the electronic ignition system that controls the gas valve.



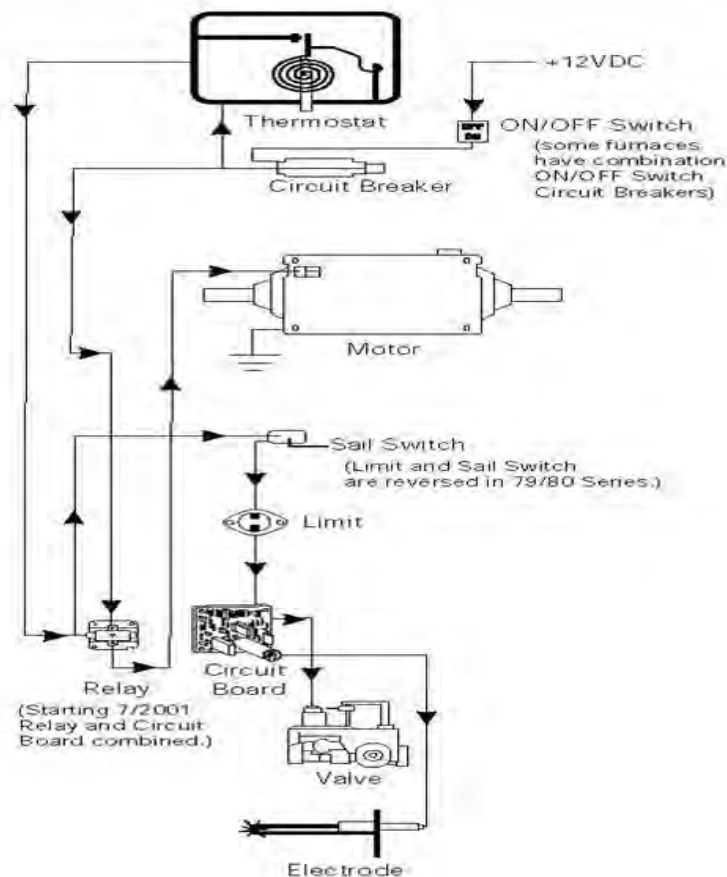
As power is applied to the circuit board, the system does the following:

1. A timing circuit allows the blower to purge the chamber (15-17 seconds)
2. The board supplies current to the gas valve and causes it to open.
3. As the valve opens, the board sends a high voltage spark to the electrode at the burner. The board detects the presence of a flame. If the flame is not sensed after approximately six seconds, the board will lock out (three try for ignition, one hour lockout and then three retry), shutting off power to the valve.
4. If the system does not ignite and the thermostat remains closed, the blower will remain on until the thermostat is reset manually.



When the thermostat senses the desired room air temperature, the contacts open, removing power from the ignition system and shutting off the gas valve. The blower runs until the relay opens the circuit, shutting off current to the motor.

 WARNING FURNACE PRODUCES HIGH TEMPERATURE
<ul style="list-style-type: none"> • Locate furnace out of traffic and away from furniture and draperies. • Do not touch or put combustibles near appliance. Hot surface temperature may occur. • Supervise young children in the same room as the furnace. • Do not place clothing or flammable materials on or near the furnace.



Sequence of Operation - DC Models (STANDARD ONE-STAGE)

The ON/OFF switch allows power to pass to the circuit breaker and the thermostat.

The thermostat controls the operating circuit to the furnace by reacting to room temperature. When the temperature is below the set point, the contact closes to allow current to flow.

The circuit breaker limits the current to the furnace.

The relay allows current to flow by closing a switch within the furnace. The thermostat activates the relay, which takes 1-25 seconds.

Current flows to the motor to operate the blower. One end of the motor shaft is for the circulating air wheel and the other side is for the combustion air wheel.

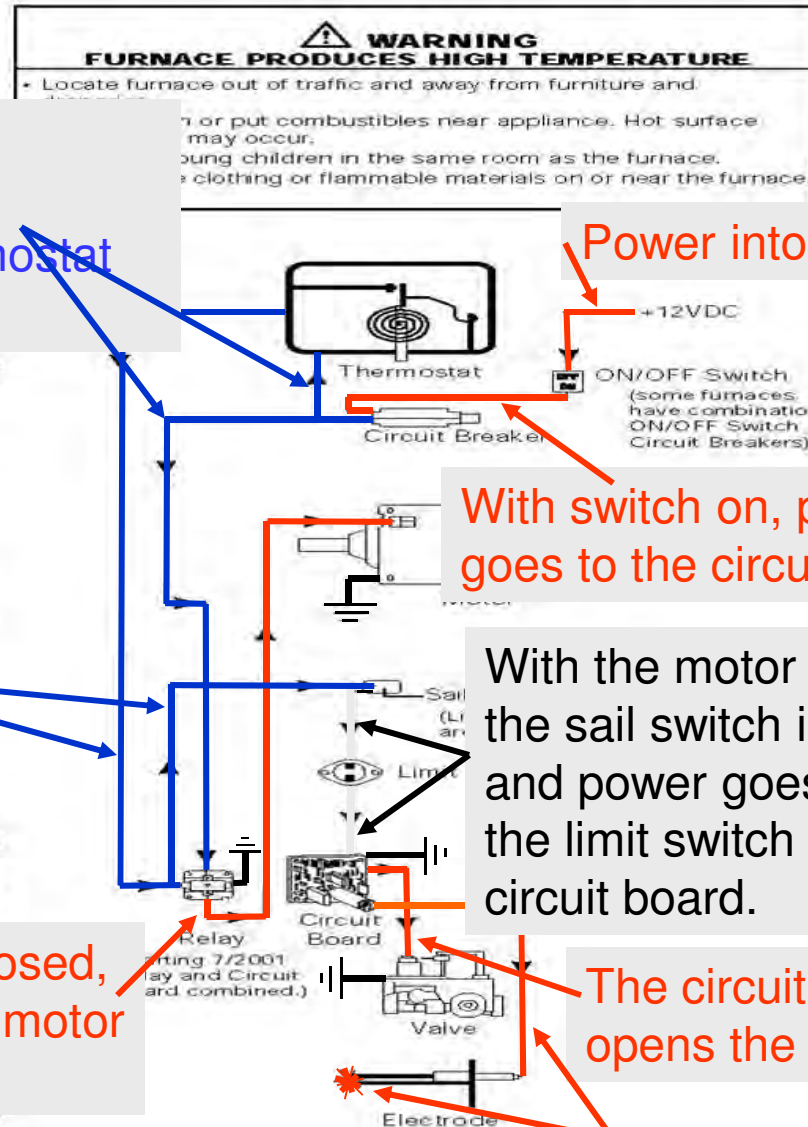
Circulating air blows against the sail switch and closes the switch. When the sail switch is closed, it allows current to flow to the gas valve.

The furnace switch-off point is reached when the gas valve is closed. This causes the relay to open, stopping current to the motor and the gas valve.

As power is applied, the following sequence occurs:

1. A timing circuit allows the blower to purge the chamber (15-17 seconds).
2. The board supplies current to the gas valve and causes it to open.
3. As the valve opens, the board sends a high voltage spark to the electrode at the burner. The board detects the presence of a flame. If the flame is not sensed after approximately six seconds, the board will lock out (three times) and then three retry attempts.
4. If the system does not sense a flame, the relay remains closed, the thermostat is reset, and the sequence repeats.

When the thermostat sense temperature, the contact opens, stopping power to the ignition system and shutting off the gas valve. The blower runs until the relay opens the circuit, shutting off current to the motor.



At the same time providing power to the thermostat and the relay.

Power into switch

With switch on, power goes to the circuit breaker.

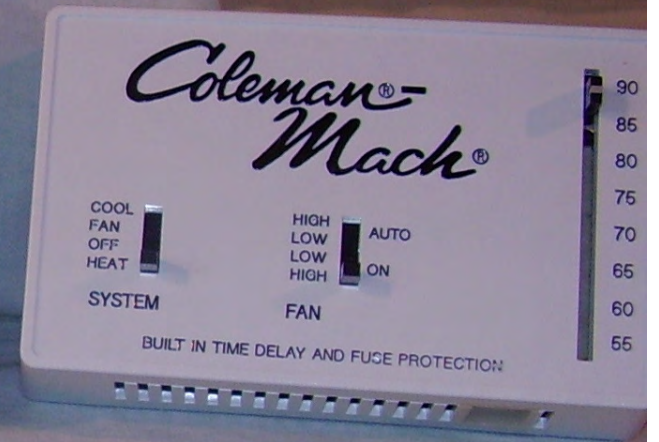
With the motor running, the sail switch is closed and power goes through the limit switch to the circuit board.

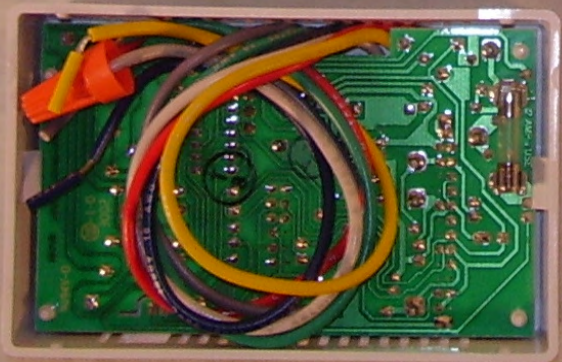
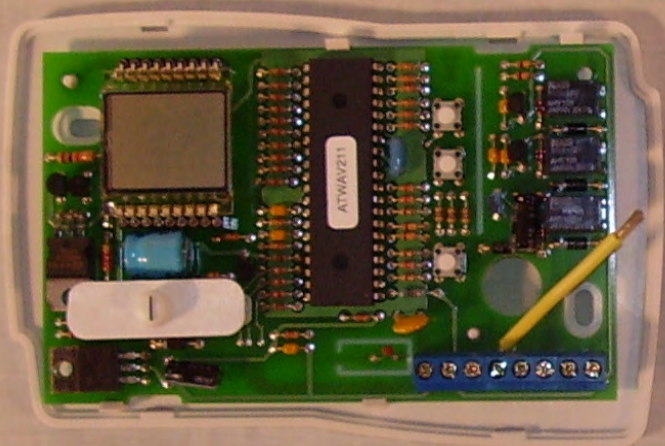
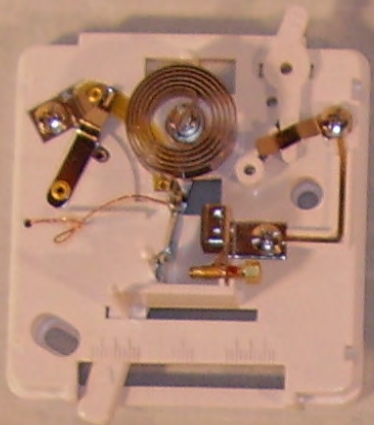
When the relay is closed, power is sent to the motor and it runs.

The circuit board opens the gas valve.

And initiates spark.

Note: starting 07/2001 relay is incorporated into circuit board.

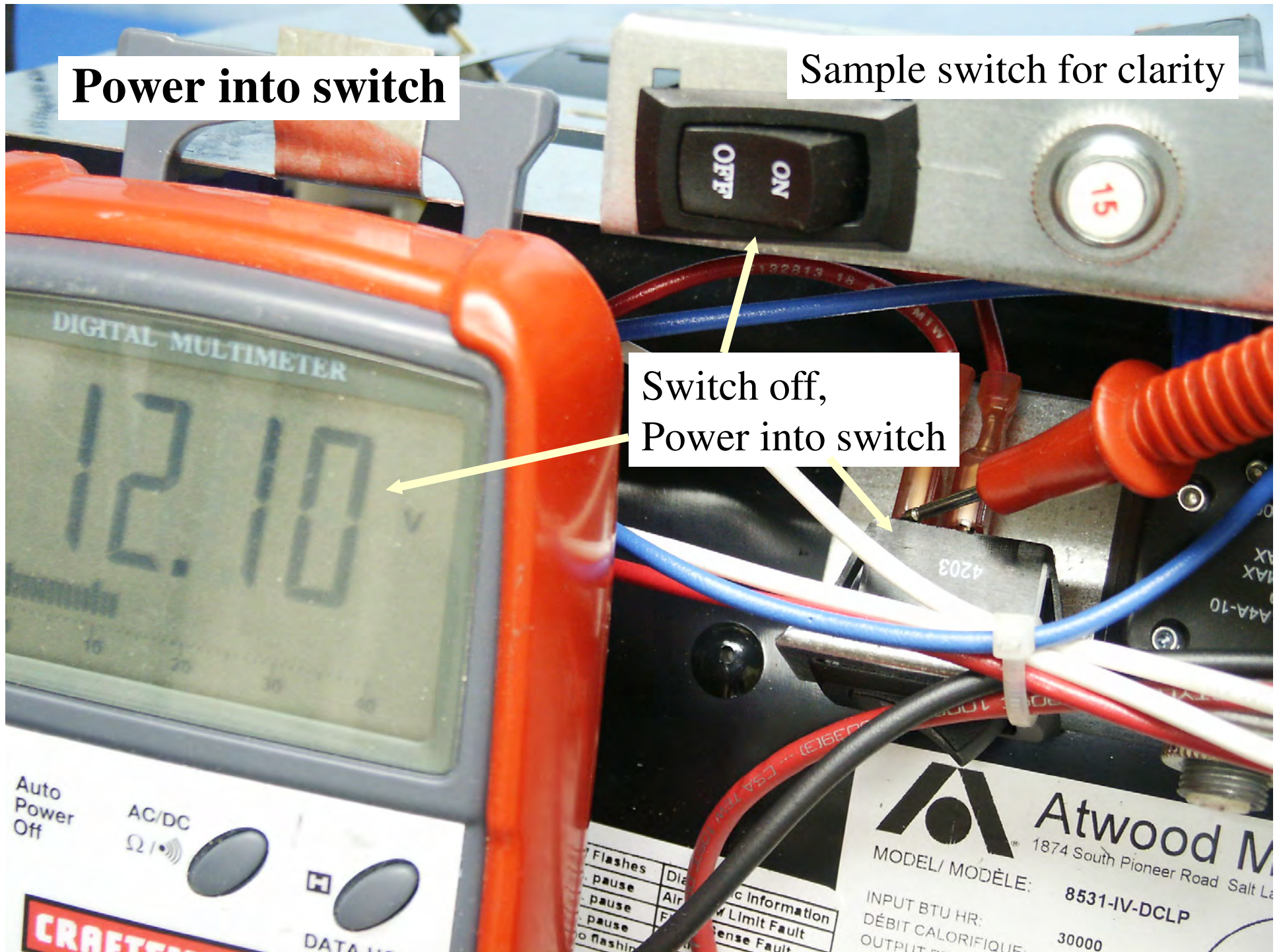


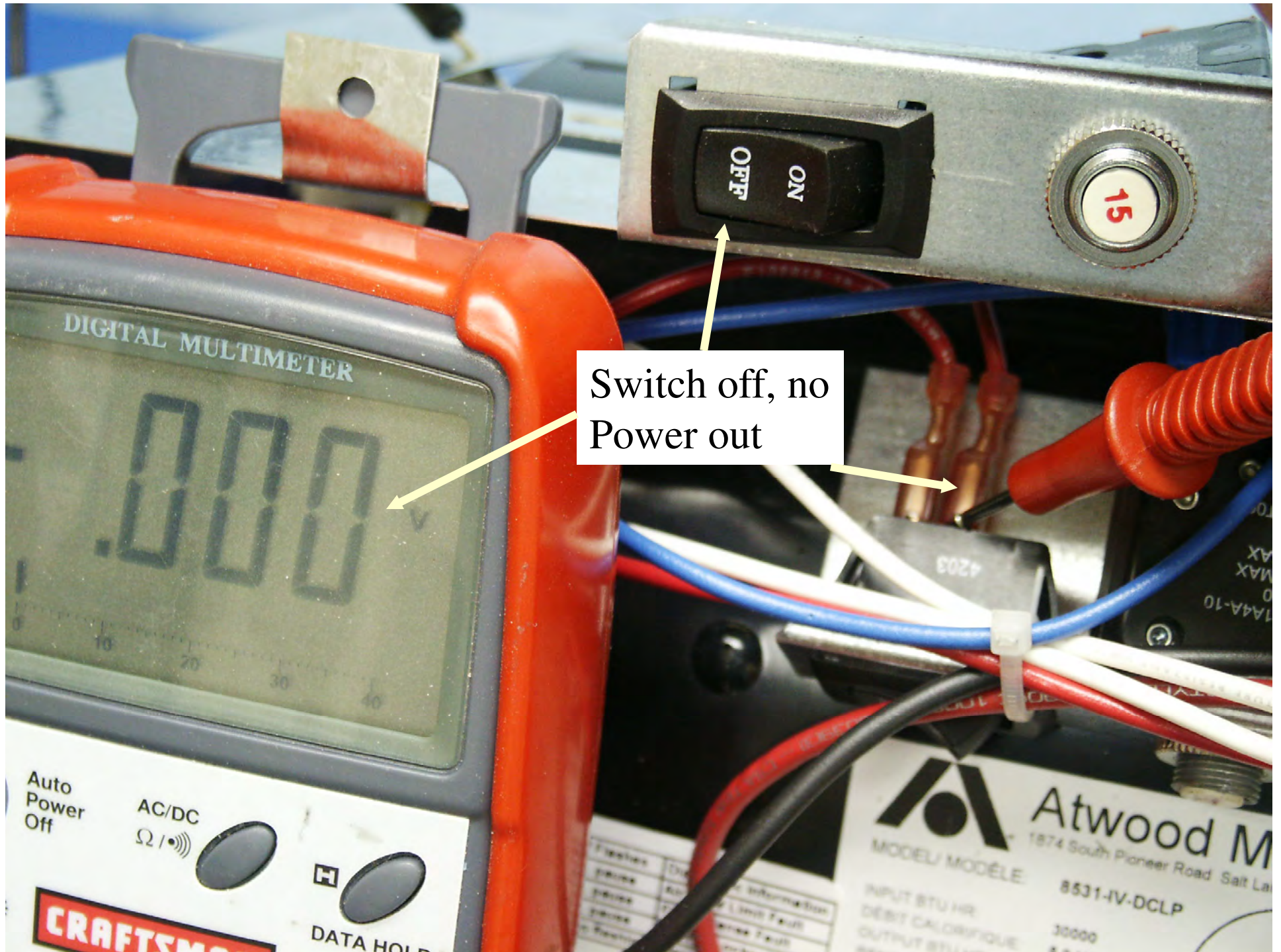


Power into switch

Sample switch for clarity

Switch off,
Power into switch

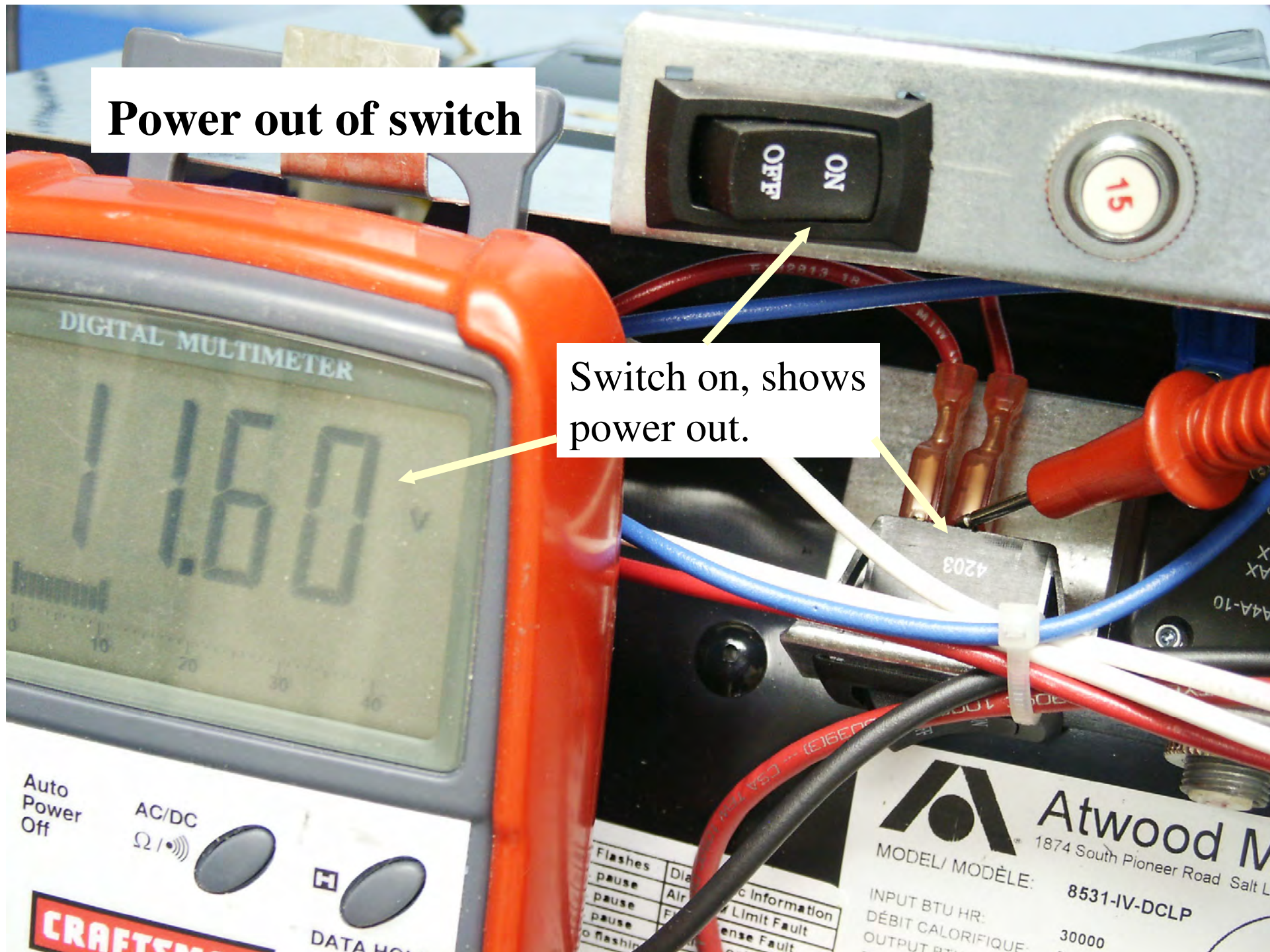




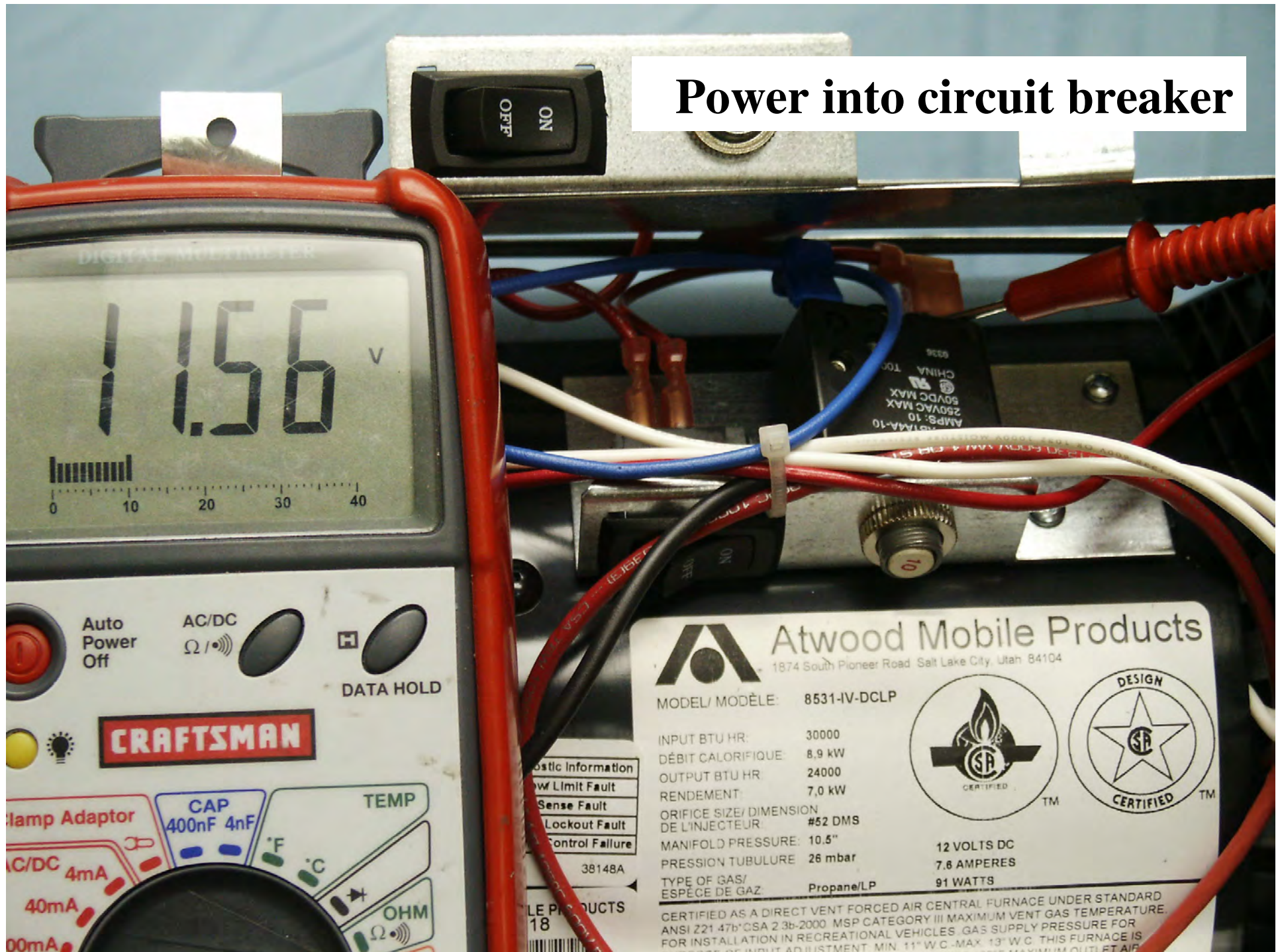
Switch off, no
Power out

Power out of switch

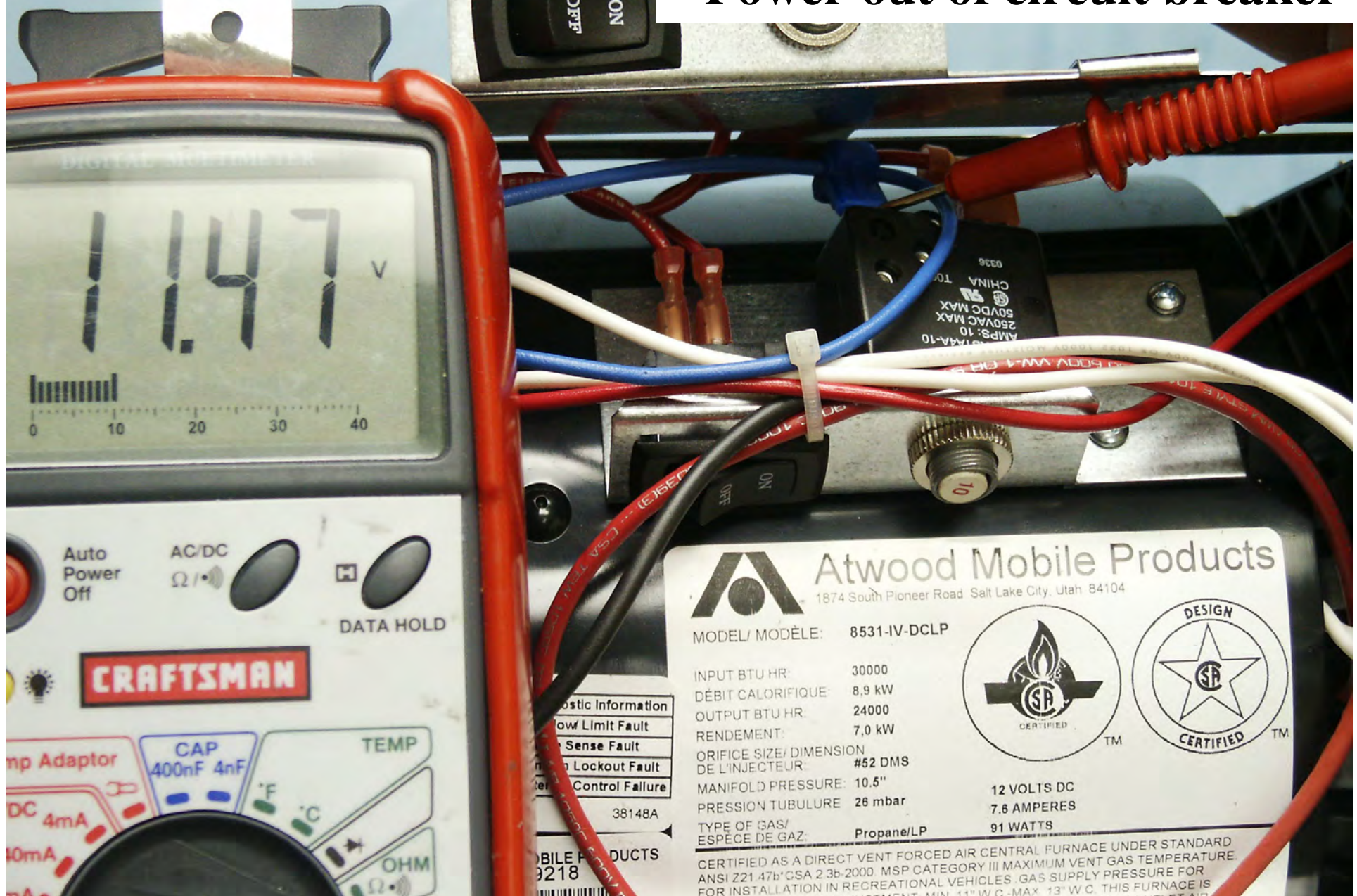
Switch on, shows
power out.



Power into circuit breaker



Power out of circuit breaker



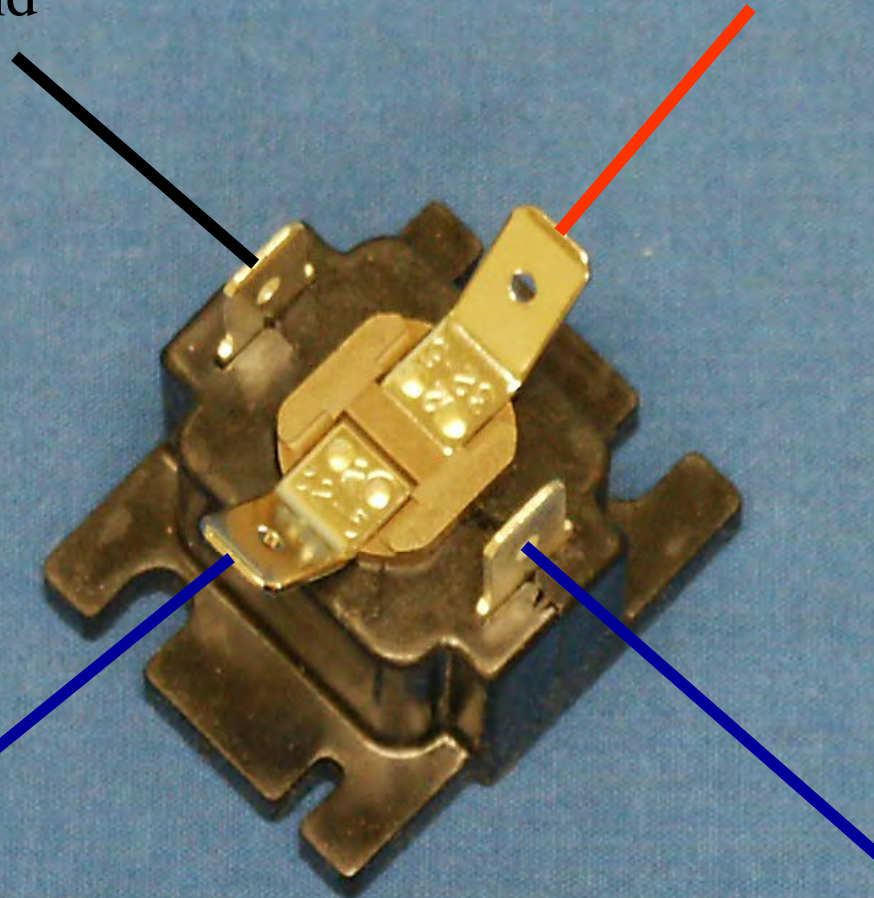
Relay

Ground

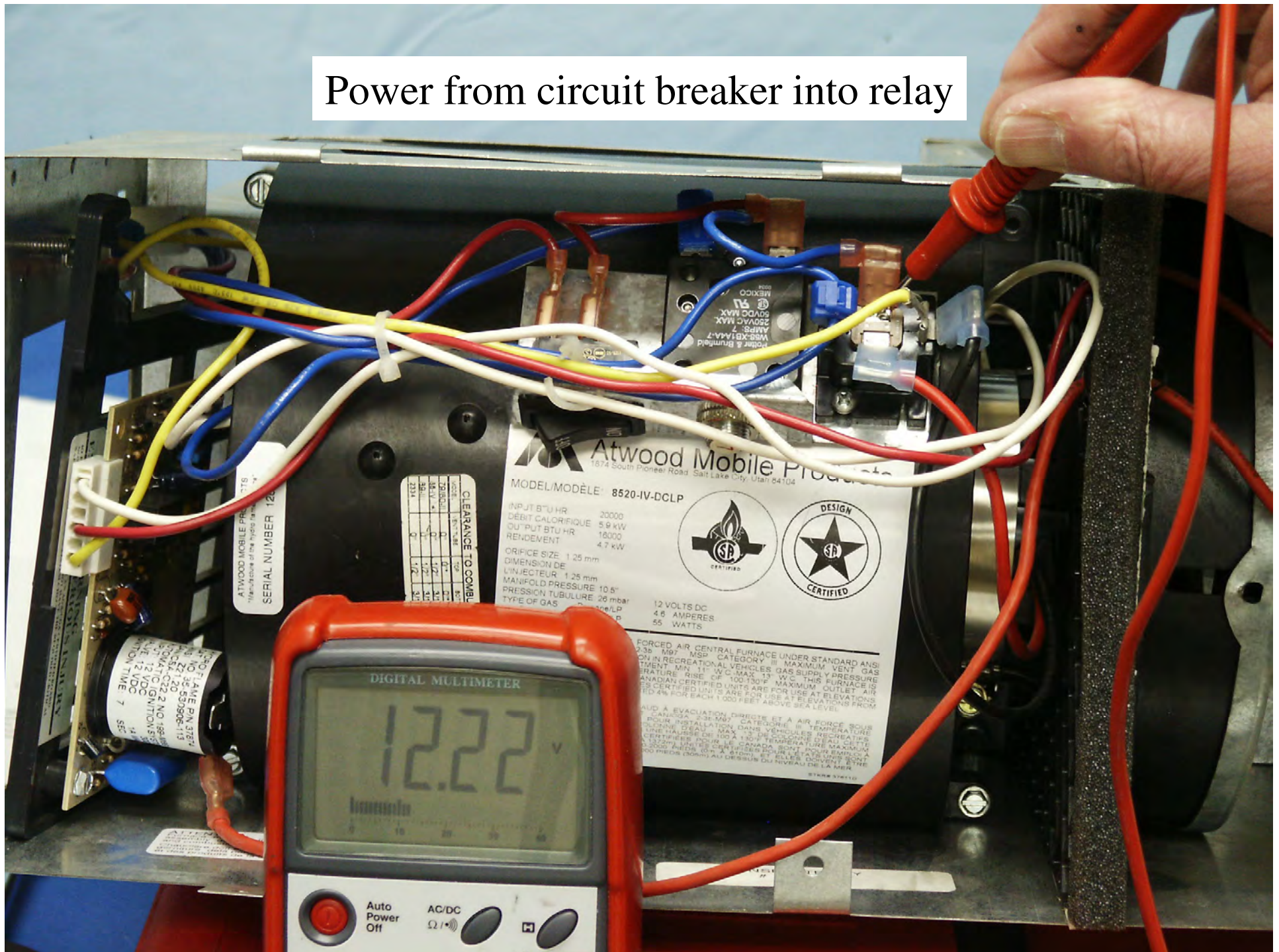
To motor

(+) in from
Circuit breaker

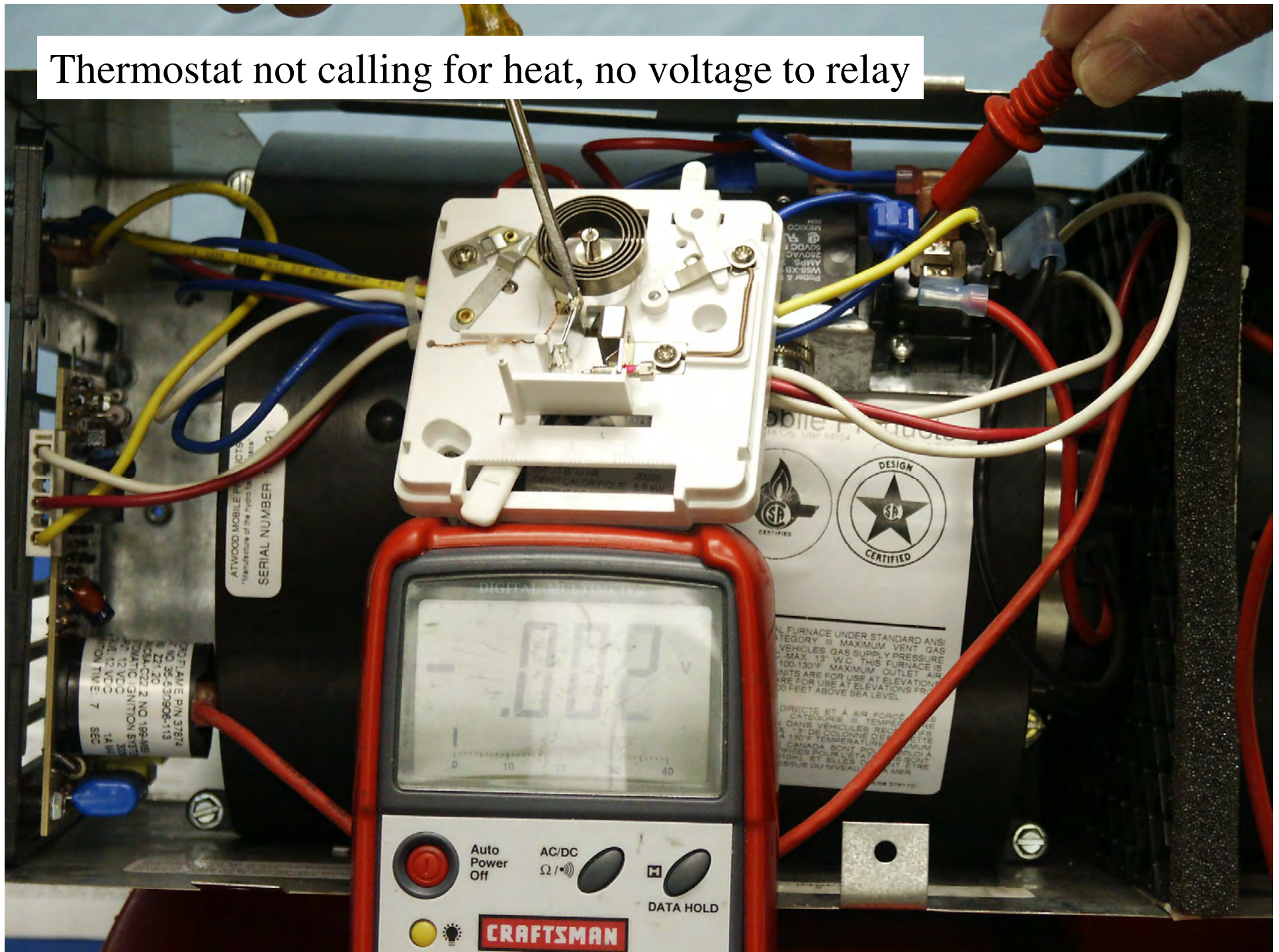
(+) in from thermostat

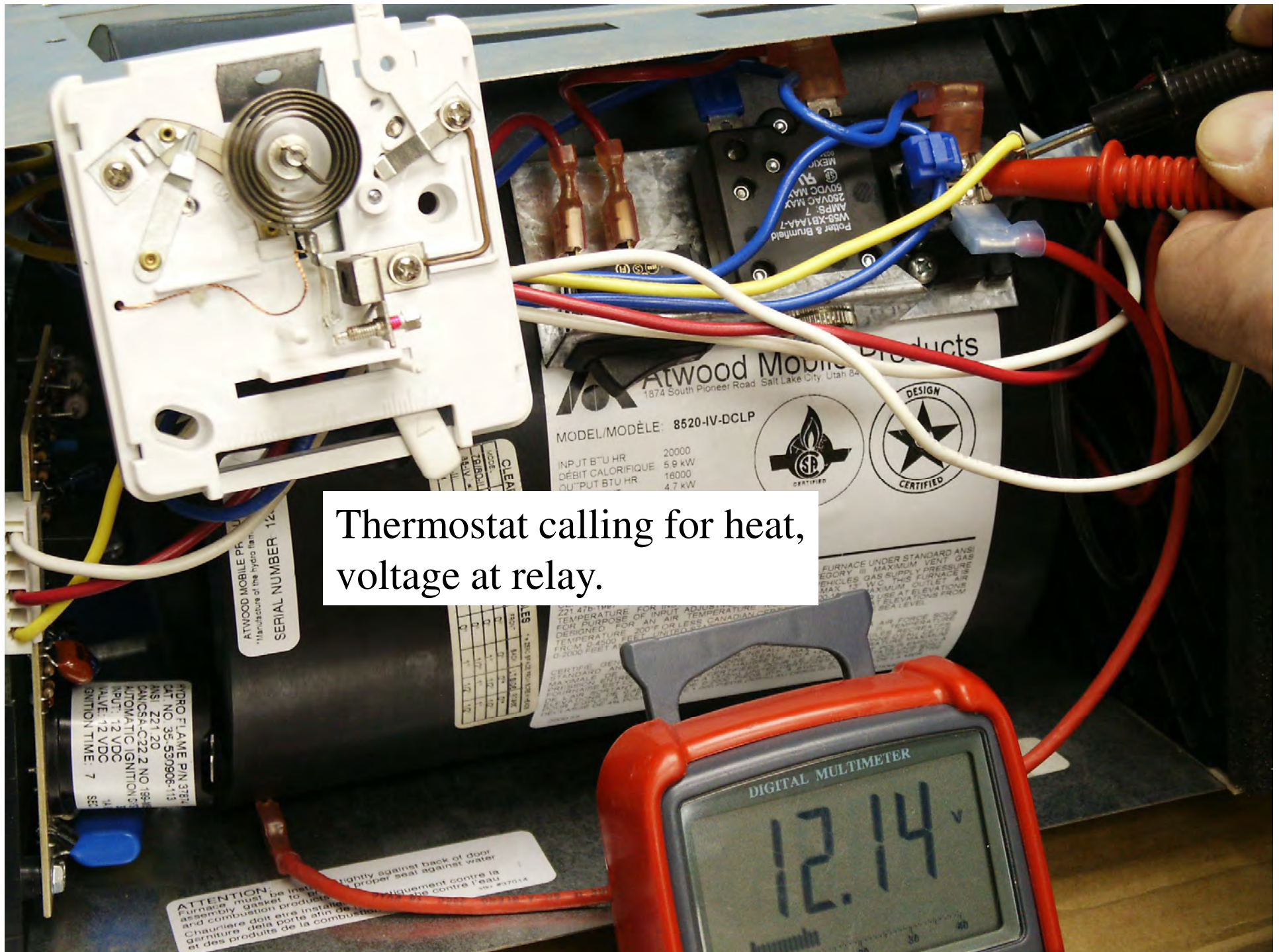


Power from circuit breaker into relay



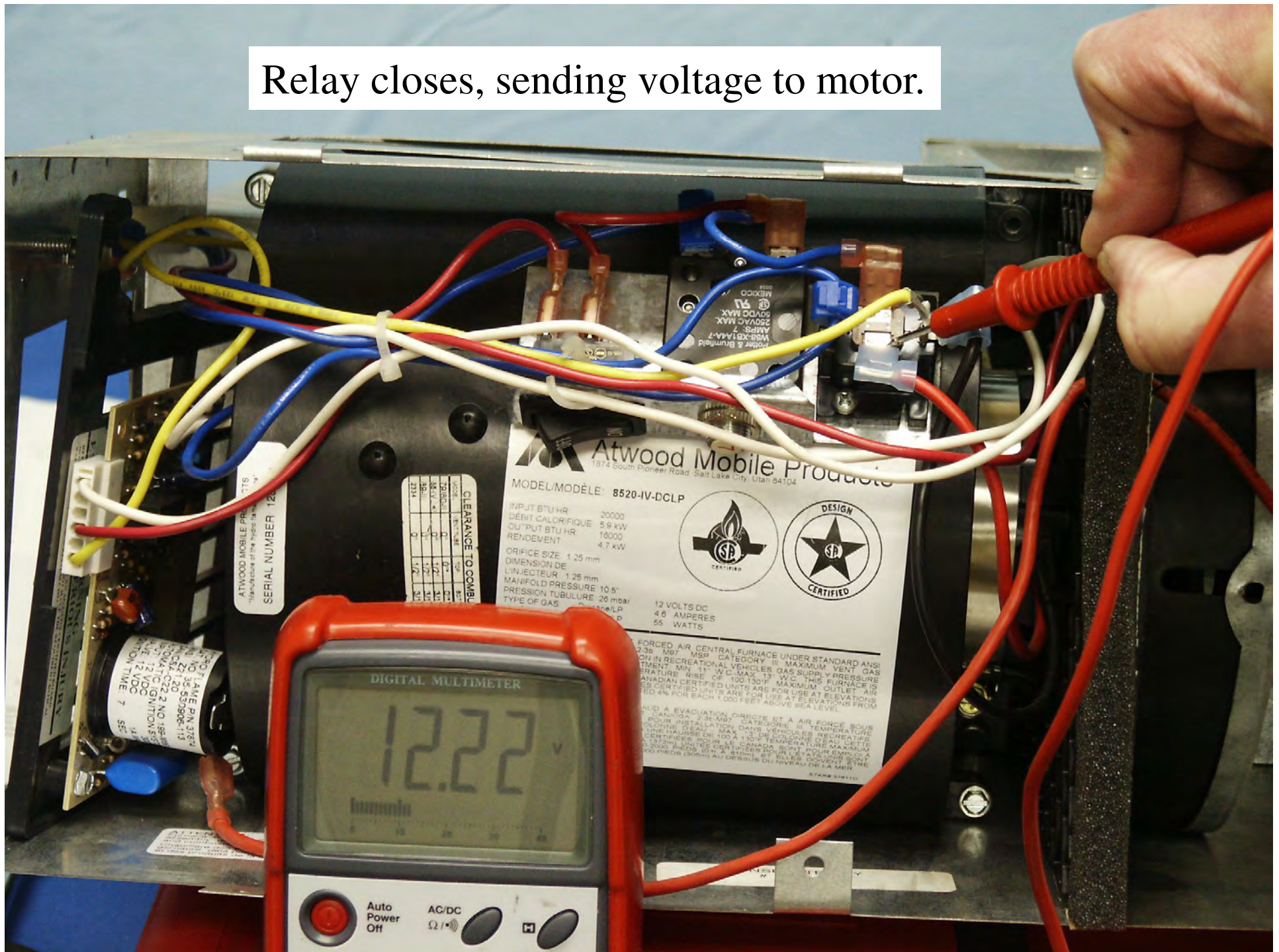
Thermostat not calling for heat, no voltage to relay



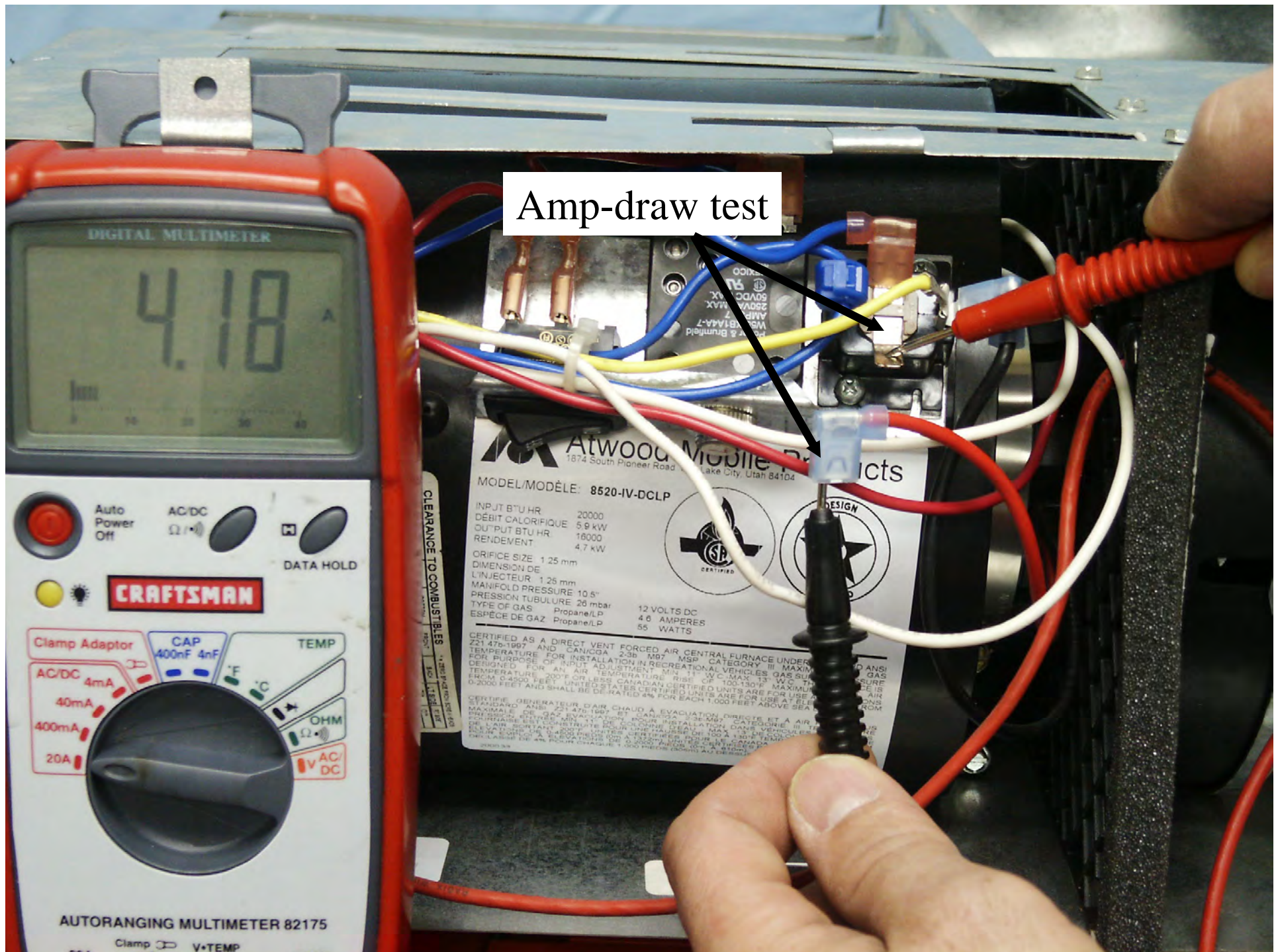


Thermostat calling for heat,
voltage at relay.

Relay closes, sending voltage to motor.



Amp-draw test



Number of Flashes	Diagnostic Information
1 sec. pause	Air Flow Limit Fault
2 sec. pause	Flame Sense Fault
3 sec. pause	Ignition Lockout Fault
4, no flashing	Internal Control Failure

38148A

WOOD MOBILE PRODUCTS
S/N: 2080339



WOOD MOBILE PRODUCTS
S/N: 2080339



Atwood Mobile Products

1874 South Pioneer Road Salt Lake City, Utah 84104

MODEL/ MODÈLE: **8516-IV-DCLP**

INPUT BTU HR: **18000**
 DÉBIT CALORIFIQUE: **4,7 kW**
 OUTPUT BTU HR: **13000**
 RENDEMENT: **3,8 kW**
 ORIFICE SIZE/ DIMENSION
 DE L'INJECTEUR: **#56 DMS**
 MANIFOLD PRESSURE: **10.5"**
 PRESSION TUBULURE **26 mbar**
 TYPE OF GAS/
 ESPECE DE GAZ: **Propane/LP**



12 VOLTS DC
4.6 AMPERES
55 WATTS

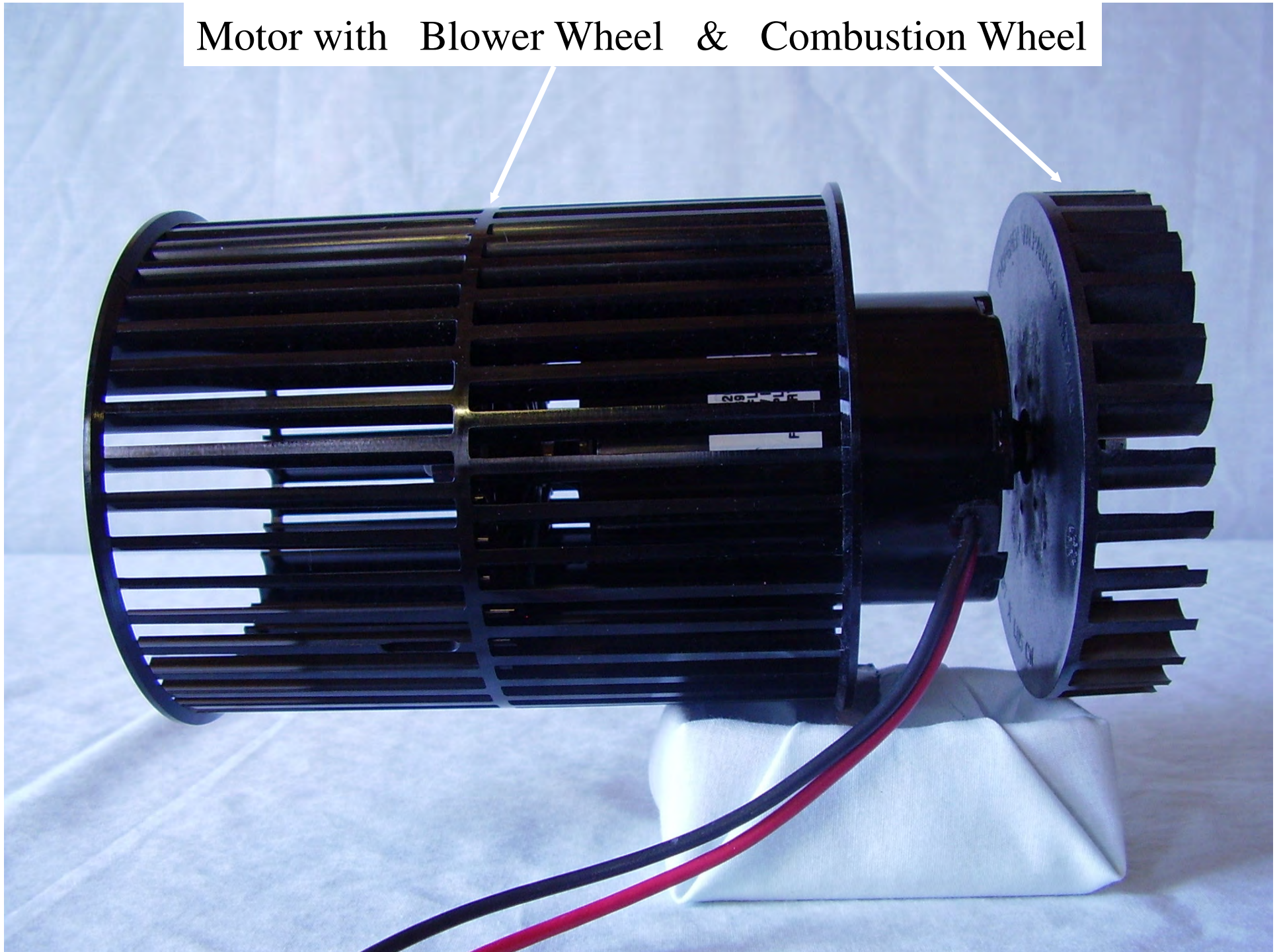
Amp draw limits
are on label.

CERTIFIED AS A DIRECT VENT FORCED AIR CENTRAL FURNACE UNDER STANDARD ANSI Z21.47b*CSA 2.3b-2000. MSP CATEGORY III MAXIMUM VENT GAS TEMPERATURE. FOR INSTALLATION IN RECREATIONAL VEHICLES. GAS SUPPLY PRESSURE FOR PURPOSE OF W.C.-MAX. 13" W.C. THIS FURNACE IS DESIGNED FOR OF 100-130°F MAXIMUM OUTLET AIR TEMPERATURE. CERTIFIED UNITS ARE FOR USE AT ELEVATIONS UP TO 4500 FEET. UNITS CERTIFIED FOR USE AT ELEVATIONS ABOVE SEA LEVEL. BE DE-RATED 4% FOR EACH 1,000 FEET.

CERTIFIÉ GENERATEUR D'AIR CHAUD À EVACUATION DIRECTE ET À FORCÉ SOUS STANDARD ANSI Z21.47b*CSA 2.3b-2000. CATEGORIE III. TEMPERATURE MAXIMALE DE GAZ EVACUATION. POUR INSTALLATION DANS VÉHICULES RECREATIVES. PRESSION D'ENTRÉE MIN. 11" DE COLONNE D'EAU - MAX. 13" DE COLONNE D'EAU. CETTE FOURNAISE EST CONSTRUITE POUR UNE HAUSSE DE 100 À 130°F TEMPERATURE MAXIMUM DE L'AIR SORTANT 200°F. UNITÉS CERTIFIÉES POUR LE CANADA SONT POUR EMPLOI À ELEVATIONS DE 0-4500 PIEDS (0m À 1372m). UNITÉS CERTIFIÉES POUR L'ÉTATS UNIS SONT POUR EMPLOI À ELEVATIONS DE 0-2000 PIEDS (0m À 610m), ET ELLES DOIVENT ÊTRE DECLASSÉ DE 4% POUR CHAQUE 1,000 PIEDS (305m) AU DESSUS DU NIVEAU DE LA MER.

CLEARANCE TO COMBUSTIBLES: * = ZERO SPACE FROM SCREW HEAD OR SLIDE PLATE VENT TUBE. 0" TOP 1/2" BOTTOM 0" FRONT 0" BACK 1" LT SIDE 1" RT SIDE 1/2" 200446

Motor with Blower Wheel & Combustion Wheel



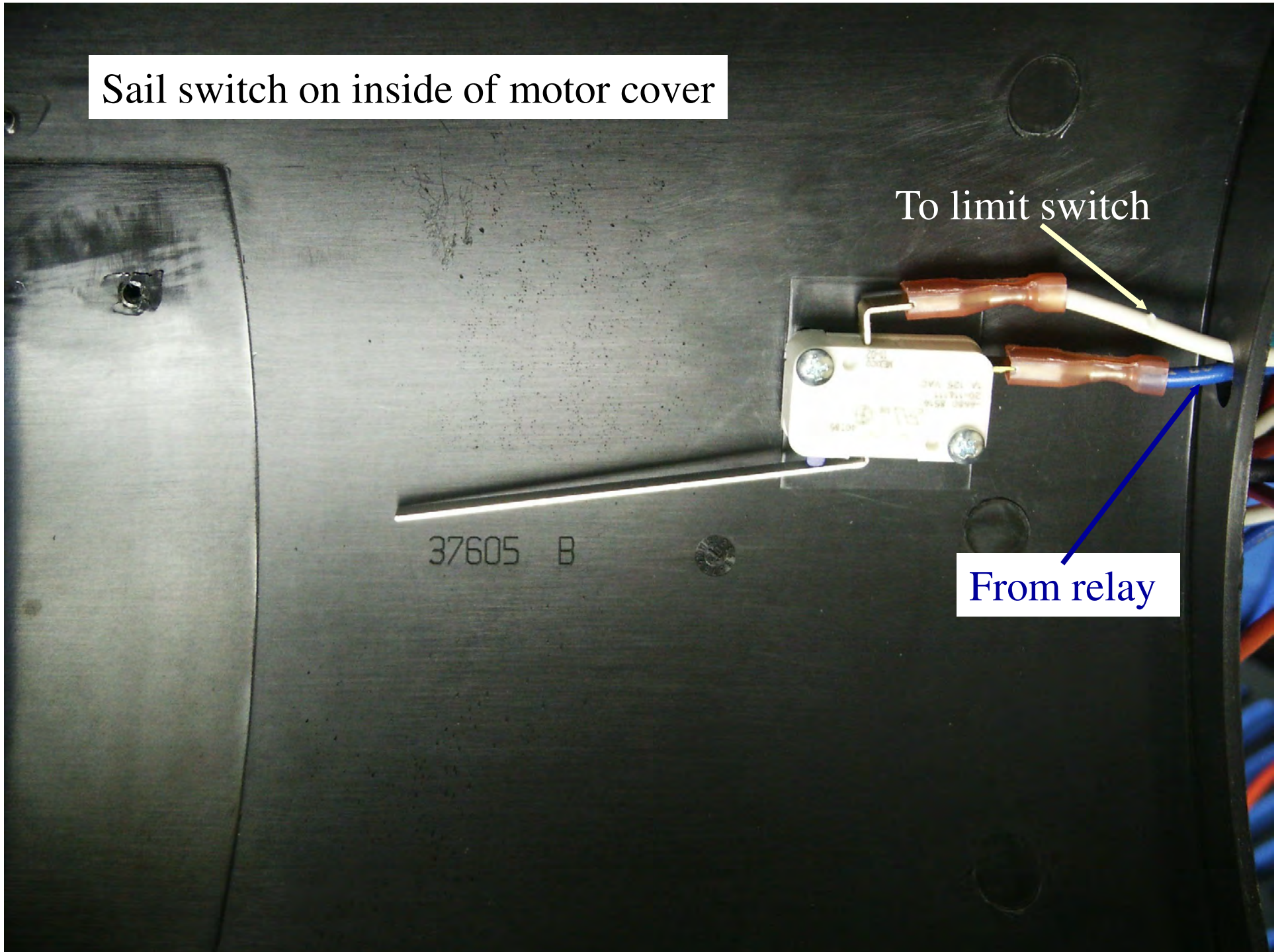


Sail switch on inside of motor cover

To limit switch

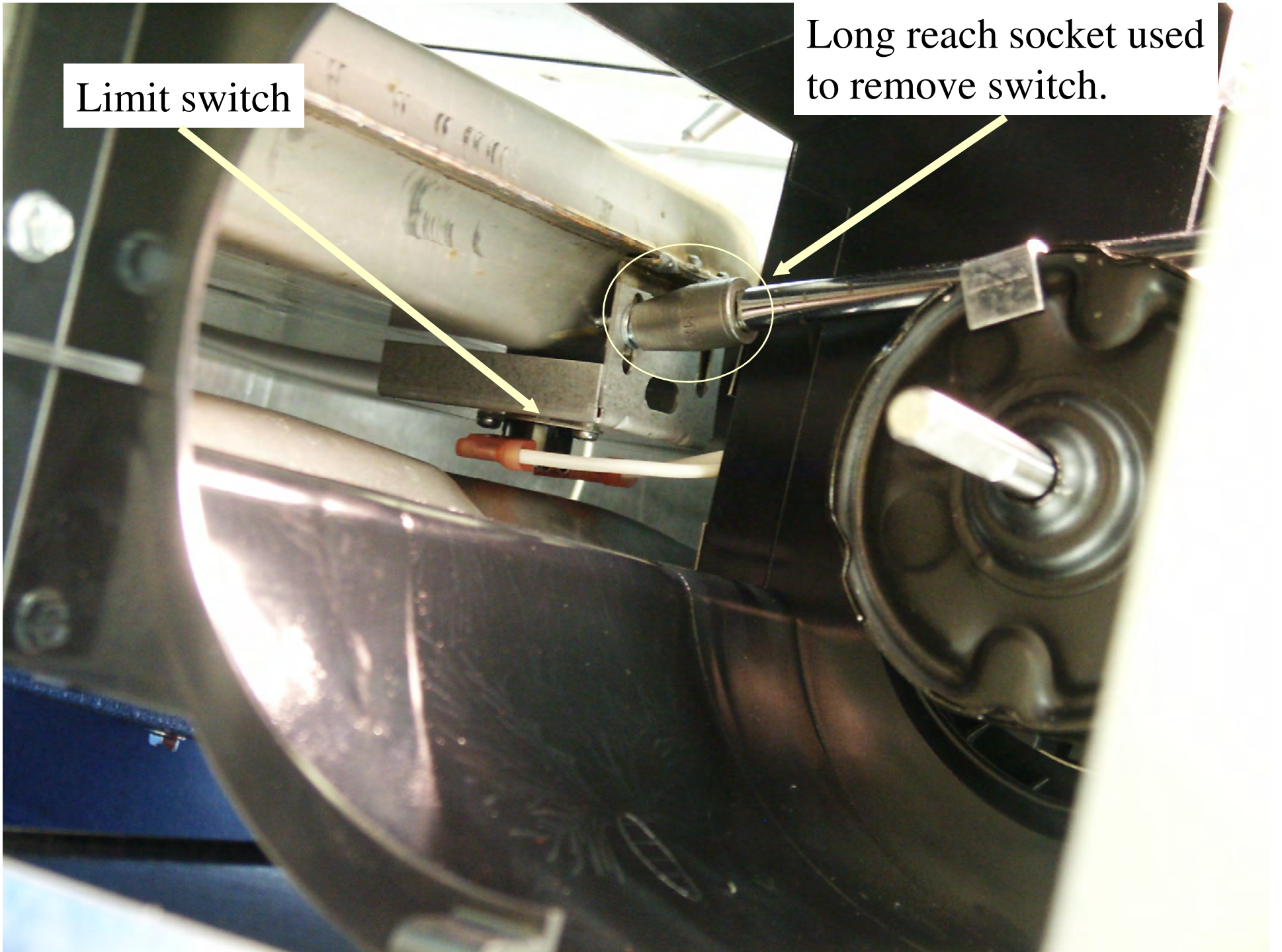
From relay

37605 B

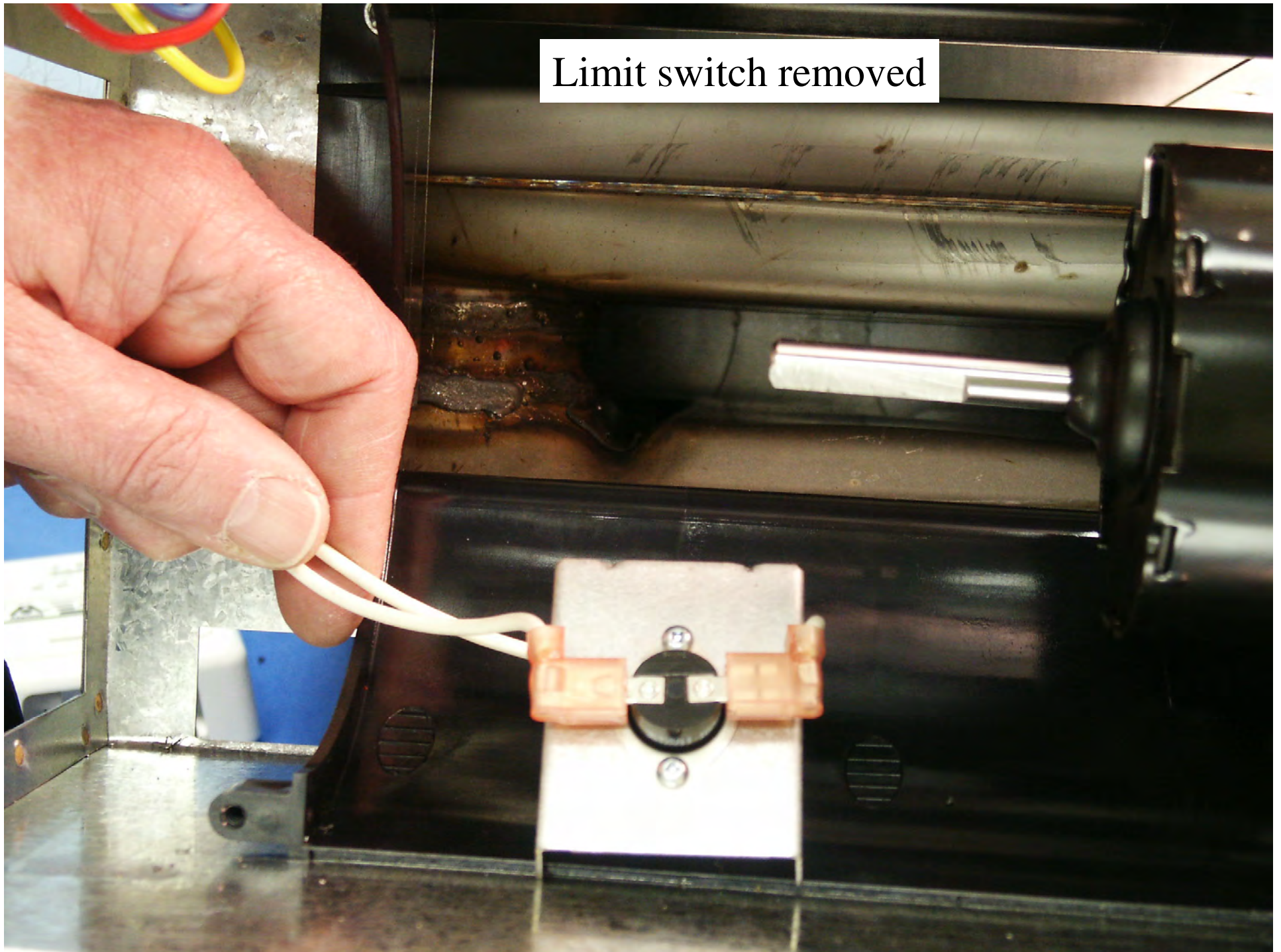


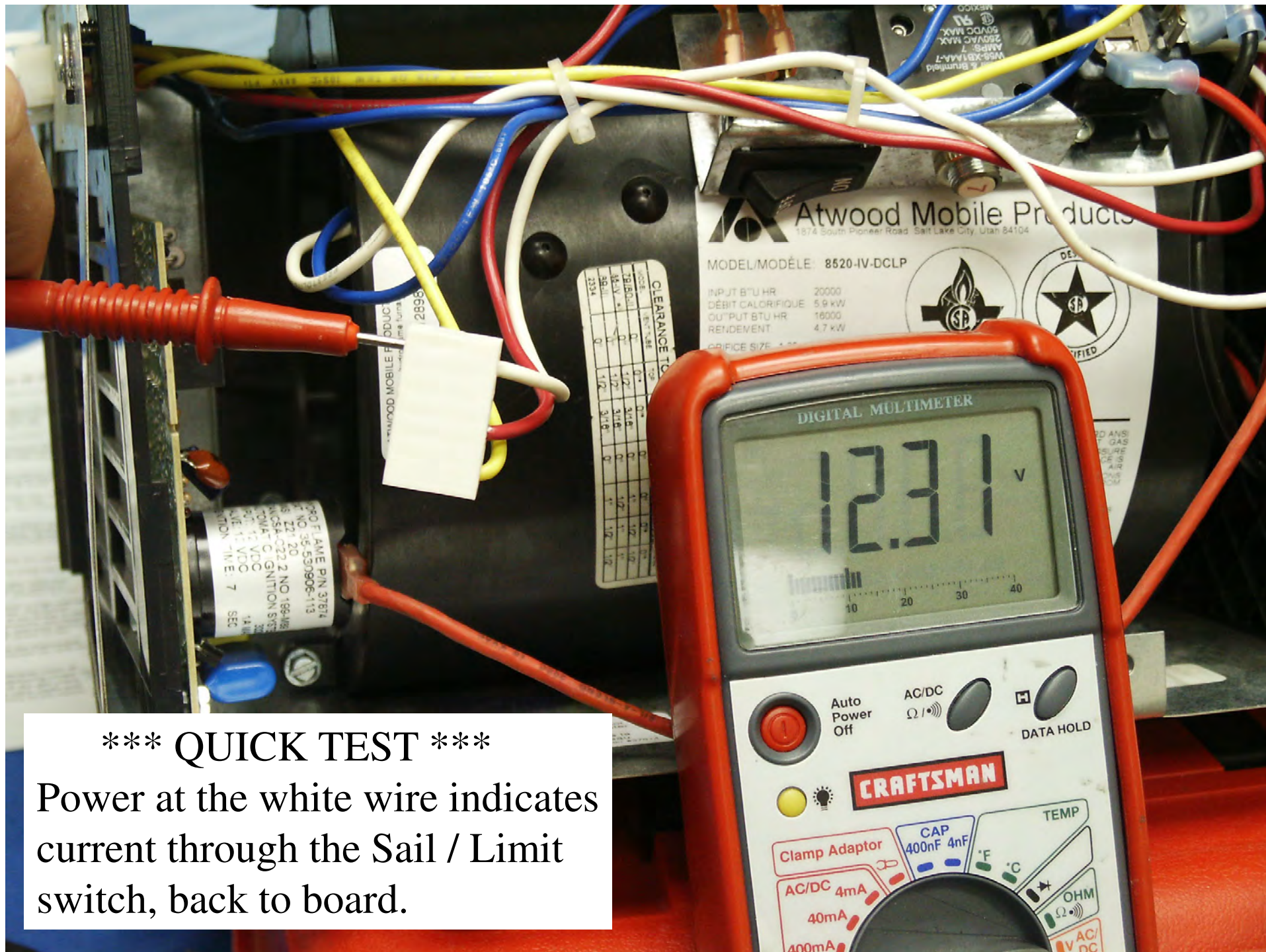
Limit switch

Long reach socket used to remove switch.

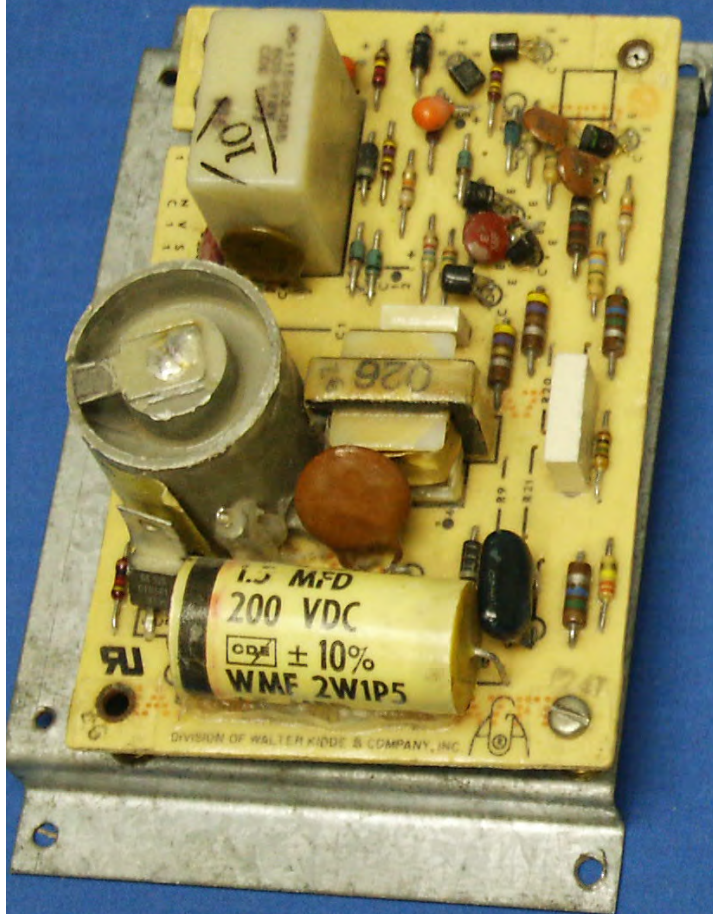


Limit switch removed

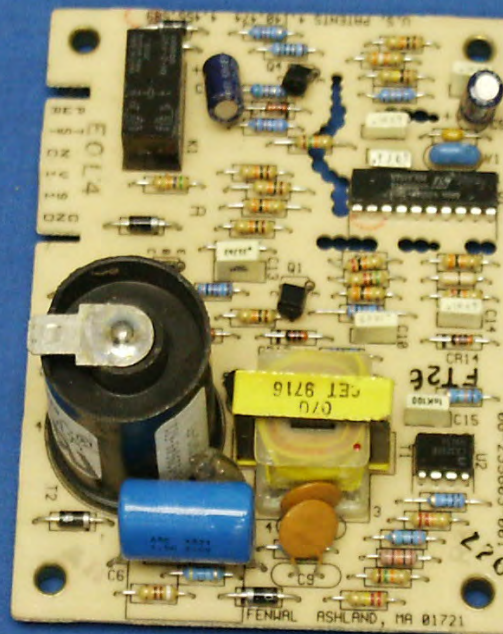




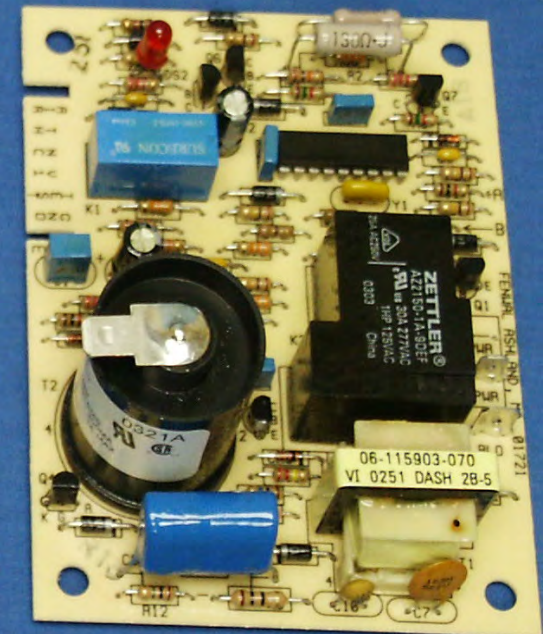
Previous ignition control boards



Single try with external relay.

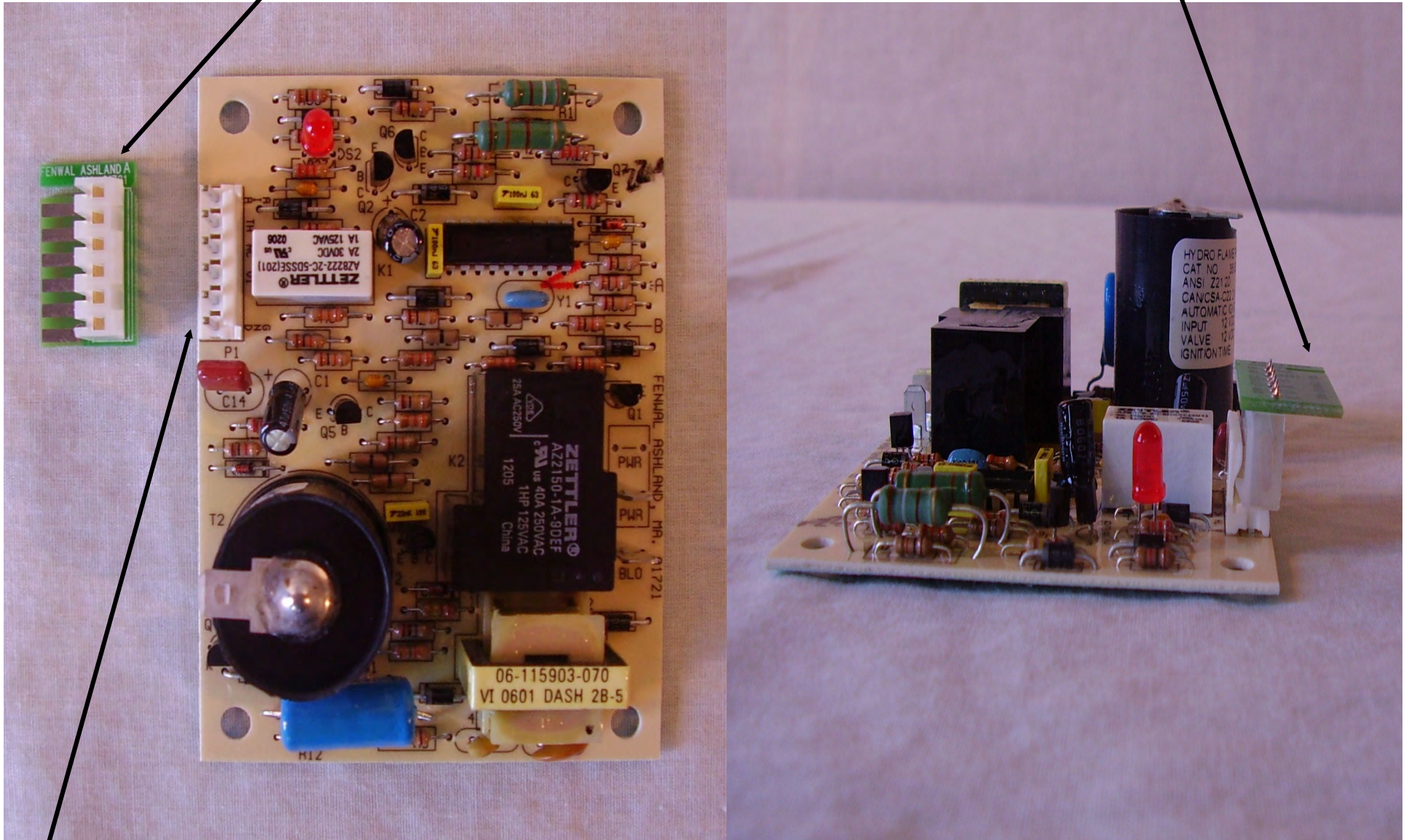


Three try with external relay.



Three try with built in relay.

New board with adapter for old connector.



New push pin style connector

Sequence of Operation - DC Models

The ON/OFF switch allows power to pass to the circuit breaker and the thermostat.

The thermostat controls the operating circuit to the furnace by reacting to room temperature. When room temperature is below the thermostat set point, the contact closes to allow current to flow to the relay.

The circuit breaker limits amperage draw of motor.

The relay allows current to pass to the motor by closing a switch within the relay. A heater coil within the relay actuates a bimetal disc which closes the relay circuit. This takes 17-20 seconds.

Current flows to the motor to operate the blower. One end of the motor shaft is for the circulating air wheel and the other side is for the combustion air wheel.

Circulating air blows against the sail switch and closes the contacts, completing the circuit. The sail switch is a safety device that insures air flow before ignition.

The limit switch is a safety device that protects the furnace from over heating. The contacts in the limit switch open at a given temperature setting, shutting off power to the electronic ignition system that controls the gas valve.

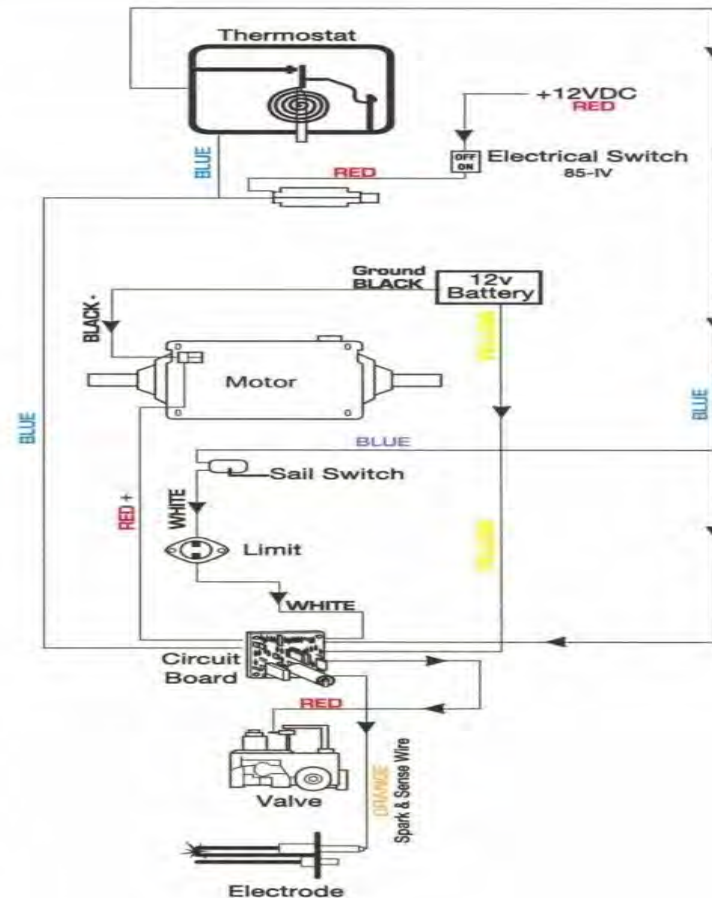
As power is applied to the circuit board, the system does the following:

1. A timing circuit allows the blower to purge the chamber (15-17 seconds)
2. The board supplies current to the gas valve and causes it to open. A manual electrical switch is provided and must be in the "ON" position for current to reach the valve.
3. As the valve opens, the board sends a high voltage spark to the electrode at the burner. The board detects the presence of a flame. If the flame is not sensed after approximately six seconds, the board will lock out (three try for ignition, one hour lockout and then three retry), shutting off power to the valve.
4. If the system does not ignite and the thermostat remains closed, the blower will remain on until the thermostat is reset manually.

When the thermostat senses the desired room air temperature, the contacts open, removing power from the ignition system and shutting off the gas valve. The blower runs until the heater in the relay cools and opens the circuit, shutting off current to the motor.

WARNING
FURNACE PRODUCES HIGH TEMPERATURE

- Locate furnace out of traffic and away from furniture and draperies.
- Do not touch or put combustibles near appliance. Hot surface temperature may occur.
- Supervise young children in the same room as the furnace.
- Do not place clothing or flammable materials on or near the furnace.



Power from Sail / Limit switch

Power from T-stat

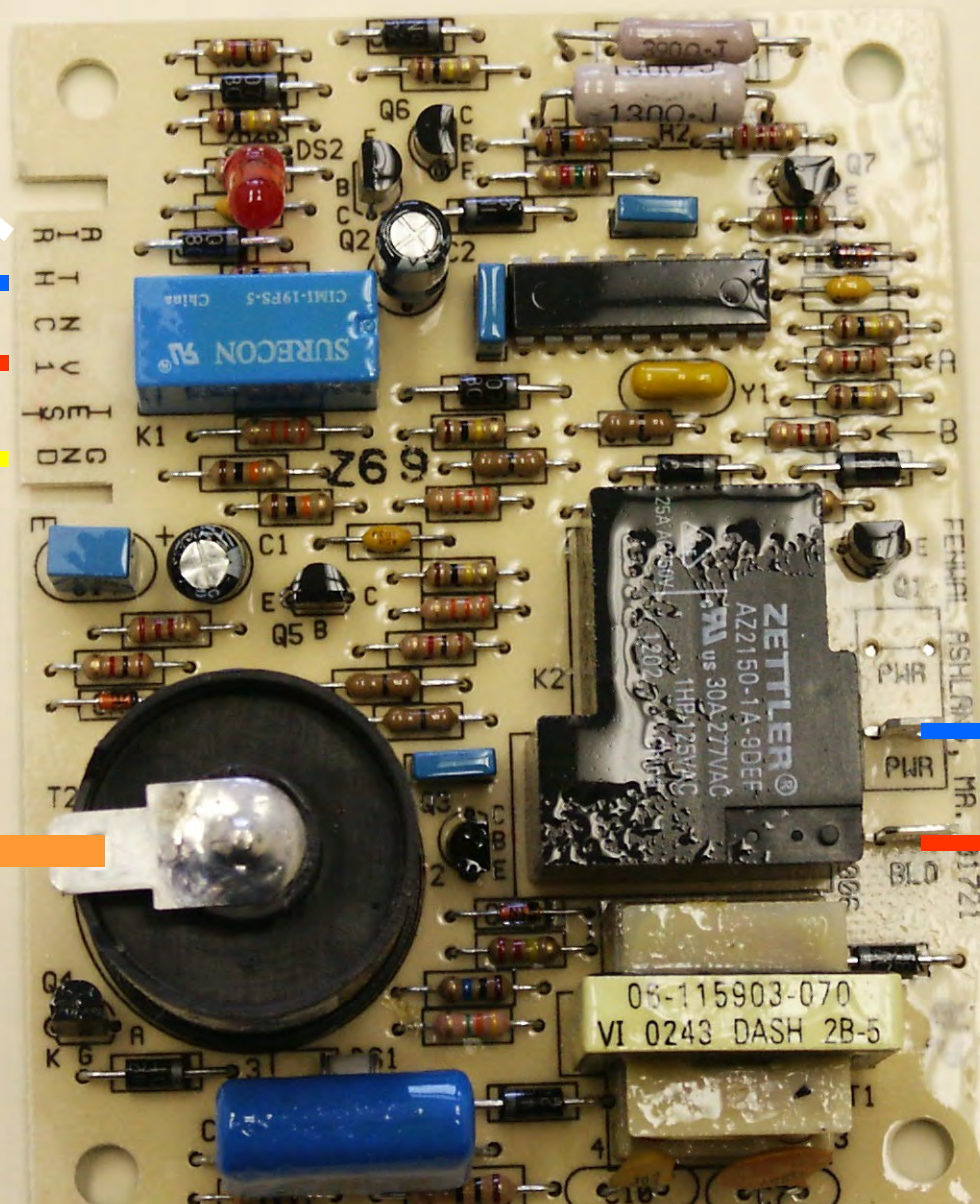
Power to gas valve

Ground

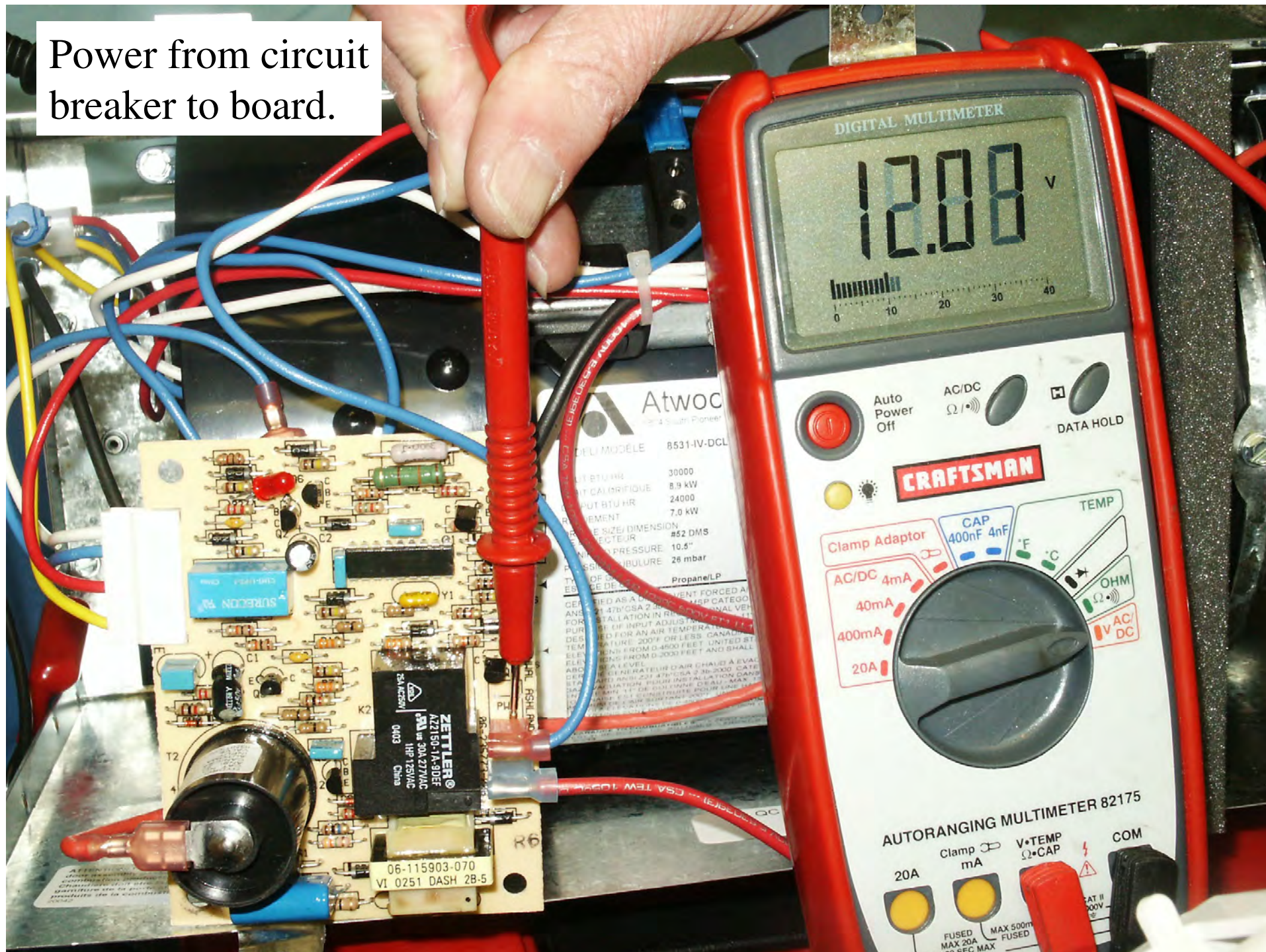
High tension
to electrode

Power from CB

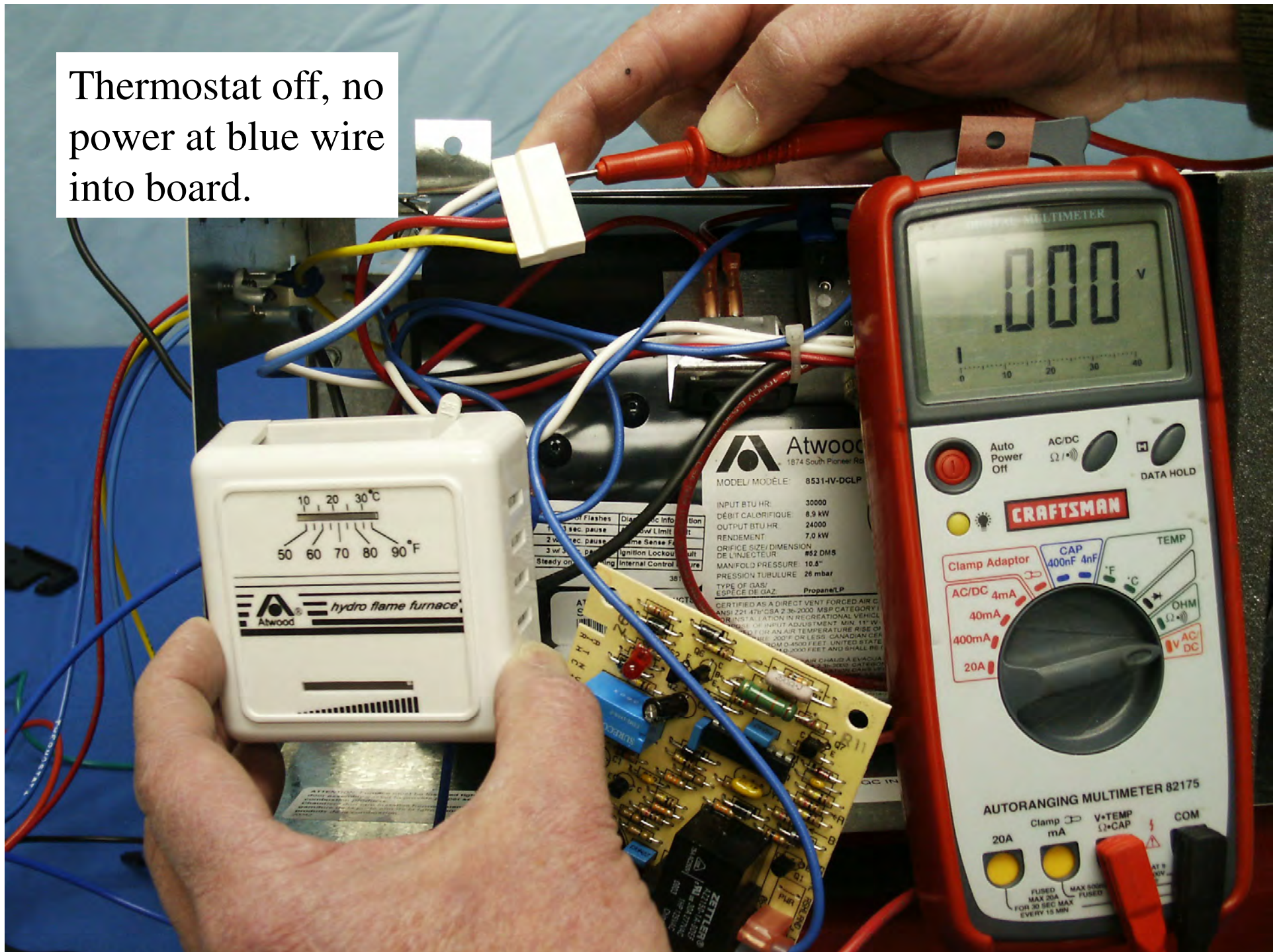
Power to motor



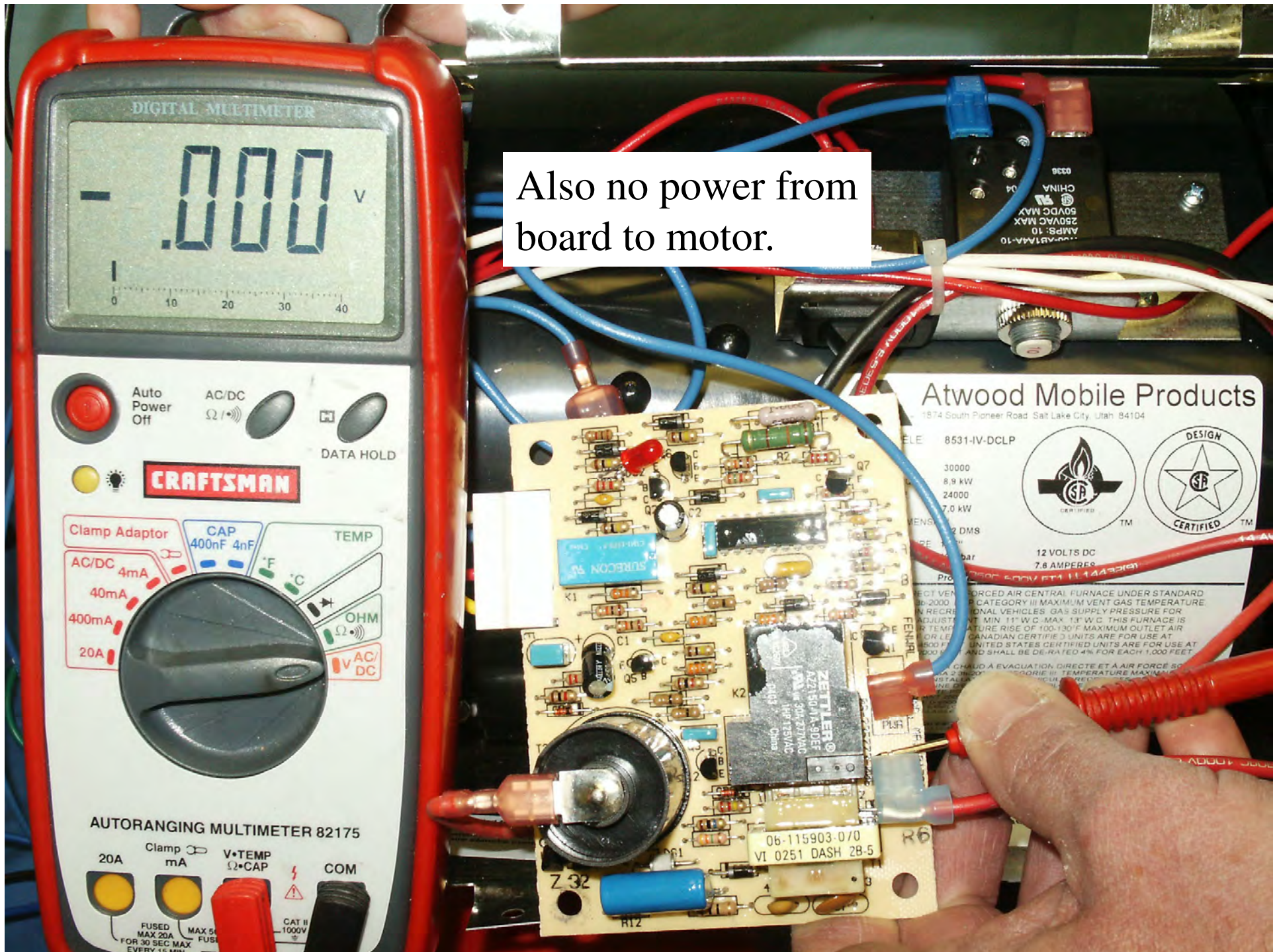
Power from circuit breaker to board.

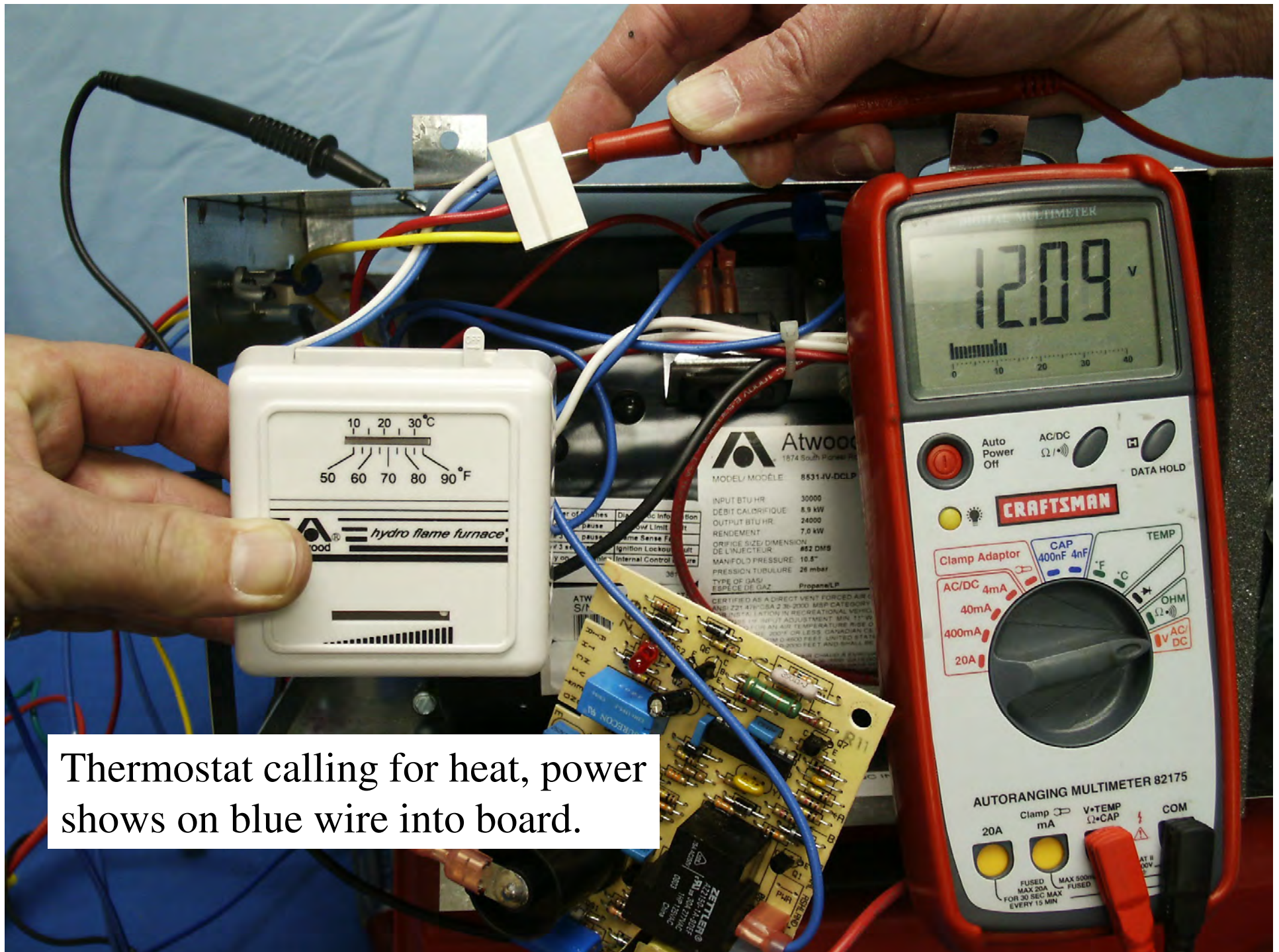


Thermostat off, no
power at blue wire
into board.



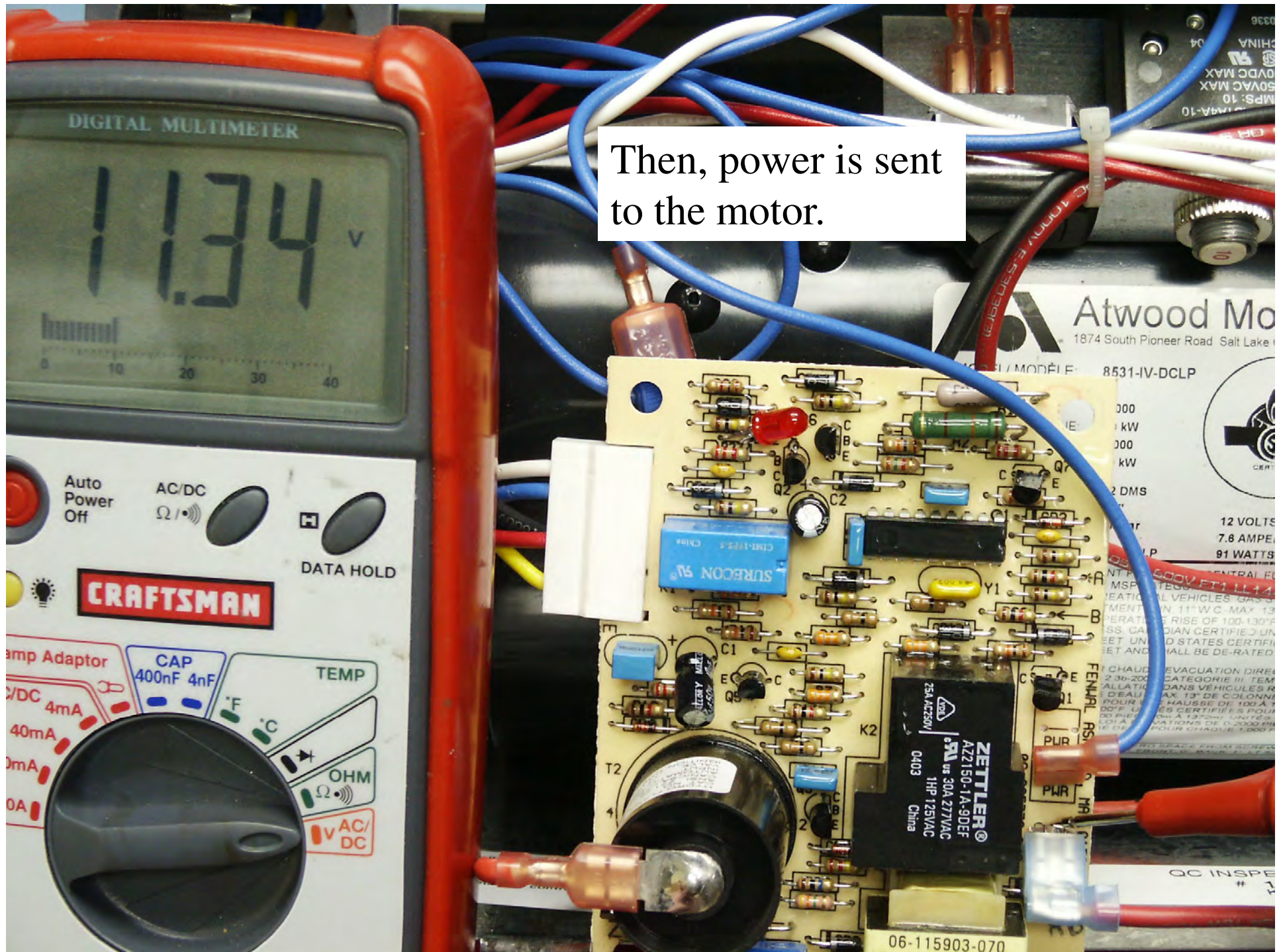
Also no power from
board to motor.





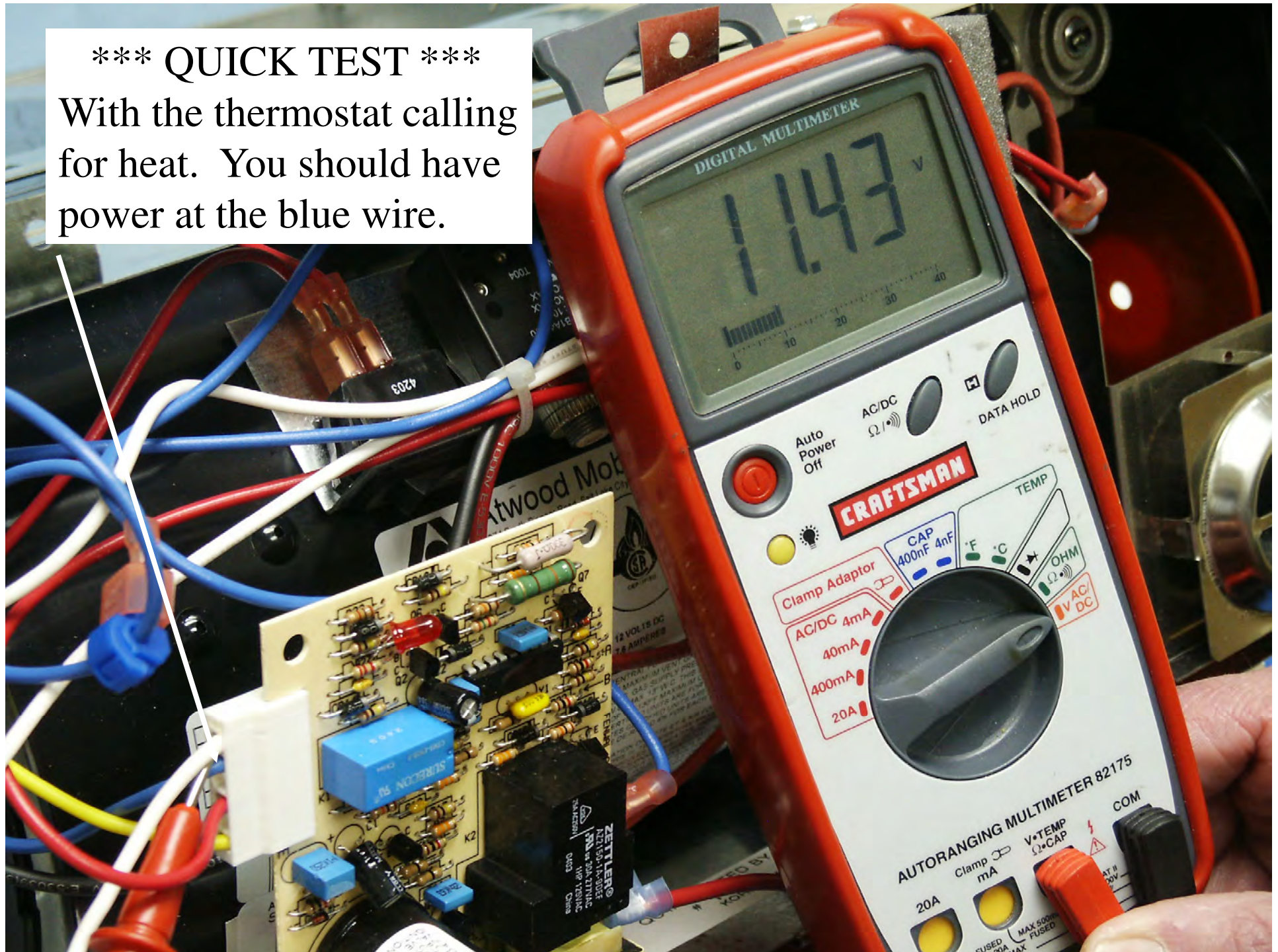
Thermostat calling for heat, power shows on blue wire into board.

Then, power is sent
to the motor.



*** QUICK TEST ***

With the thermostat calling for heat. You should have power at the blue wire.



Amp-draw test

DIGITAL MULTIMETER

7.19 A

CRAFTSMAN

Clamp Adaptor

AC/DC 4mA 40mA 400mA 20A

CAP 400nF 4nF

TEMP °F °C

OHM Ω

V AC/DC

AUTORANGING MULTIMETER 82175

Clamp V•TEMP

ZETTLER

AZ2150-1A-SD0F

30A 277VAC

HP 125VAC

06-115903-070

VI 0251 DASH 2B-5

Atw

8531

INFLUENT BTU HR 30000

DEBIT CALORIFIQUE 8.9 kW

OUTFLUENT BTU HR 24000

INFLUENT 7.0 kW

ORIFICE SIZE/DIMENSION #52 D

MANIFOLD PRESSURE 10.5"

PRESSION MANIFOLD 26 mb

TYPE OF GAS PROPANE

CECE DE PROPANE

Propane

CERTIFIED AS DIRECT VENT

ANSI Z21.47b CSA 221.000 M

FOR INSTALLATION IN CRE

PURPOSE OF INPUT

DESIGNED FOR AN AIR

TEMPERATURE 200°F

ELUTIONS FROM 0.45

ELUTIONS FROM 0.2000

INVERSSA LEVEL

ARTIFICIE GENERATEUR D'AIR

STANDARD ANSI Z21.47b CSA

GAZ EVACUATION POUR INST

ENTREE MIN 11 DE COLONNE

FOURNAISE EST CONSTRUITE

MAXIMUM DE L'AIR SORTANT 2

EMPLOI A EL EVATIONS DE 40

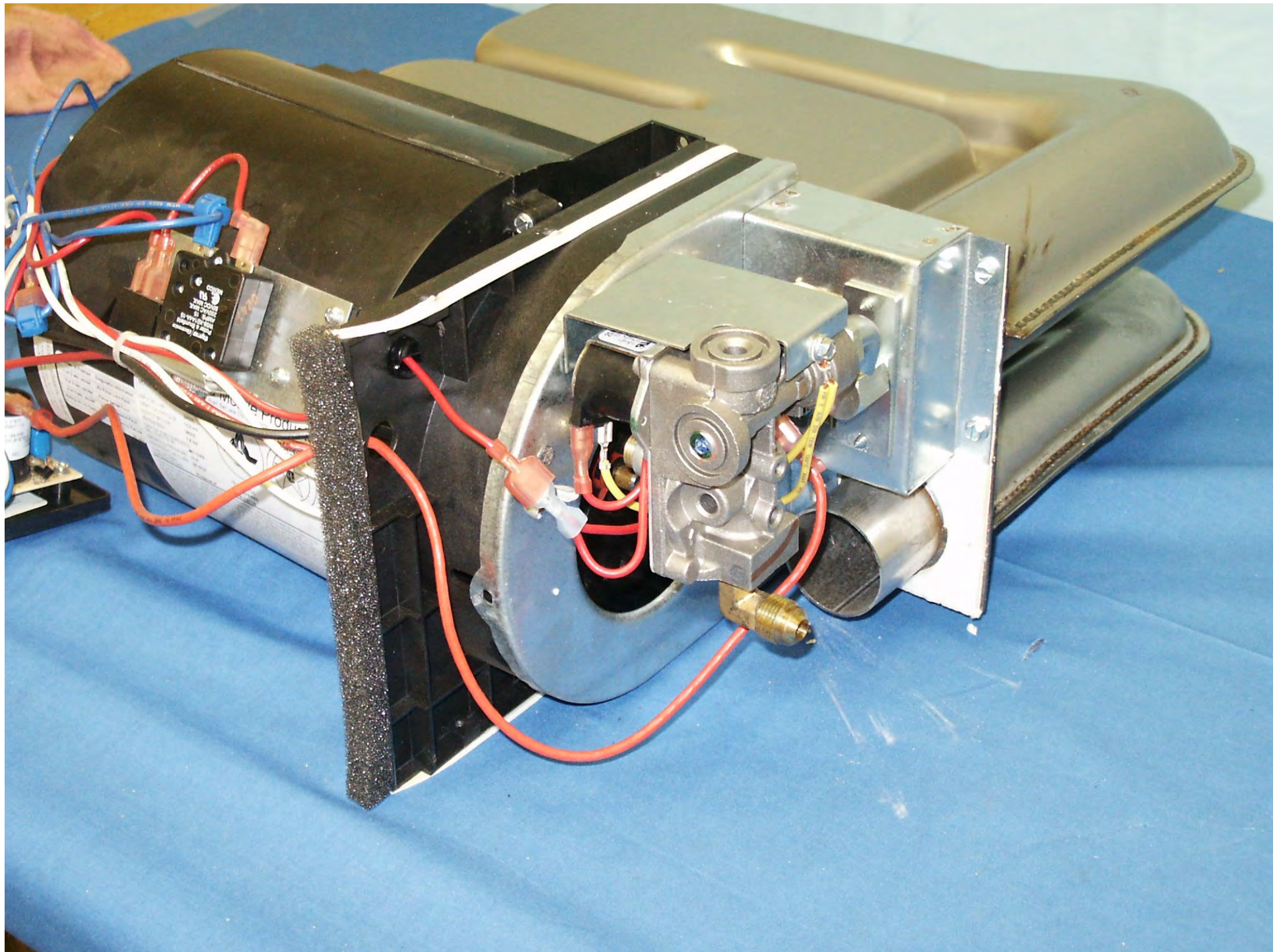
ETATS UNIS SONT POUR EM

ELLES DOIVENT ETRE DECLAS

DU NIVEAU DE LA MER

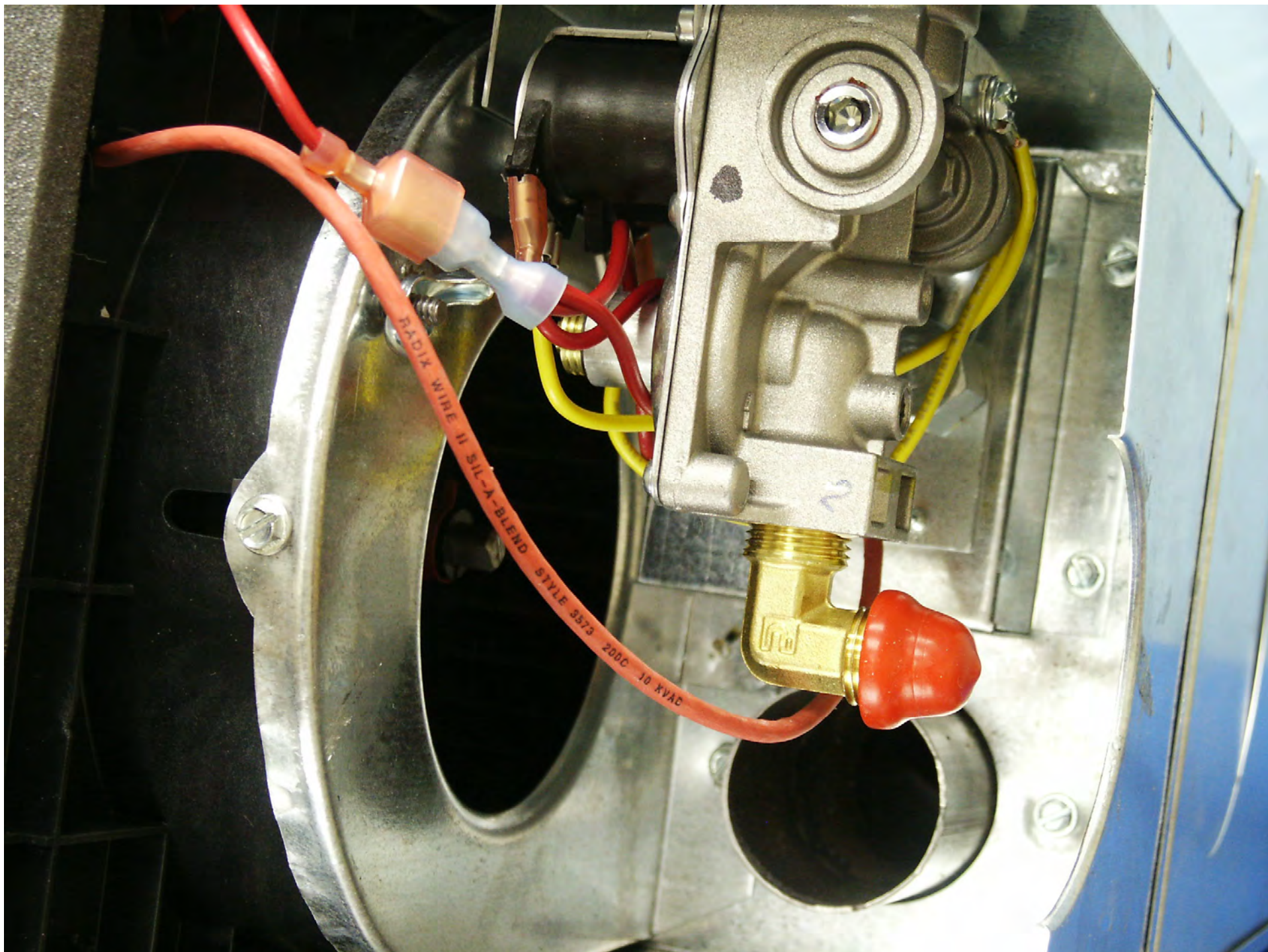
ELABORATE TO COMBUSTIBLE

SEUL N° 100-100-100-100

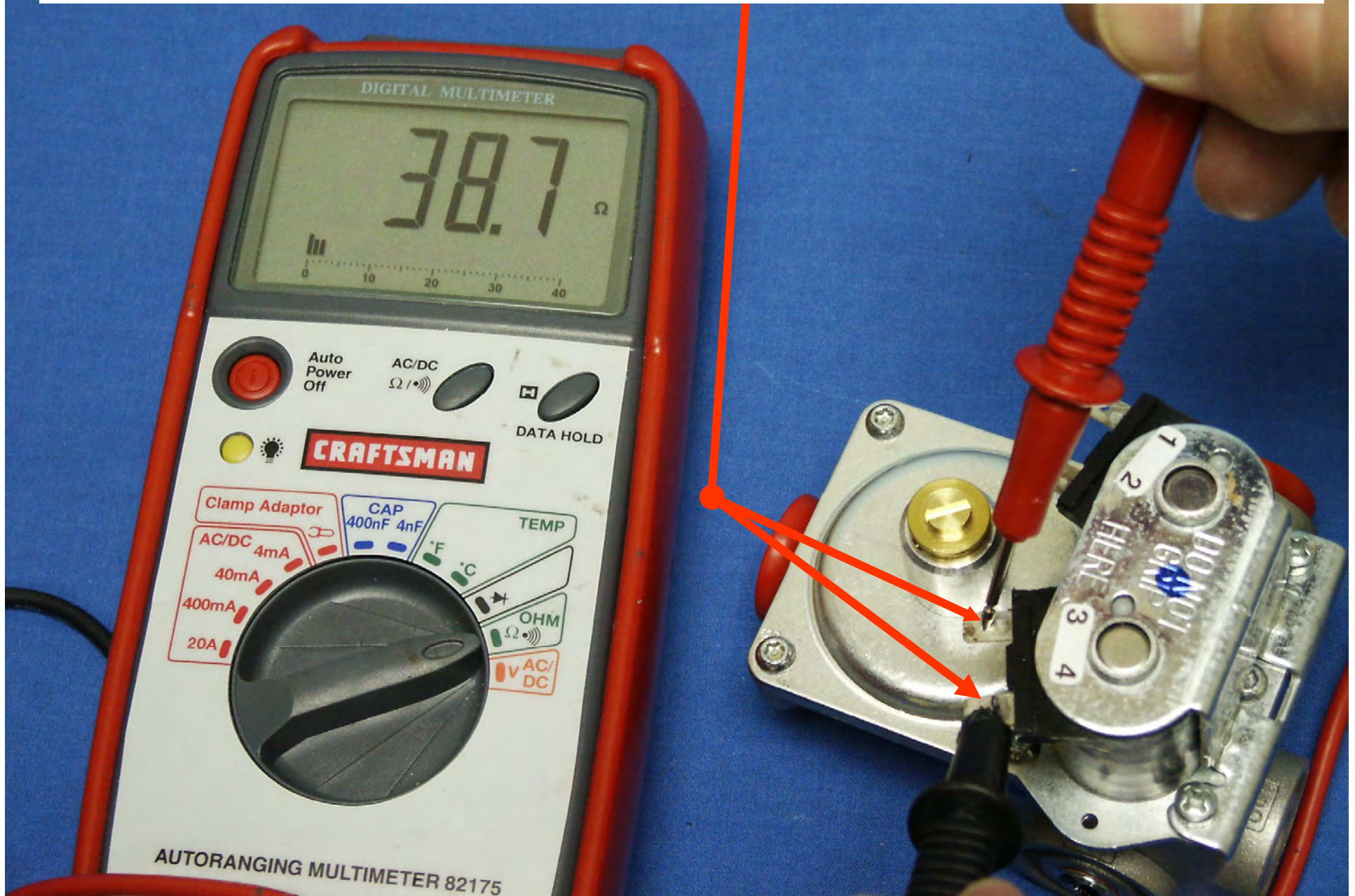


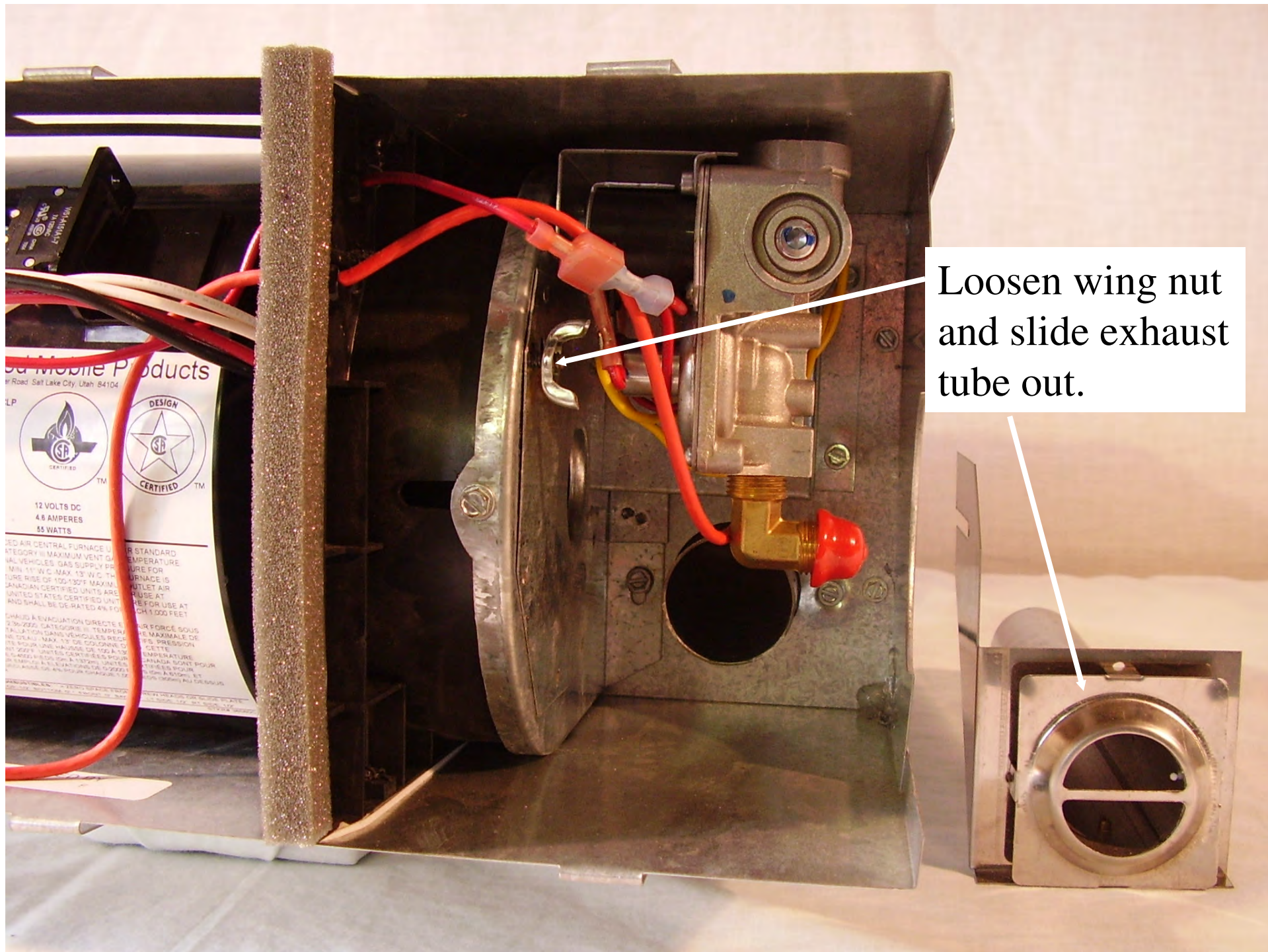
Checking to see if power is sent to the gas valve.



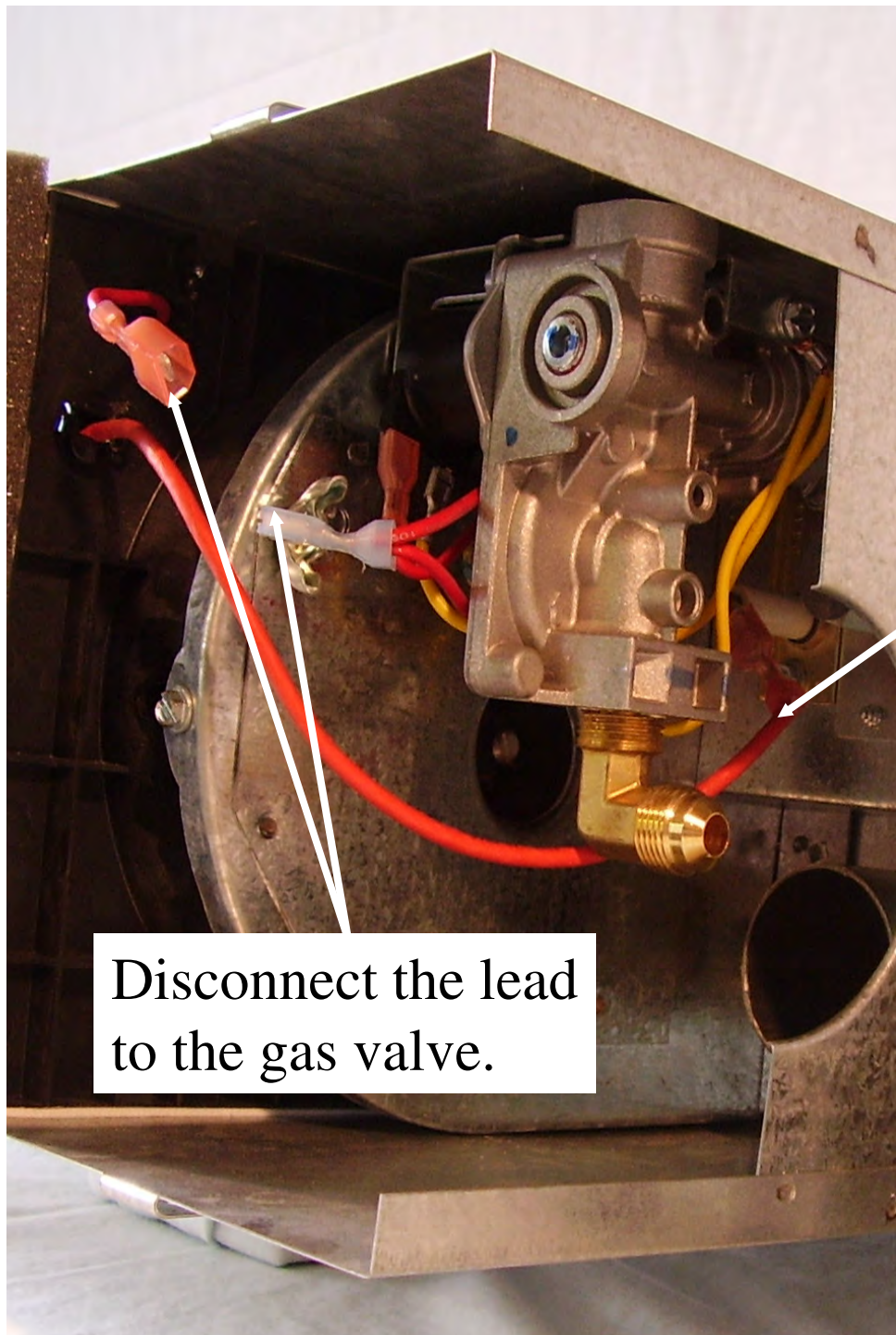


Checking resistance of a coil, each should be between 30 – 50 OHMs.

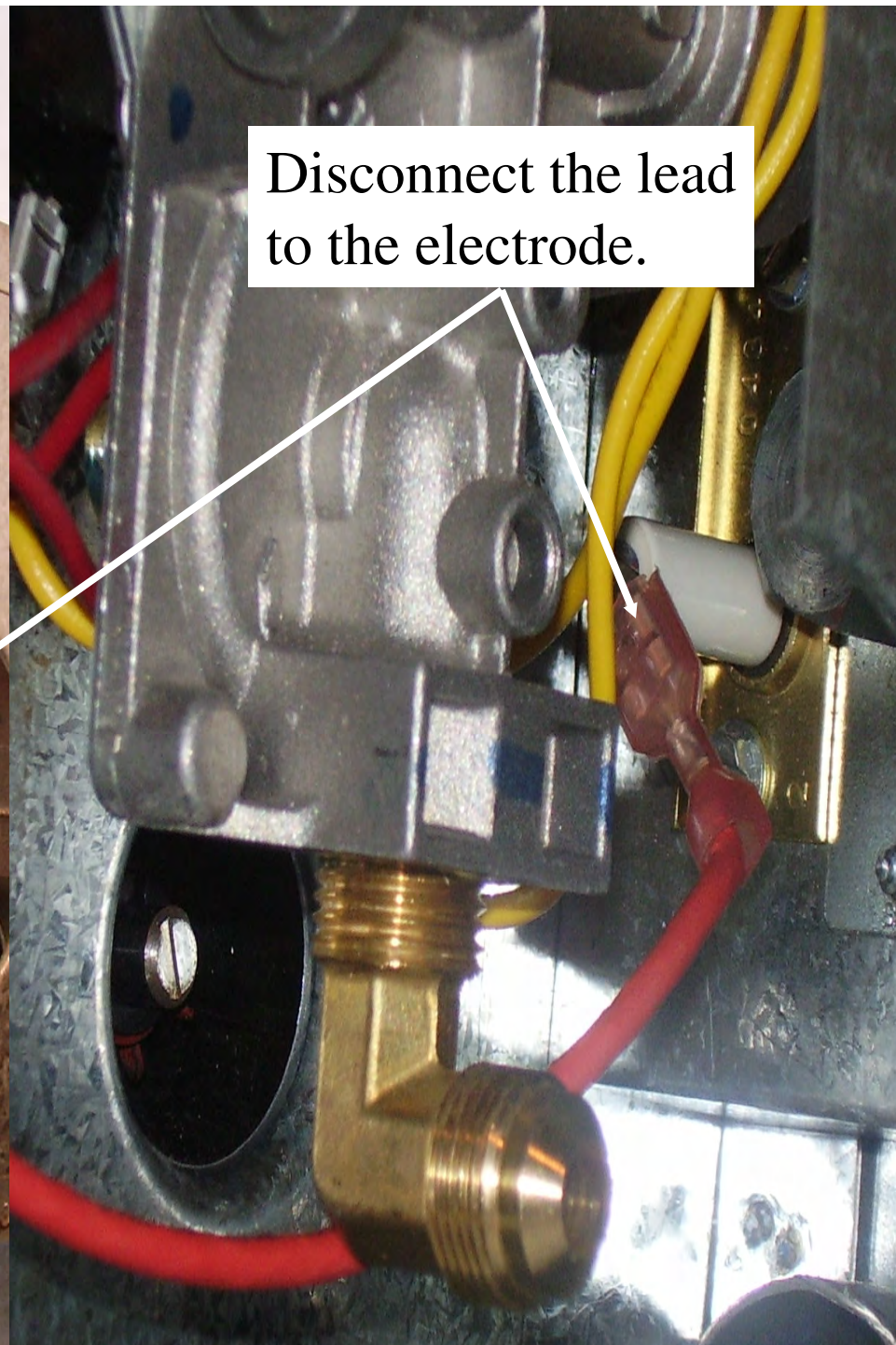




Loosen wing nut
and slide exhaust
tube out.

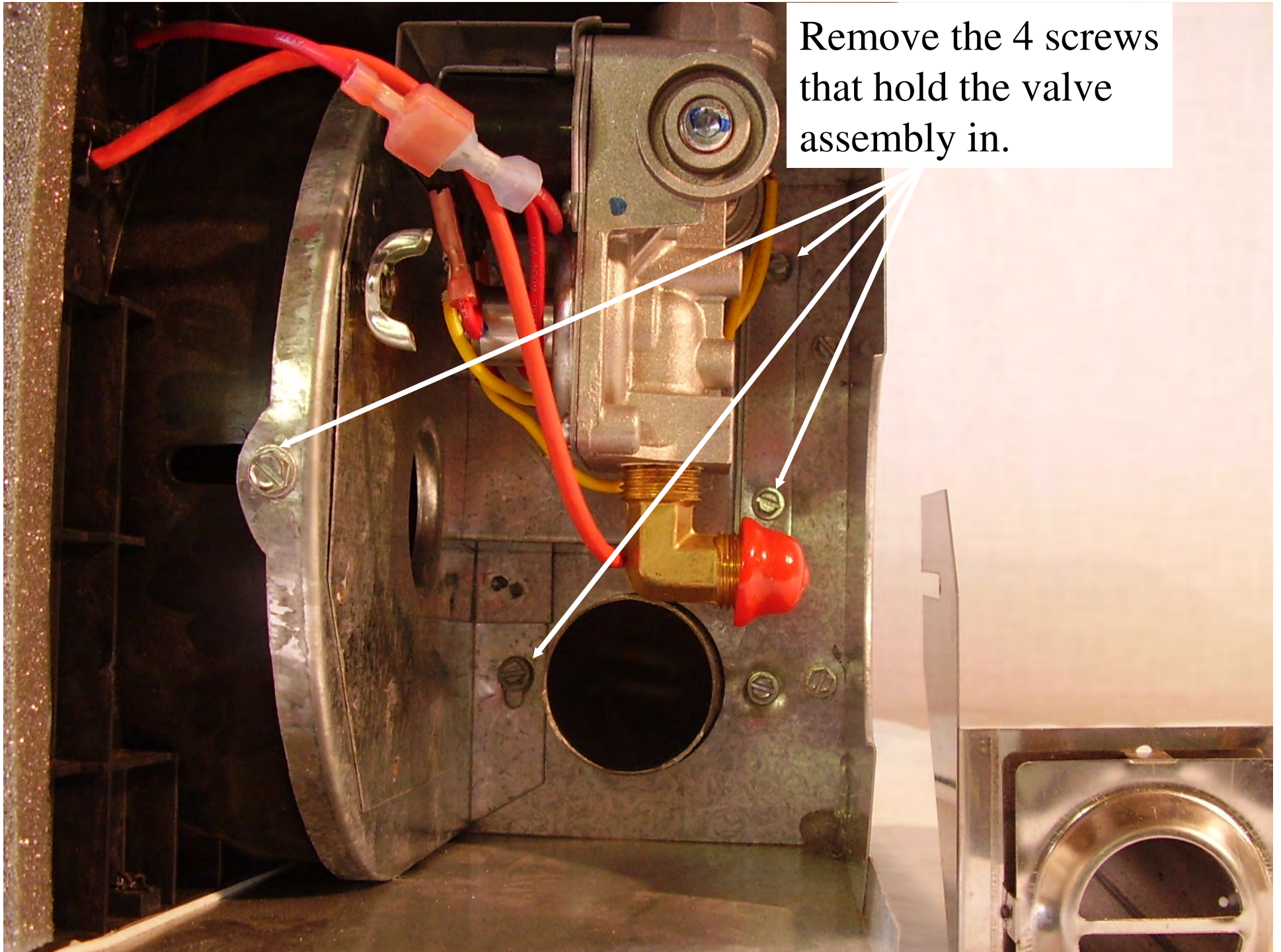


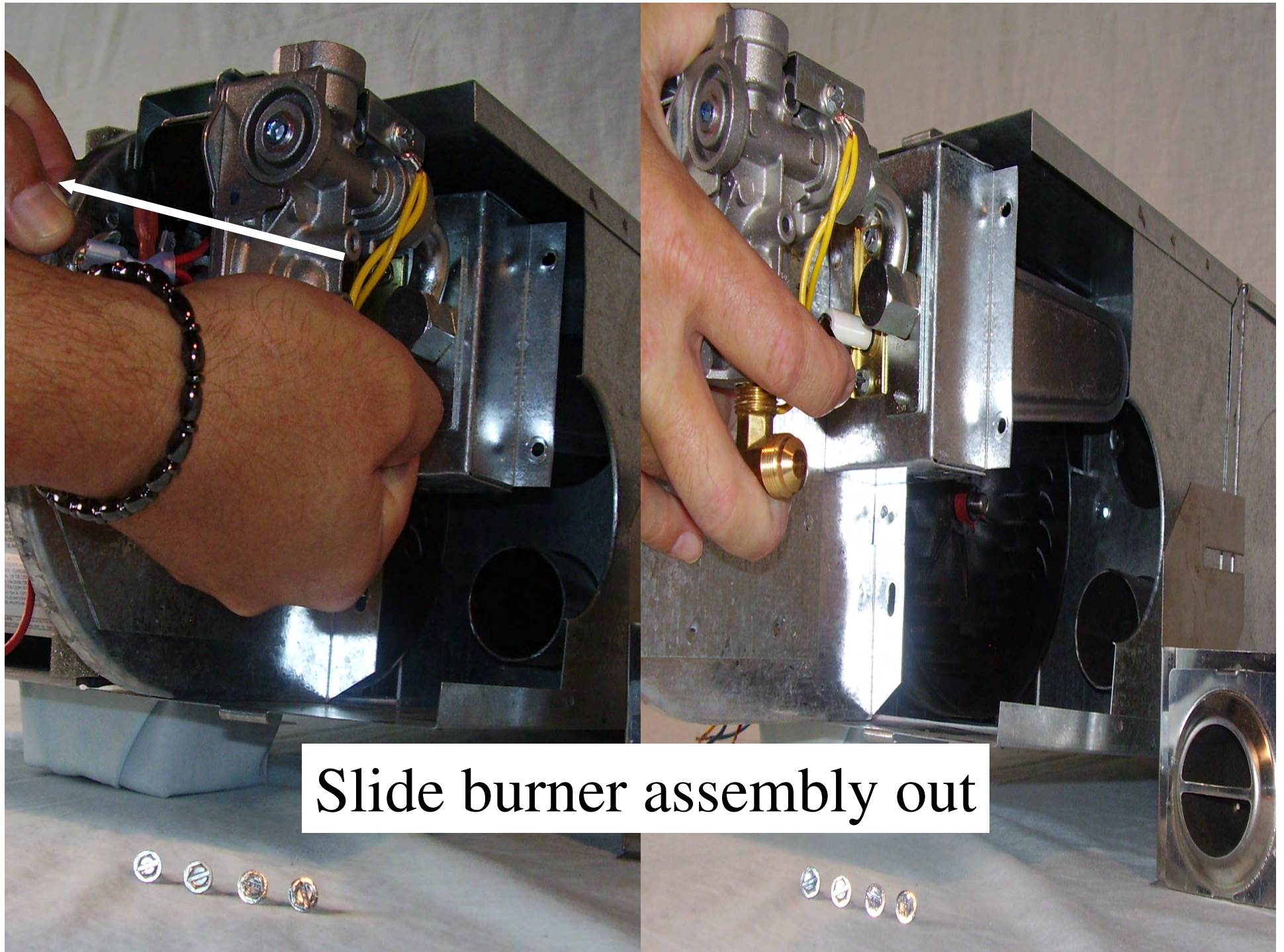
Disconnect the lead
to the gas valve.



Disconnect the lead
to the electrode.

Remove the 4 screws
that hold the valve
assembly in.





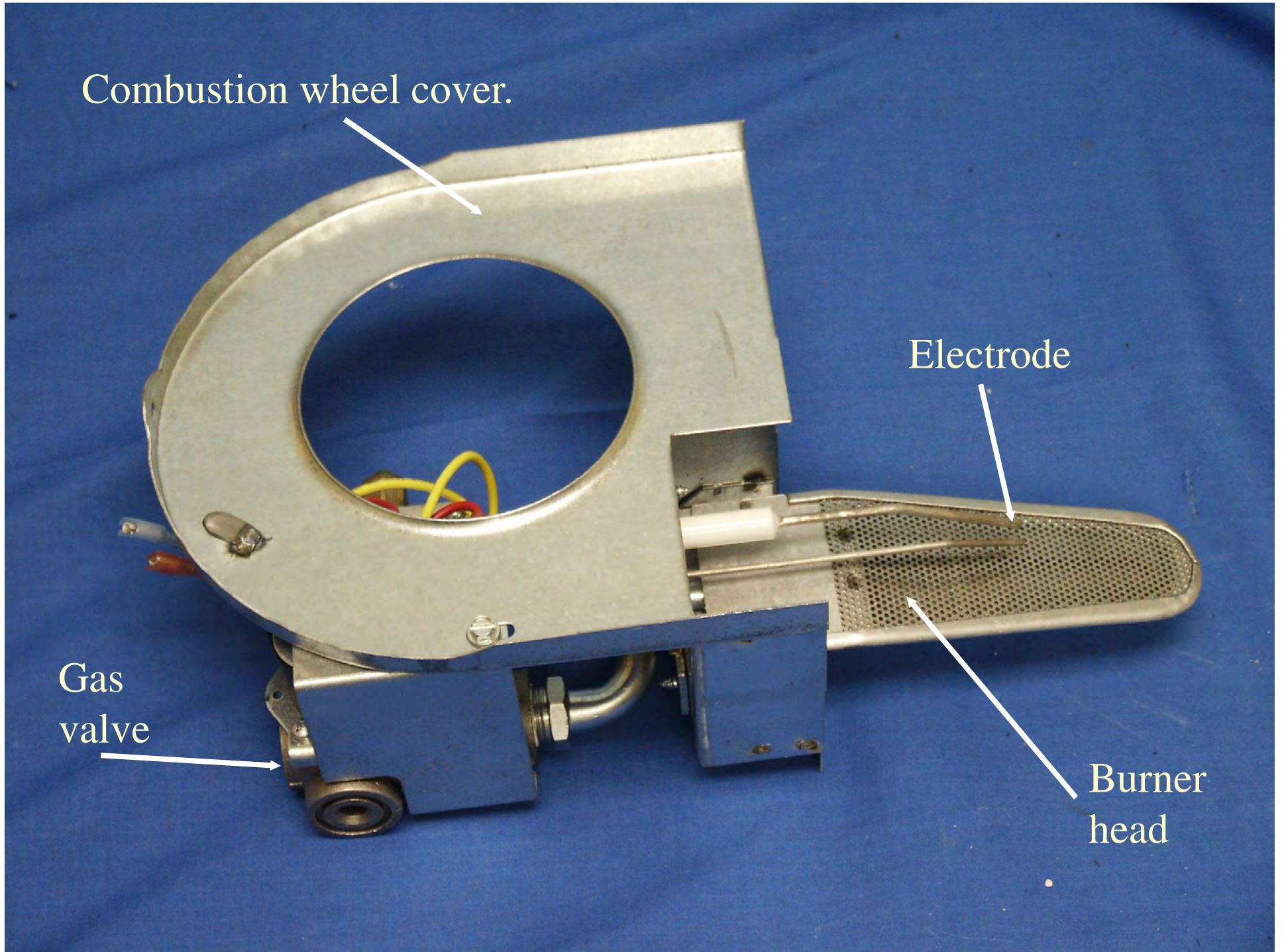
Slide burner assembly out

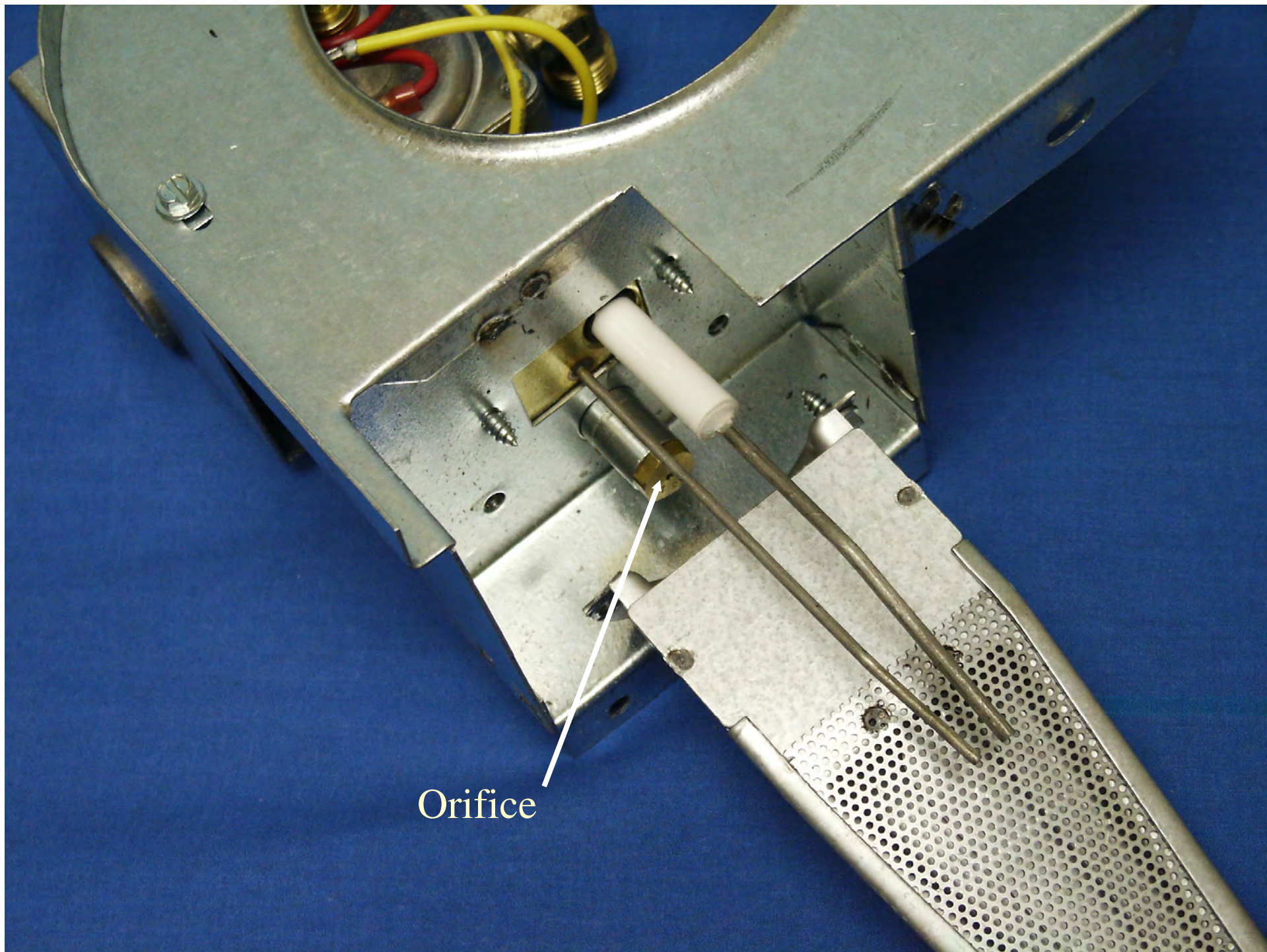
Combustion wheel cover.

Electrode

Gas
valve

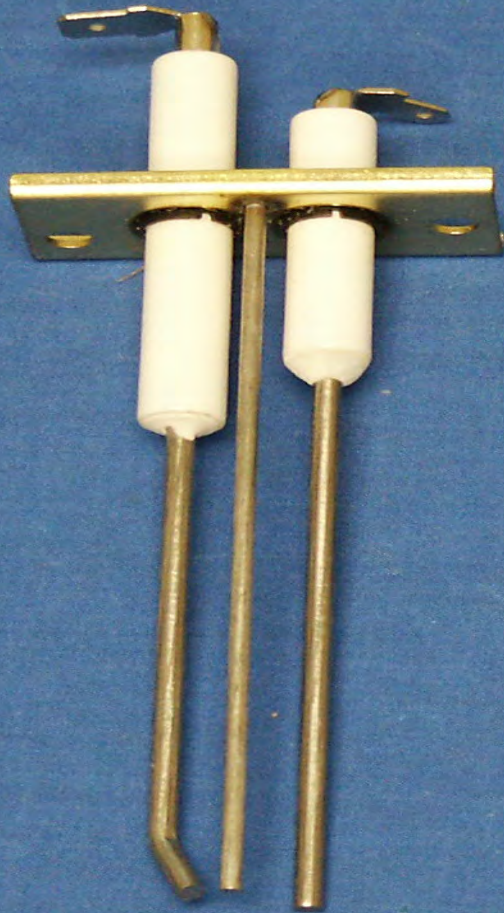
Burner
head



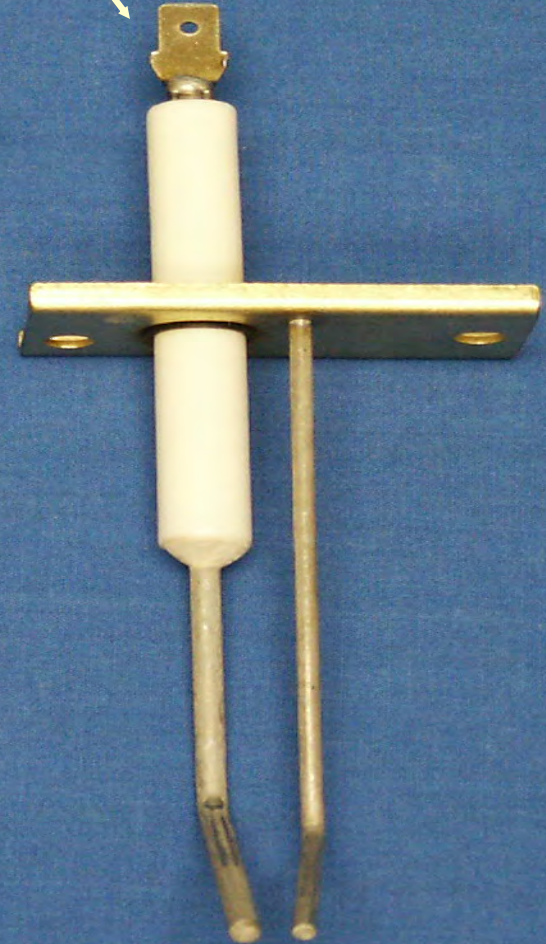
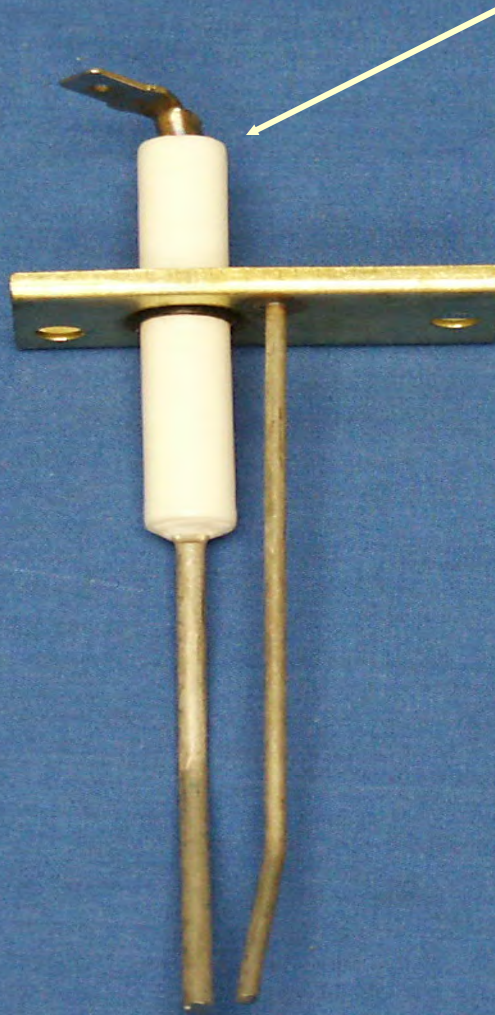


Orifice

Local sense
electrode.



Remote sense
electrode.



Should have 1/8" gap.

No flame
spreader

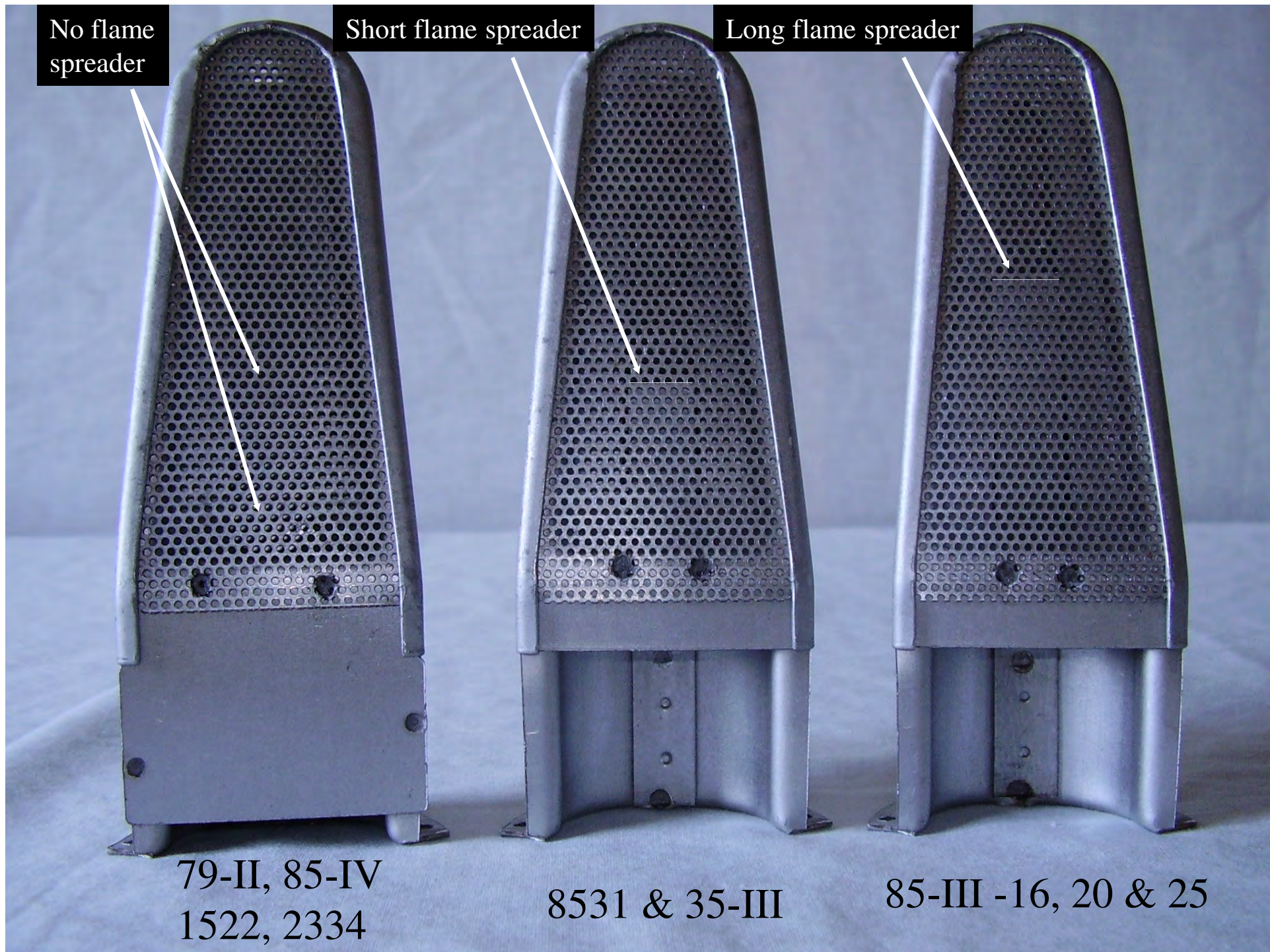
Short flame spreader

Long flame spreader

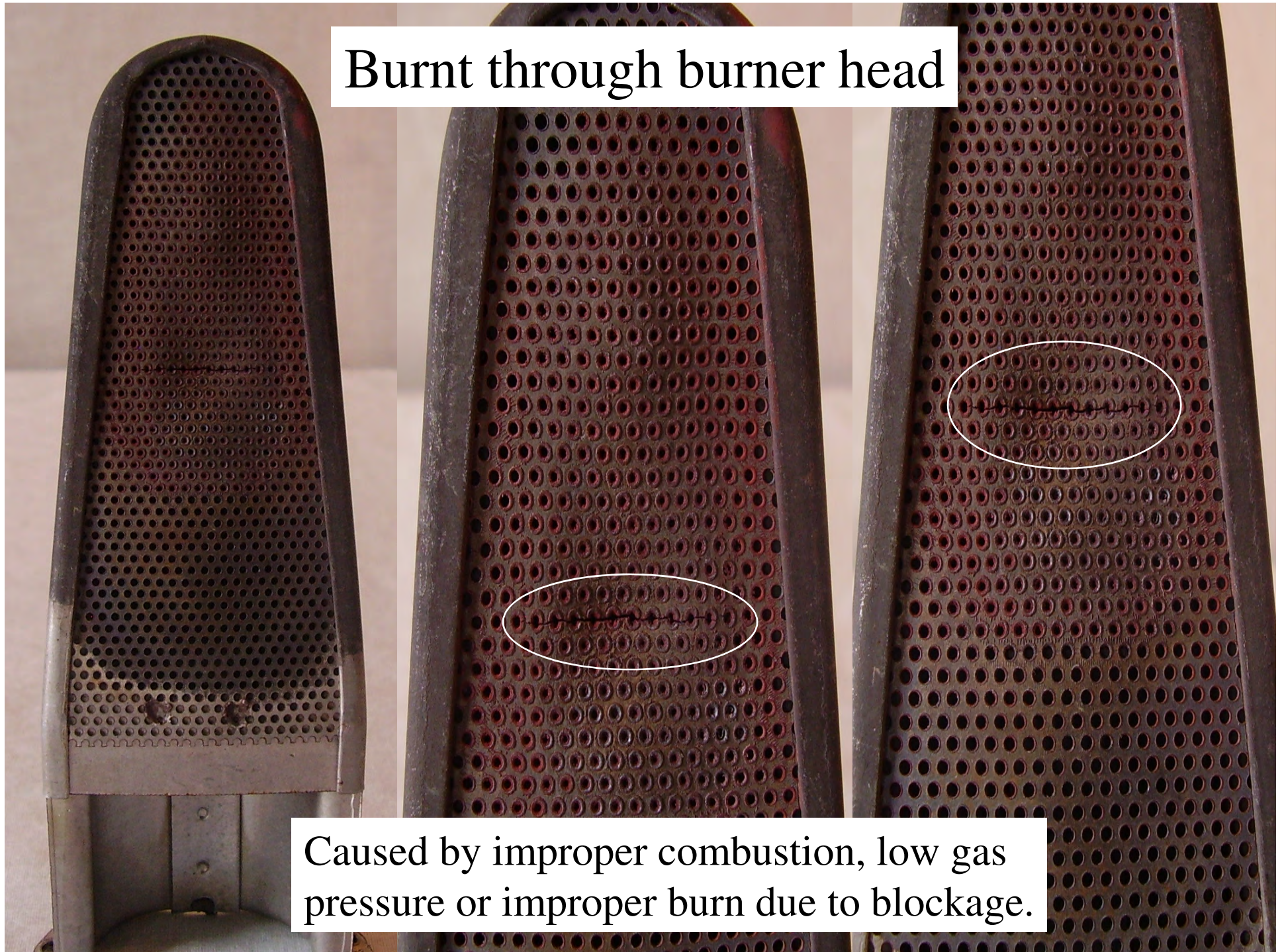
79-II, 85-IV
1522, 2334

8531 & 35-III

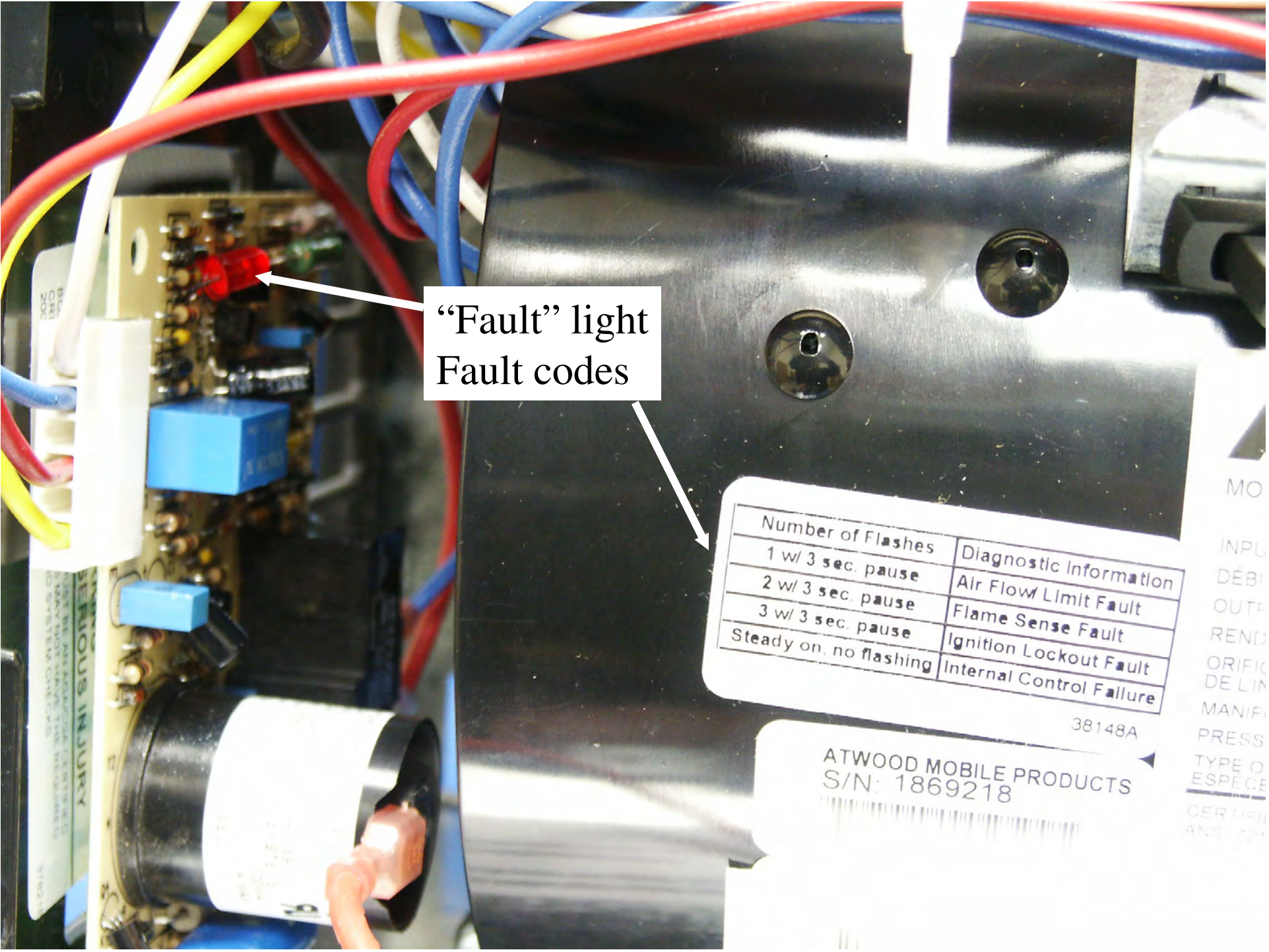
85-III -16, 20 & 25



Burnt through burner head



Caused by improper combustion, low gas pressure or improper burn due to blockage.



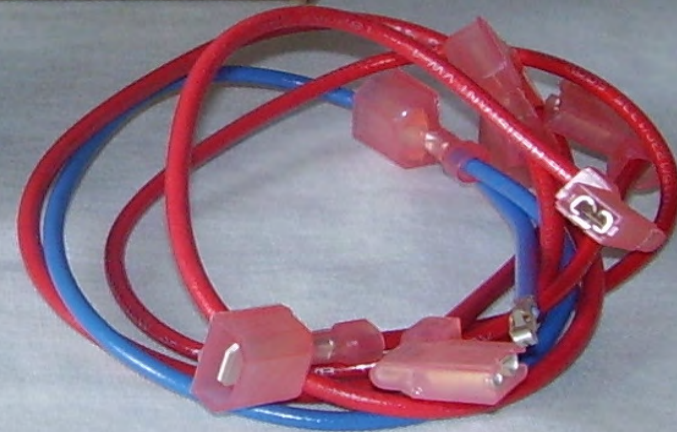
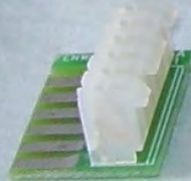
“Fault” light
Fault codes

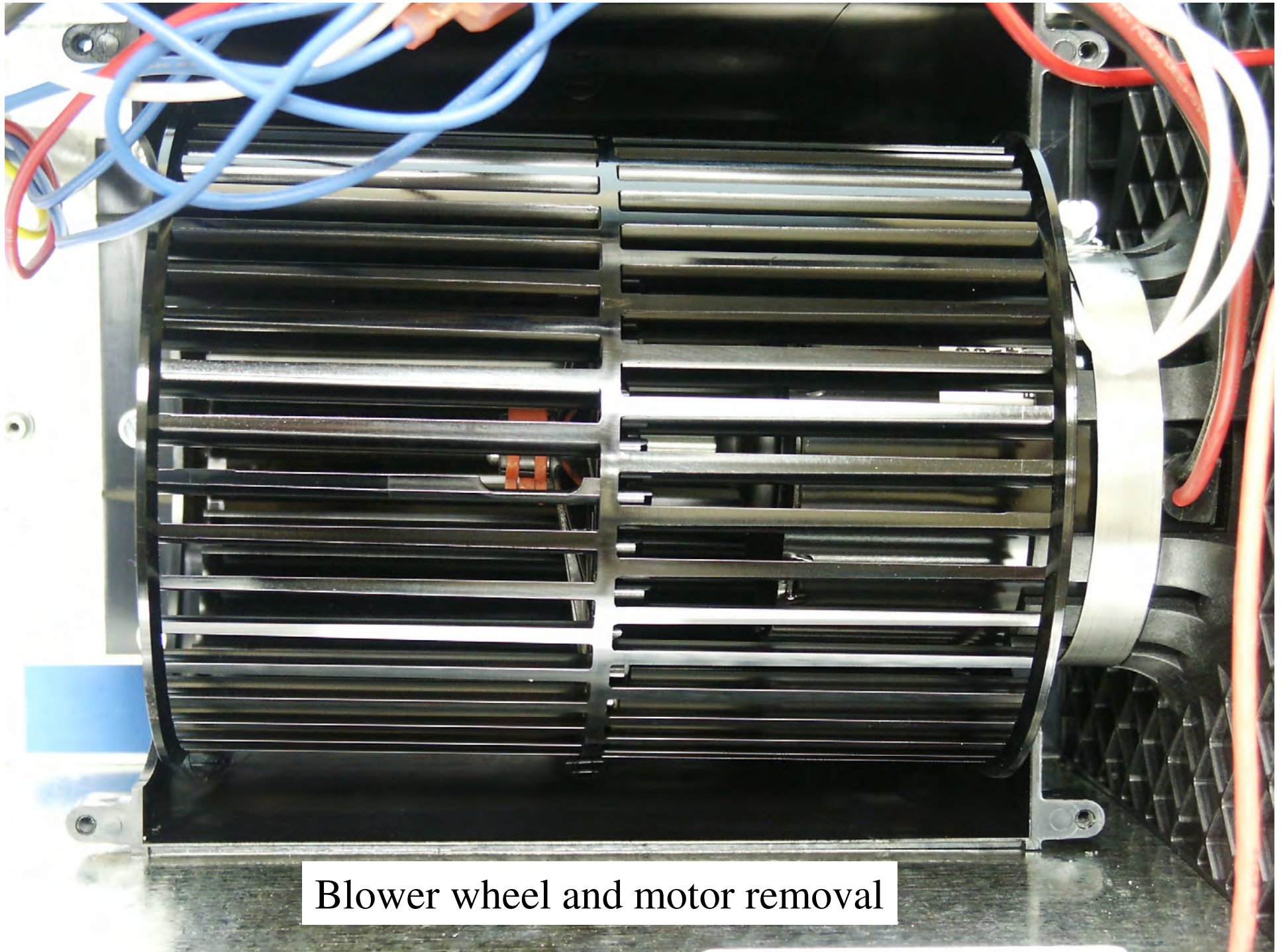
Number of Flashes	Diagnostic Information
1 w/ 3 sec. pause	Air Flow Limit Fault
2 w/ 3 sec. pause	Flame Sense Fault
3 w/ 3 sec. pause	Ignition Lockout Fault
Steady on, no flashing	Internal Control Failure

38148A

ATWOOD MOBILE PRODUCTS
S/N: 1869218

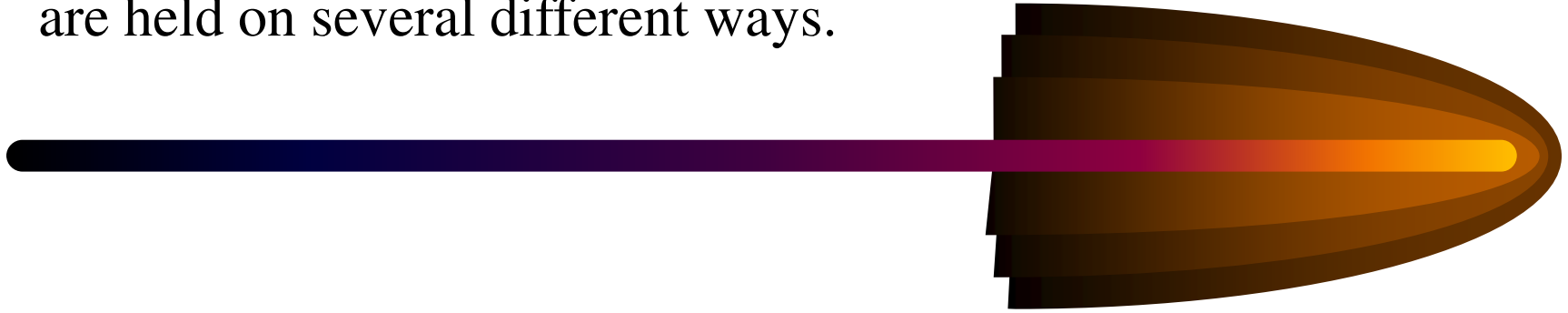
KIT, DC UNIVERSAL
C/N: 31501



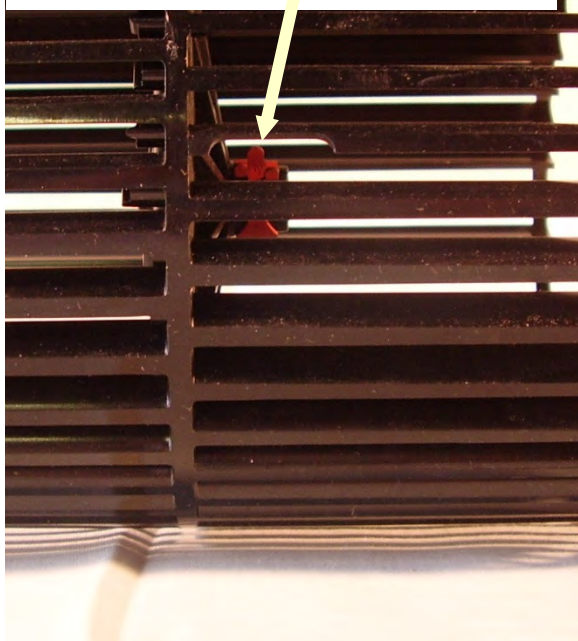


Blower wheel and motor removal

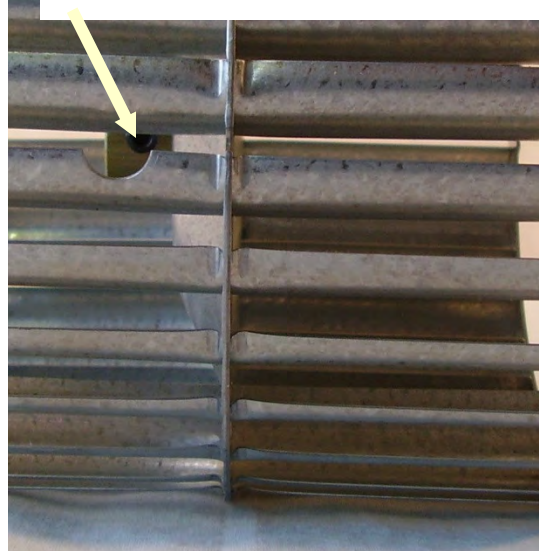
The blower and combustion wheels are held on several different ways.



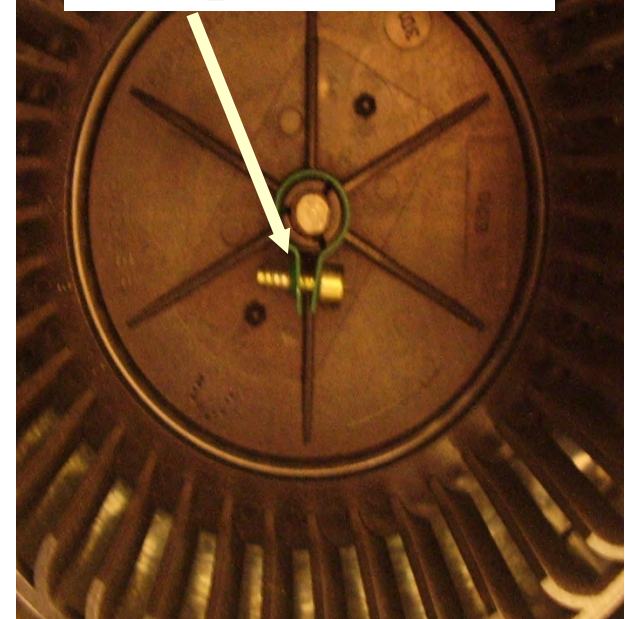
Spring type compression clamp.



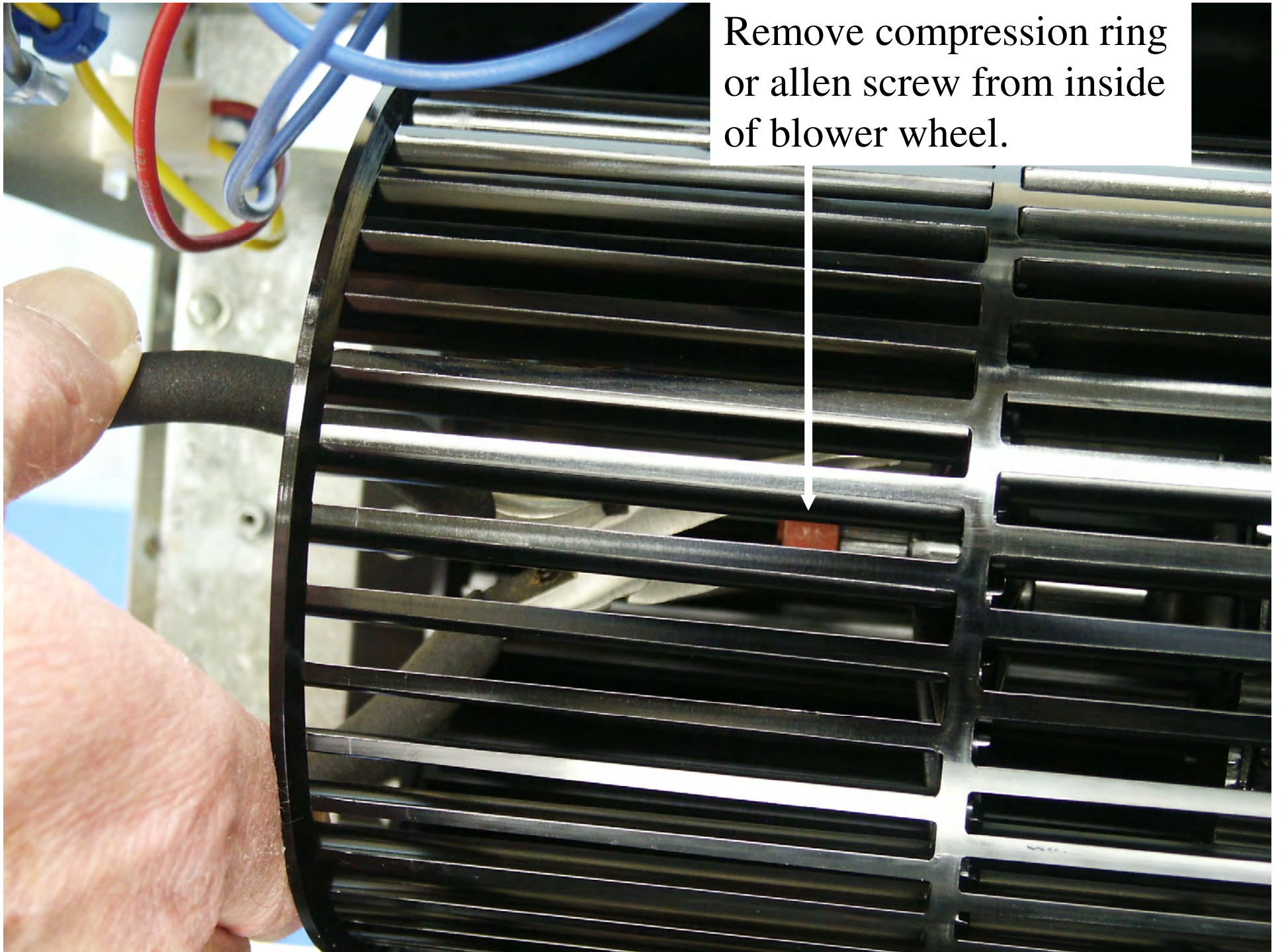
An allen screw that locks against the armature.



Or a strap / screw clamp.



Remove compression ring
or allen screw from inside
of blower wheel.

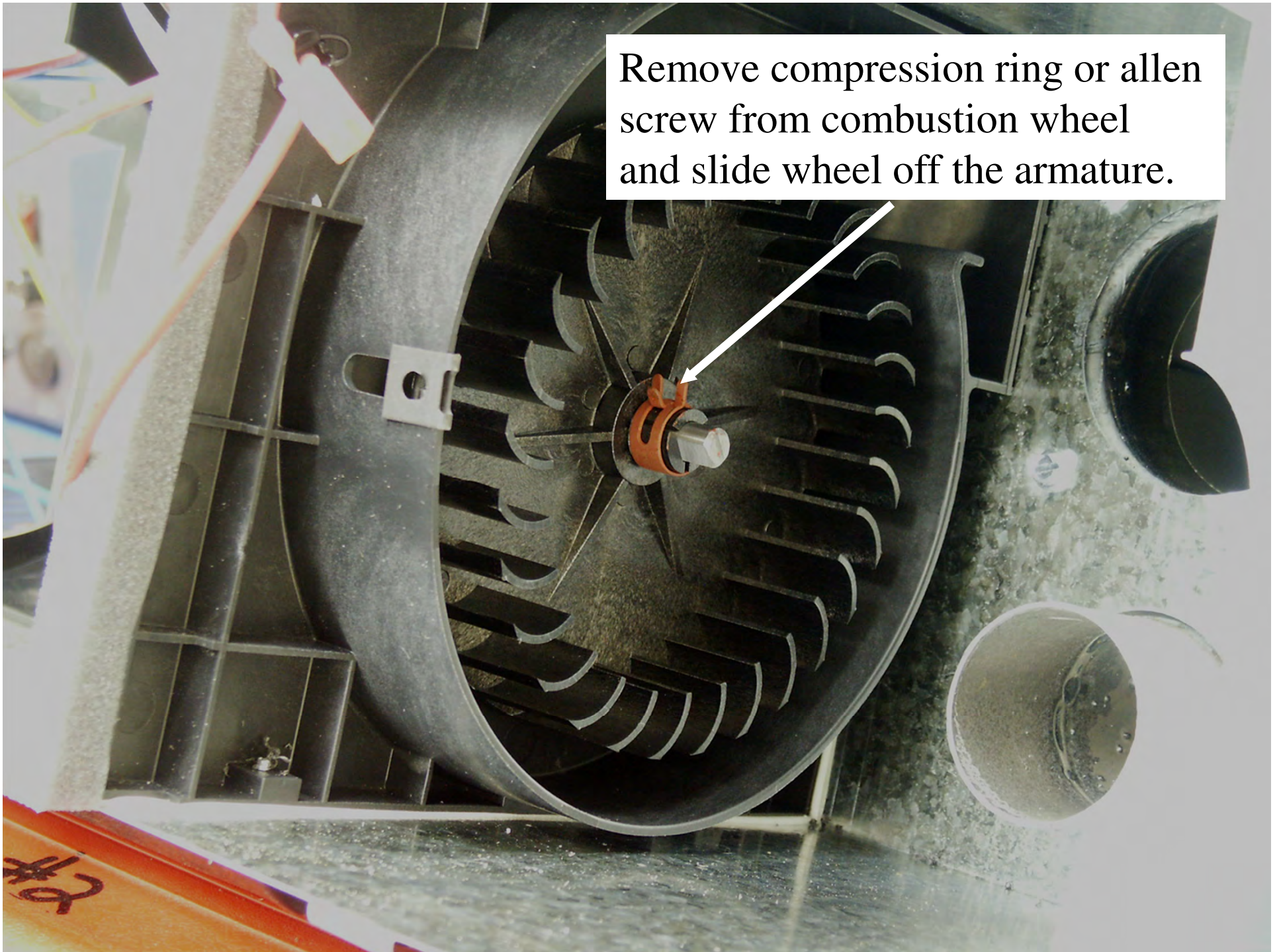


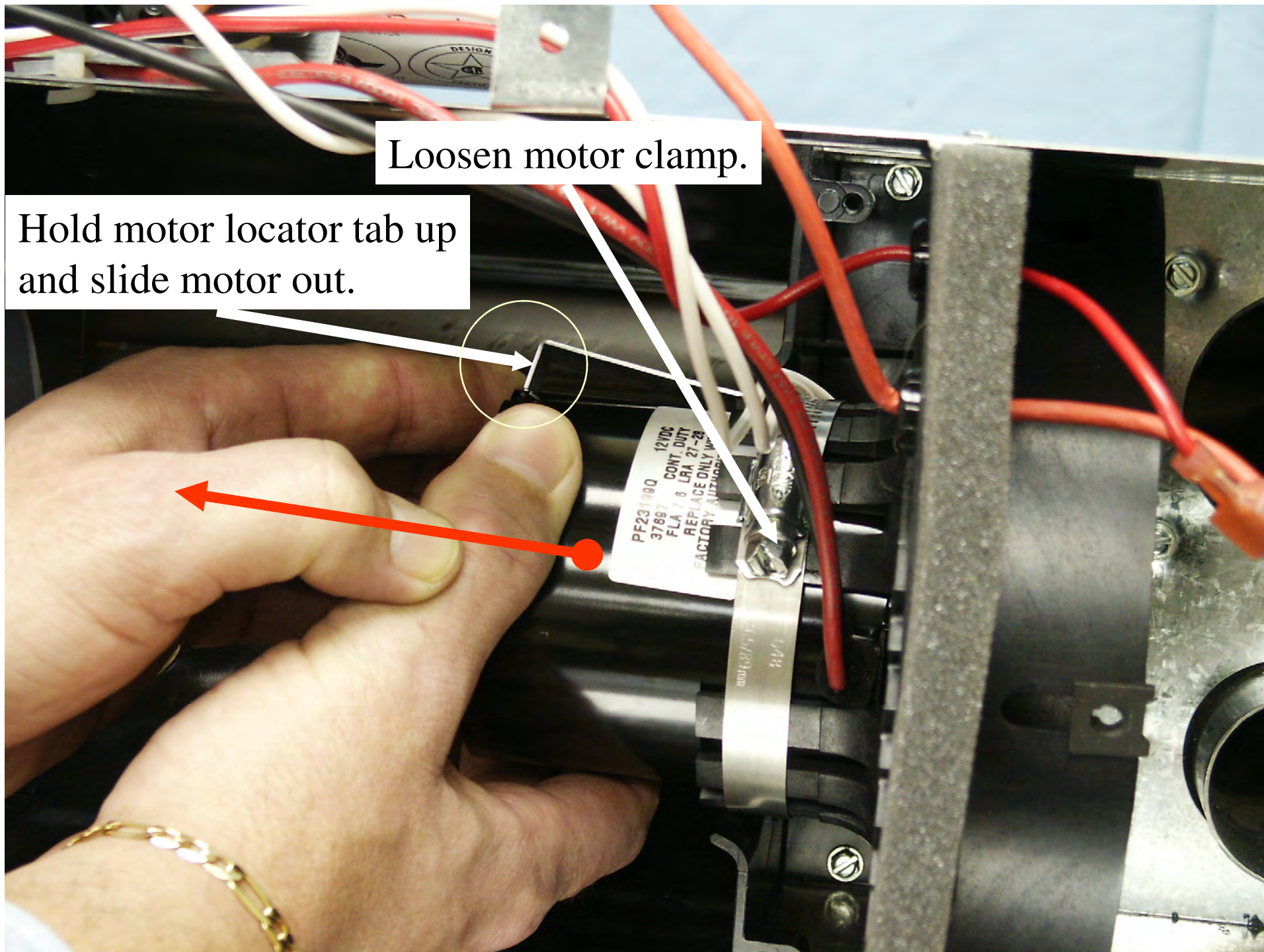
A close-up photograph showing a person's hand, wearing a gold ring, sliding a black, cylindrical blower wheel with horizontal fins off a motor armature. The wheel is being moved to the left and then outwards. The background shows various colored wires (blue, red, yellow) and a red component.

Slide blower wheel to the left and then out.

Note: Any of the blower wheels (plastic or metal) may be quite difficult to slide off of the motor armature.

Remove compression ring or allen screw from combustion wheel and slide wheel off the armature.

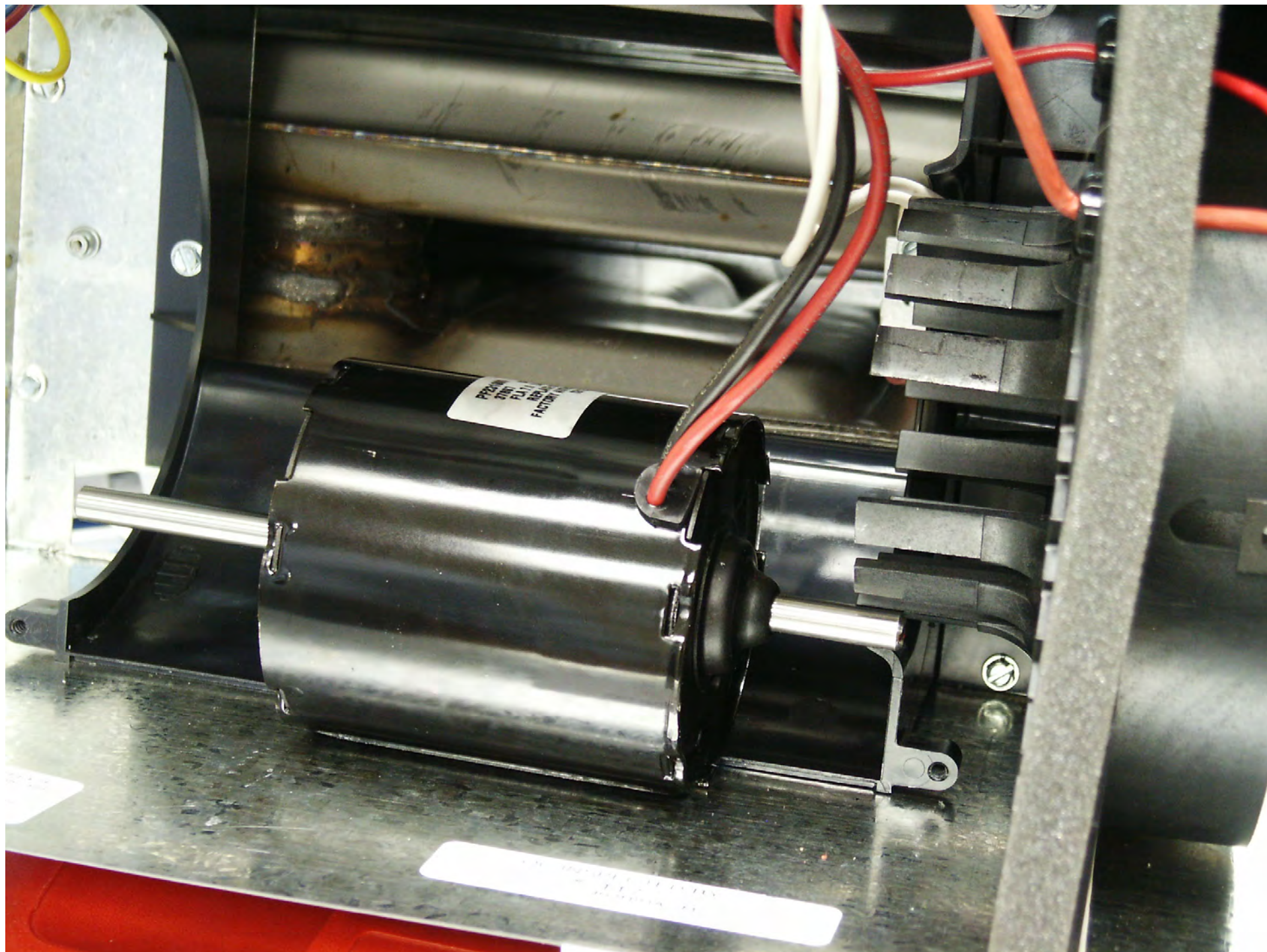




Loosen motor clamp.

Hold motor locator tab up
and slide motor out.

PF231890 12VDC
37887 CONT. DUTY
FLA 7.8 LRA 27-30
REPLACE ONLY W/
FACTORY AUTHORIZED



QUESTIONS ?????

QUESTIONS ?????

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Over the years of running a mobile RV repair service, having a dedicated place to access service manuals for all the different appliances and components found on RVs was something that I always had a desire to create.

I hope this resource makes your RV repairs easier, as it has mine, but please be careful and follow proper safety practices when attempting to repair your own RV.

If in doubt, please consult with a professional RV technician!



DARREN KOEPP - OWNER, MY RV WORKS, INC.

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