ISLAND BREEZE TECHNICIAN CERTIFICATION PROGRAM

Reading Wiring Diagrams From Scratch

MODULE F9 FOUNDATIONS PREREQ F8

It is 4:30 PM in August. You are at a condenser that will not run. The customer is watching from the patio. You open the electrical panel and there it is, glued to the inside of the access door: a sheet of lines, circles, and zigzags that looks like a subway map drawn by a robot. The tech who can read that sheet will find this fault in ten minutes. The tech who cannot will start swapping parts and hoping. This module turns you into the first tech. You learned what the components are in F8. Now you learn how the manufacturer tells you, on one piece of paper, exactly how they all connect and exactly what should happen when the thermostat asks for cooling.

Short Version

A wiring diagram is the map of the machine's electrical system. Most equipment gives you two maps: a connection diagram (a picture of the actual wires, good for installing) and a ladder diagram (the circuit redrawn as logic, good for thinking). On a ladder diagram, the two vertical rails are the power supply, every horizontal rung is one circuit, and every rung holds exactly one load (the thing that does work) plus the switches that control it. The legend decodes the symbols, because manufacturers invent their own. To diagnose with a diagram, use the four-step schematic diagnosis method: Step 1, identify the failed load. Step 2, find its rung and every switch that feeds it. Step 3, predict what should be present at each point. Step 4, measure along the rung until the prediction breaks. The break is the fault. That four-step loop is the rest of your diagnostic career in miniature.

Key Values

Thermostat terminal letters and their jobs

The thermostat is just a switch panel. Each letter is a wire it can connect to R (24 volt power). Memorize these like your own phone number.

TERMINAL	JOB	WHAT IT ENERGIZES WHEN CONNECTED TO R
R	24 volt hot from the transformer	The power source for every other terminal
Rc	24 volt hot, cooling side	Same as R, but fed by the cooling transformer when a system has two transformers (common on furnace plus AC pairings with separate power)
Rh	24 volt hot, heating side	Same as R, but fed by the heating transformer in a two-transformer system
C	Common, the return path back to the transformer	Nothing. C does not energize anything; it completes the circuit so current can flow. Also powers the thermostat itself on most digital stats

TERMINAL	JOB	WHAT IT ENERGIZES WHEN CONNECTED TO R
Y	First stage cooling call	The contactor coil at the outdoor unit (which then starts compressor and condenser fan)
Y2	Second stage cooling call	Second stage of cooling on two-stage equipment (second compressor stage or high speed)
G	Fan call	The indoor blower relay or board input, running the blower by itself or with a call
W	First stage heat call	Gas furnace board (starts the ignition sequence) or electric heat sequencer
W2	Second stage heat call	Second stage heat: high fire on a two-stage furnace, or auxiliary strips on a heat pump
O/B	Reversing valve signal (heat pumps)	The reversing valve solenoid. O energizes the valve in cooling (most brands). B energizes it in heating (a few brands). Set wrong, the system heats when asked to cool

Standard wire color conventions

COLOR	USUAL JOB
Red	R (24 volt hot)
Blue or brown	C (common)
Yellow	Y (cooling)
Green	G (fan)
White	W (heat)
Orange	O (reversing valve)

Warning: color is a convention, not a law. Nothing stops the last tech, the homeowner, or the original installer from landing a green wire on W. The terminal the wire lands on is the truth. The color is only a hint. Verify at both ends before you trust any wire color, every time.

Common symbol glossary

SYMBOL YOU WILL SEE	WHAT IT IS
Circle, often with letters inside (CC, R, IFR)	A coil: an electromagnet that moves contacts somewhere else on the page
Two short parallel lines breaking a wire	Contacts, normally open: closed only when their coil is energized

SYMBOL YOU WILL SEE	WHAT IT IS
Two short parallel lines with a diagonal slash	Contacts, normally closed: open only when their coil is energized
A line angled away from a contact point, like a drawbridge	A switch (thermostat, pressure switch, limit switch). Drawn in its at-rest position
Two longer parallel lines of equal length, side by side	A capacitor
Circle with M or motor name (COMP, OFM, IFM)	A motor
Two coils of loops facing each other, sometimes with parallel lines between	A transformer (primary and secondary windings)
Three descending horizontal lines, like a tiny pyramid	Ground (chassis or earth connection)
Zigzag line	A resistor or heater element
Dashed line between components	Mechanical link (parts that move together) or a field-installed wire, per the legend

Field Checklist

The four-step schematic diagnosis method, pocket version. Run it in order, every electrical call.

- [ ] **Step 1, identify the failed load.** Name the exact thing that is not doing its job: condenser fan motor, compressor, inducer, blower. Not "the AC." One component.
- [ ] **Step 2, find its rung and every switch that feeds it.** Locate the load on the ladder diagram. Trace its rung from rail to rail and list every switch, contact, and safety in series with it. If those contacts have a coil, find the coil's rung too and list its switches.
- [ ] **Step 3, predict what should be present at each point.** Before touching a meter, write down what a healthy system shows: rail to rail voltage at the source, full voltage across the load, zero volts across every closed switch.
- [ ] **Step 4, measure along the rung until the prediction breaks. The break is the fault.** Park one probe on the rail (or common) and walk the other probe point to point. The fault lives between the last point that matched your prediction and the first point that did not.

> **IB STANDARD**
>
> Before you touch a single wire, photograph the wiring diagram and the panel as found, and attach both photos to the ServiceTitan job. The diagram photo means you can keep diagnosing from the truck or call for help with the exact diagram in hand. The panel photo means you can always put it back the way you found it, and it protects you if a previous repair was already wrong.

Full Breakdown

What a wiring diagram is

A wiring diagram is the manufacturer telling you, in standardized picture language, three things: what electrical parts are in this machine, how they are connected, and what should happen in what order when the equipment runs. You already know the parts from F8: transformers, relays, contactors, capacitors, motors, sequencers. The diagram is where they all come together.

Open the electrical access panel on almost any unit and you will find the diagram glued to the inside of the door or panel cover. Most manufacturers print two different drawings of the same machine on that one sheet, and knowing which one to use for which job is the first skill.

> **PHOENIX FIELD NOTE**
>
> On Phoenix rooftops, ten summers of direct sun can bleach a diagram into a ghost. If the door sticker is unreadable, the model number on the data plate gets you the same diagram online: search the manufacturer's literature site or a parts supplier site for the model number plus "installation manual" or "wiring diagram." Save the PDF to your phone before you climb. A diagram you can pinch-zoom in the shade beats squinting at a bleached sticker in 115 degree glare.

The two drawings: connection vs ladder

The connection diagram (also called a pictorial or label diagram) is a picture of the physical machine. Components are drawn roughly where they actually sit in the cabinet, and every wire is drawn following something like its real path, labeled with its real color. This is the installer's drawing. Use it to answer "where does this brown wire physically land?"

The ladder diagram (also called a schematic) throws physical location away completely and redraws the same machine as pure electrical logic. It does not care where the contactor bolts to the cabinet. It cares about one thing: what is electrically in series with what.

The ladder is the tool of thought. Here is why. Electricity does not know where parts are mounted. Current only knows the path: source, through switches, through a load, back to source. The connection diagram buries that path inside a plate of spaghetti. The ladder lays the path out flat so you can read it like sentences. When you are diagnosing, think on the ladder, then jump to the connection diagram only when you need to find the physical wire or terminal your ladder logic pointed at. You will hop between them constantly, and the diagram sheet usually prints them side by side for exactly that reason.

There is a third element on the sheet: **the legend**. It decodes every abbreviation (CC, OFM, HPS) and every symbol on that specific diagram. Manufacturers invent their own symbols and abbreviations, so the legend is not optional reading. More on that below.

Reading a ladder: rails, rungs, loads, and switches

Picture an actual ladder leaning against a wall.

The rails are the two vertical side pieces. On the diagram they represent the power supply. On the line voltage section, the rails are L1 and L2: the two legs of the 240 volt supply (you proved in F7 that 240 volt single phase arrives as two hot legs). On the control section, the rails are the transformer secondary: R (24 volt hot) and C (common). Every rail has the full supply voltage between it and the opposite rail, top to bottom.

The rungs are the horizontal steps. Each rung is one complete circuit: a path from one rail, through some stuff, to the other rail. Current flows across a rung the way you would walk across a bridge.

Everything on a rung is one of exactly two things, and telling them apart is the core literacy skill:

A load is anything that does work when current flows through it: a motor, a coil, a heater element, a light. A load consumes voltage. A healthy load that is running has the full rail to rail voltage across it.

A switch is anything that allows or interrupts current without doing work: a thermostat contact, a pressure switch, a limit switch, a set of relay contacts, a fuse. A healthy closed switch has essentially zero volts across it, because both sides are at the same electrical pressure. A switch only shows voltage across it when it is open. Burn that into memory: **voltage across a switch means the switch is open.** It is the single most useful sentence in electrical diagnosis.

One load per rung. This is the grammar rule of ladder diagrams. Each rung holds exactly one load, plus however many switches the designer put in series with it. Why only one? Because two loads in series would split the voltage between them (you proved this with series resistors in F7) and neither would get enough to work properly. When a designer wants two loads to run together, they get two parallel rungs, each receiving full rail voltage, often controlled by contacts from the same coil. So when you scan a strange ladder, count the rungs and you have counted the loads. Every rung answers one question: what single thing does this circuit run, and what has to close to run it?

Symbol literacy, patiently

You do not need to memorize every symbol ever drawn. You need a working vocabulary plus the habit of checking the legend. Here is the working vocabulary.

Switches. The basic switch symbol looks like a drawbridge: a contact point with a line angled away from it. Variations tell you what operates the switch. A thermostat switch adds a temperature hint (a curved bimetal or a circled T). A pressure switch sits on a half circle dome representing a diaphragm. A limit switch (a temperature safety that opens when something gets too hot) is drawn like the thermostat switch but lives in series with a load as a guard. Every switch is drawn in its normal, at-rest position: the state it sits in with the equipment off and nothing pushing on it. "Normally open" (NO) means open at rest. "Normally closed" (NC) means closed at rest. Safeties are almost always normally closed: they sit closed, letting the circuit work, and open only when something goes wrong.

Coils and contacts: the same device, two places on the page. This is the concept that unlocks ladder diagrams, so slow down here. A relay or contactor is physically one device, but electrically it is two separate things: a coil (a load, lives on the control voltage section) and contacts (switches, live wherever the controlled circuit is, usually the line voltage section). The diagram draws them in two different places because they are in two different circuits. They share a label so you can match them up: the circle marked CC is the compressor contactor coil down in the 24 volt section, and the contact sets marked CC up in the 240 volt section are the switches that coil pulls closed. When you see contacts in series with a line voltage load, your immediate move is: find the matching coil. Whatever controls that coil controls this load. That matching game, contacts up top, coil down below, is how the two halves of every ladder talk to each other.

Capacitors. Two parallel lines of equal length. From F8 you know run capacitors live in motor circuits to create the phase-shifted second winding current. On the diagram, the capacitor hangs off the motor with its terminals labeled (C, HERM, FAN on a dual run capacitor).

Motors. A circle, labeled: COMP (compressor), OFM (outdoor fan motor), IFM or BLWR (indoor fan motor). The diagram usually shows the motor's internal windings and where the capacitor connects.

Transformers. Two windings drawn facing each other, often with parallel lines between them representing the iron core. Primary side connects to line voltage, secondary side becomes the R and C rails of the control section. The transformer is the bridge between the two sections of the ladder, which is why it is usually drawn at the boundary.

Grounds. Three descending lines like a small pyramid. This marks where the circuit bonds to the equipment chassis and earth. On most residential equipment, C (common) is bonded to chassis ground. That fact has a practical payoff: you can park one meter probe on clean unpainted chassis metal and walk the other probe through the 24 volt circuit one-handed, which is both faster and safer.

The legend and wire colors

The legend (or key) is the dictionary printed on the diagram sheet. It expands every abbreviation, defines every symbol, and explains the line styles: solid lines are usually factory wiring, dashed lines are usually field-installed wiring or mechanical links. "Usually" is the operative word. Manufacturers do not all draw alike, which is exactly why the legend exists. Reading a diagram without the legend is reading a map without the key: you will guess, and some guesses will be expensive.

Wire colors follow the conventions in the Key Values table above: red R, yellow Y, green G, white W, blue or brown C, orange O. Conventions are useful, and you should follow them in your own work so the next tech can read it. But treat every existing wire color as a rumor until you verify where it lands at both ends. Houses get rewired by whoever had whatever wire on the truck that day.

Sequence of operation: walking a cooling call

Sequence of operation means the order in which things are supposed to happen when the equipment gets a call. The ladder diagram, read rung by rung, is the sequence of operation written down. Let us walk a cooling call through a basic split system condenser, the same circuit drawn in visual F9-2.

Standing state: 240 volts sits on L1 and L2. The transformer primary is fed, so 24 volts sits between R and C. The thermostat is satisfied, so Y is open. The contactor coil is de-energized, its contacts are open, and the compressor and condenser fan sit dark.

1. The home warms past the setpoint. Inside the thermostat, the cooling switch closes, connecting R to Y. The thermostat also closes R to G at the same time for the indoor blower.
2. The 24 volts on Y leaves the thermostat, travels to the condenser, and arrives at the contactor coil rung. But it does not go straight to the coil. The designer put the safeties in its path: the high pressure switch (HPS, normally closed, opens if head pressure goes dangerously high) and the low pressure switch (LPS, normally

closed, opens if the system loses charge). Both are closed on a healthy system, so the 24 volts passes through them like they are plain wire.

3. The 24 volts reaches the contactor coil CC and finds its way back to C through the other rail. Current flows through the coil. The coil becomes an electromagnet and pulls the contactor's contacts closed. You can hear it: that clunk at the condenser is this exact moment.
4. Up on the line voltage section, the now-closed CC contacts connect L1 and L2 through to the compressor rung and the condenser fan rung. Both motors receive 240 volts in parallel, each through its run capacitor, and both start.
5. Meanwhile indoors, G energized the blower relay (or board input) and the indoor blower is moving air across the indoor coil.
6. The home cools to setpoint. The thermostat opens Y. The coil de-energizes, spring pressure throws the contacts open, and the compressor and fan stop.

Read that walk again and notice what you just did: you predicted the voltage at every point of a healthy system. That is Step 3 of the four-step method. Diagnosis is just noticing where reality stops matching this walk.

Sequence of operation: a gas furnace heat call

Now a heat call, because furnaces add a twist: a control board runs the sequence on a timer with safety proofs, instead of one coil doing one thing. The integrated furnace control board (IFC) is the brain that sequences everything below.

1. Thermostat closes R to W. The 24 volt signal arrives at the W terminal of the furnace board.
2. The board checks its normally closed safeties first: the limit switch (opens if the furnace overheats) and the rollout switches (open if flame escapes the burner box). Closed safeties mean permission to proceed.
3. The board starts the **inducer motor** (the small fan that pulls combustion air through the furnace and pushes exhaust out the vent). Note the order: inducer first, before any gas, every time.
4. The inducer builds suction, which closes the **pressure switch** (normally open, closes only when the inducer proves real draft). This is the furnace proving to itself that the vent path works before lighting anything.
5. With draft proven, the board powers the **igniter** (hot surface igniter glows orange) and after a warmup delay opens the **gas valve**.
6. Gas lights. The **flame sensor** confirms flame within a few seconds; no confirmation and the board slams the gas valve shut and retries or locks out.
7. After a heat exchanger warmup delay (30 to 60 seconds typically), the board starts the **indoor blower** on heat speed. Warm air moves.
8. Thermostat satisfies, W opens, gas valve closes immediately, inducer runs a post-purge, and the blower runs an off-delay to harvest the remaining heat from the exchanger.

On the diagram, every one of those devices is on the page: the inducer and blower as loads, the pressure switch and limit and rollouts as switches, and the board drawn as a rectangle with labeled terminals. Which brings us to the modern complication.

How boards changed diagrams, and what survived

Older equipment did all its logic with discrete relays: every decision was a coil and contacts you could point at. Modern equipment moved most of that logic inside circuit boards: the integrated furnace control in furnaces, the defrost board in heat pumps. On the diagram, a board appears as a rectangle with terminals around its edge, and the rectangle is a black box: you cannot see the rungs inside it.

Here is the part that keeps you employed: **the ladder logic survived, it just moved inside the plastic.** A board is, electrically, an assembly that at the appropriate time completes a circuit from R to whichever coil or load it decides should run. The inputs (W, Y, G, pressure switch, limit) and the outputs (inducer, igniter, gas valve, blower) are still on the printed ladder. You diagnose a board exactly like a relay you cannot open: confirm the board is fed (24 volts at R and C terminals), confirm the inputs are asking correctly, then check whether the outputs respond. Input good plus output dead equals bad board. Input missing means the problem is upstream of the board, and the board is innocent. Most "bad board" misdiagnoses are really a missing input that nobody checked.

The four-step schematic diagnosis method

Here is the spine of this module and of every electrical diagnosis you will ever perform. Memorize it word for word.

Step 1, identify the failed load. Name the one component that is not doing its job. Not the symptom ("no cool"), the load (condenser fan motor not spinning). Everything else in the method hangs off this name, so be exact.

Step 2, find its rung and every switch that feeds it. Put your finger on the failed load on the ladder diagram. Trace its rung from rail to rail. List every switch in that path: contacts, safeties, fuses, disconnects. If any of those contacts belong to a coil, find the coil's rung and list its switches too. You now hold the complete list of everything that could possibly be keeping this load dark. Nothing off this list can be the fault.

Step 3, predict what should be present at each point. Before the meter comes out, commit to predictions: rail to rail voltage at the source, that same voltage across the load if everything feeding it is closed, zero volts across every closed switch, supply voltage across any open switch. Write them down or say them out loud. A measurement only means something compared to a prediction.

Step 4, measure along the rung until the prediction breaks. The break is the fault. Park one probe at a fixed reference (the far rail, or chassis ground on the 24 volt side since common is bonded to chassis) and walk the other probe along the rung, point to point, in order. Every reading either matches your prediction or it does not. The first mismatch locates the fault between the last good point and the dead point. You are done guessing; the fault has an address.

Worked example: condenser fan not running

The call: cooling poorly. At the condenser, the compressor is humming but the fan blade is still. Diagram open, method on.

Step 1, identify the failed load. The condenser fan motor, OFM. Not "the unit." The compressor runs, so plenty of the system is alive. One load is dead: OFM.

Step 2, find its rung and every switch that feeds it. On the ladder: L1, through contactor contacts CC, through the fan windings (with the run capacitor across its start winding), back to L2. Switches feeding it: the CC contacts. Those contacts belong to the CC coil, whose rung is R, through the thermostat Y switch, through HPS and LPS, through the coil, to C. That is the complete suspect list: supply, CC contacts, run capacitor, the motor itself, and (for the coil side) thermostat, safeties, coil.

Step 3, predict. The compressor is running, which is a gift: the compressor runs through the same contactor. So the coil rung must be working and the contacts must be closed. Predictions: 240 volts L1 to L2, 240 volts across the compressor (it is running, confirmed), 240 volts across the OFM terminals, near zero volts across the CC contacts.

Step 4, measure until the prediction breaks. Meter across the OFM leads: 240 volts. The prediction held, and that is the break right there, because a load with full voltage across it that is not running has nothing left to blame but itself or its capacitor. Voltage applied to a load means current should flow; if it does not, the load path is broken internally. Pull the disconnect, discharge and test the run capacitor (F8 procedure). Capacitor reads 2 microfarads on a 7.5 microfarad label: failed capacitor. Replace, restore power, fan spins.

Notice what did not happen: nobody replaced the fan motor on a hunch, nobody condemned the board, nobody pulled wires to look for problems. Four steps, one meter, one cheap part, and the diagram told you where to stand the whole time. And notice the counterfactual: if the meter had read 0 volts across the OFM with 240 at the rails, the fault would have been upstream in the contacts or wiring, and replacing the capacitor or the motor would have fixed nothing. The measurement, against the prediction, is the diagnosis.

> **IB STANDARD**
>
> The diagram photo and panel photo from the start of the call get attached to the ServiceTitan job before wiring is touched, and the failed component reading (the 2 microfarad capacitor measurement in this example) gets photographed next to its label and attached as well. The job record should let another tech retrace your whole diagnosis without calling you.

Common Mistakes

Tracing wires instead of logic. New techs grab a wire at the contactor and try to follow it physically through the loom with their fingers. That is connection-diagram thinking applied to a logic problem, and in a packed panel it fails fast. Find the load on the ladder, read its rung, and let the logic tell you which two points to measure. The meter walks the circuit so your fingers do not have to.

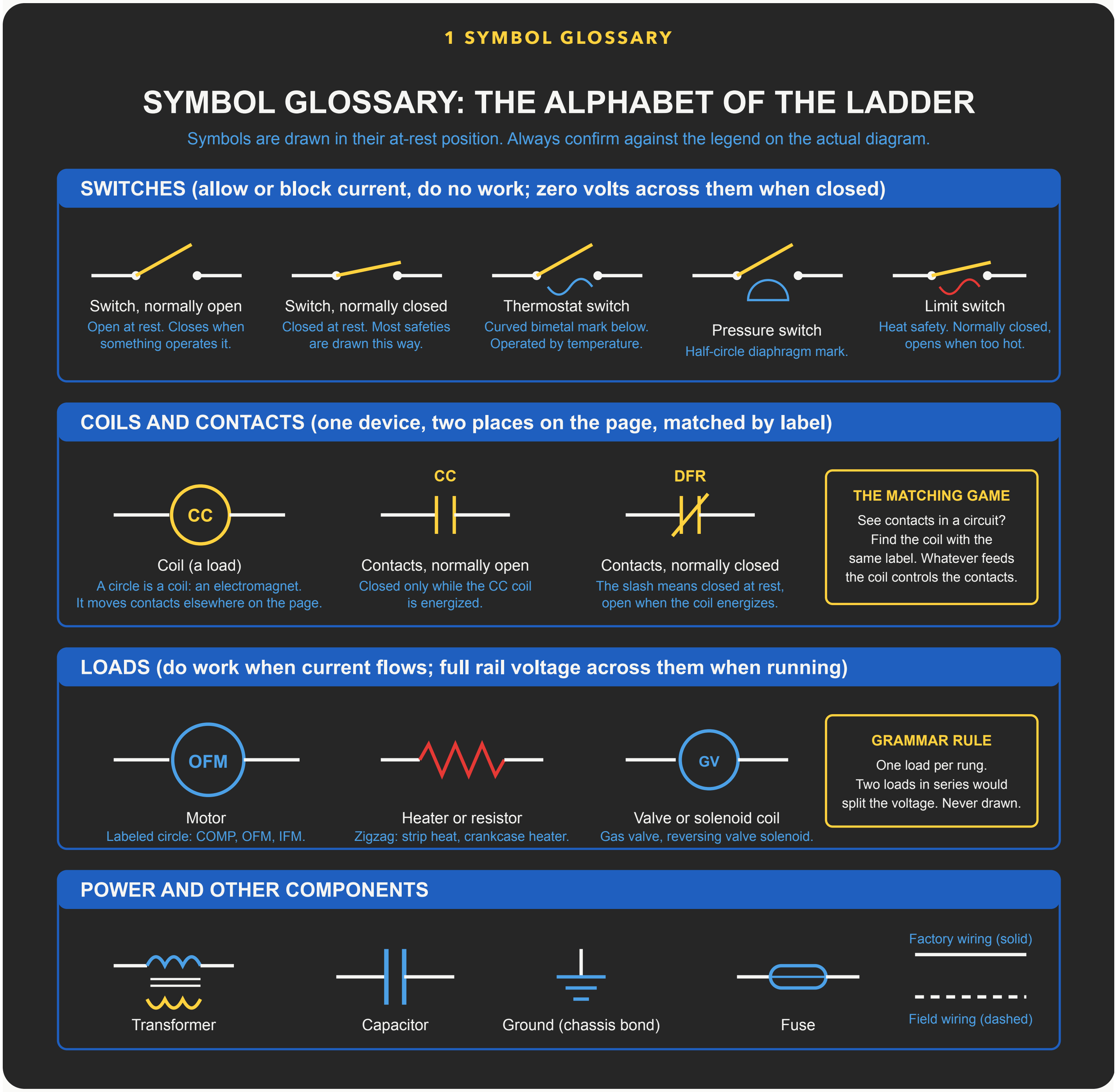
Trusting wire colors. The yellow wire is Y until somebody in 2009 ran out of yellow. Color is a hint; the terminal is the truth. Verify where a wire lands at both ends before building any conclusion on its color.

Ignoring the legend. Symbols and abbreviations are not universal. The five minutes you save skipping the legend becomes an hour chasing a component that the abbreviation did not mean. Read the legend first on every unfamiliar diagram.

Replacing the load when a series safety is open. A dead compressor with an open high pressure switch upstream is not a dead compressor. Every switch in series with a load can make that load look failed. This is exactly why Step 2 exists: list every switch feeding the load before you judge the load. Voltage across a switch means the switch is open; find out why it opened before you spend the customer's money on the part it was protecting.

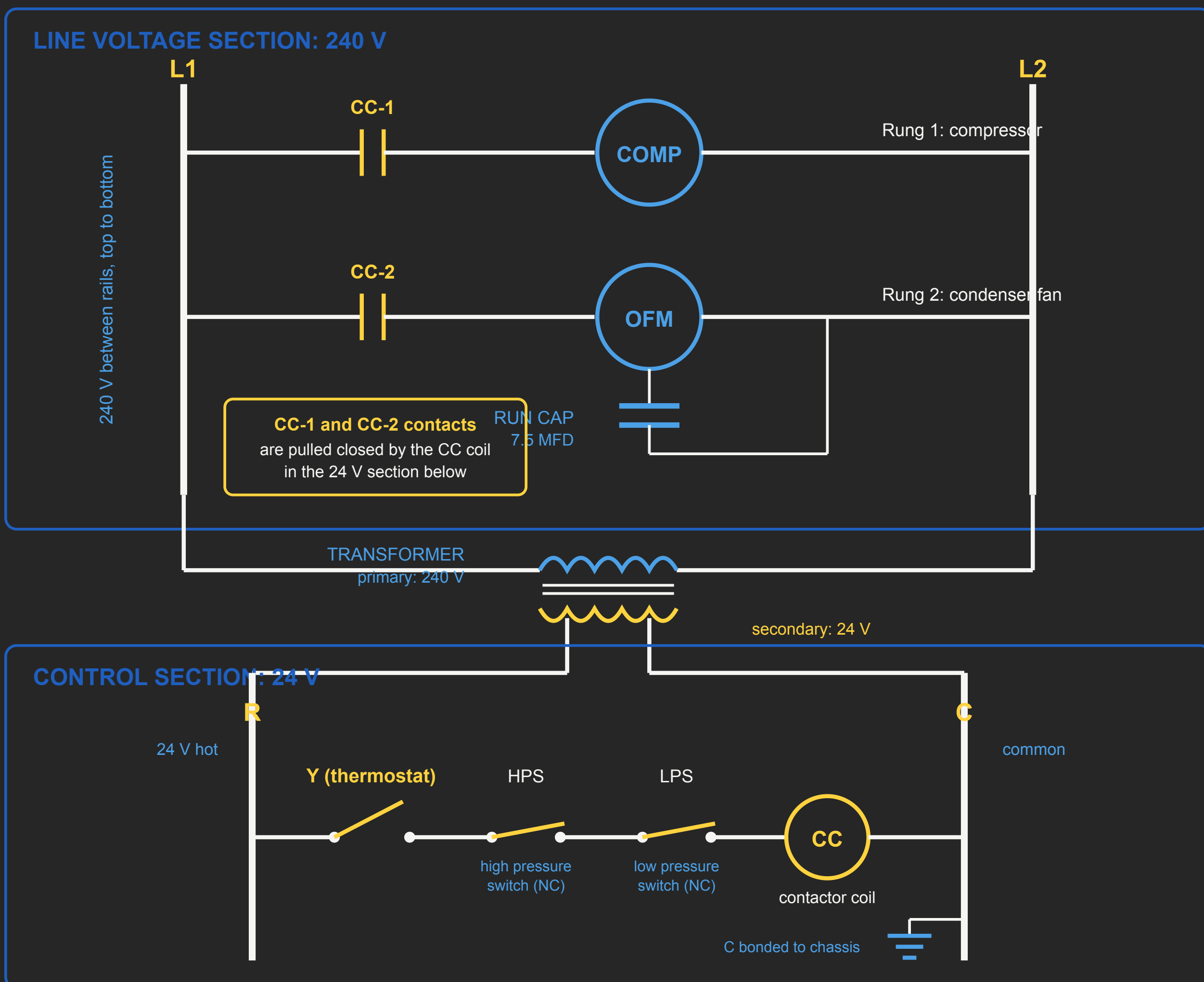
Losing your place. Diagrams are dense and panels are hot. The fix is physical: keep a finger (or a pencil tip) on the diagram at the exact point your meter probe is touching in the machine. One point on paper, one point in copper, always paired. The moment your finger and your probe are at different places, stop and re-sync. Every wrong conclusion starts with a reading assigned to the wrong point on the map.

Module Visuals



A COMPLETE CONDENSER LADDER DIAGRAM

Rails carry power. Each rung is one circuit. One load per rung, plus the switches that control it.

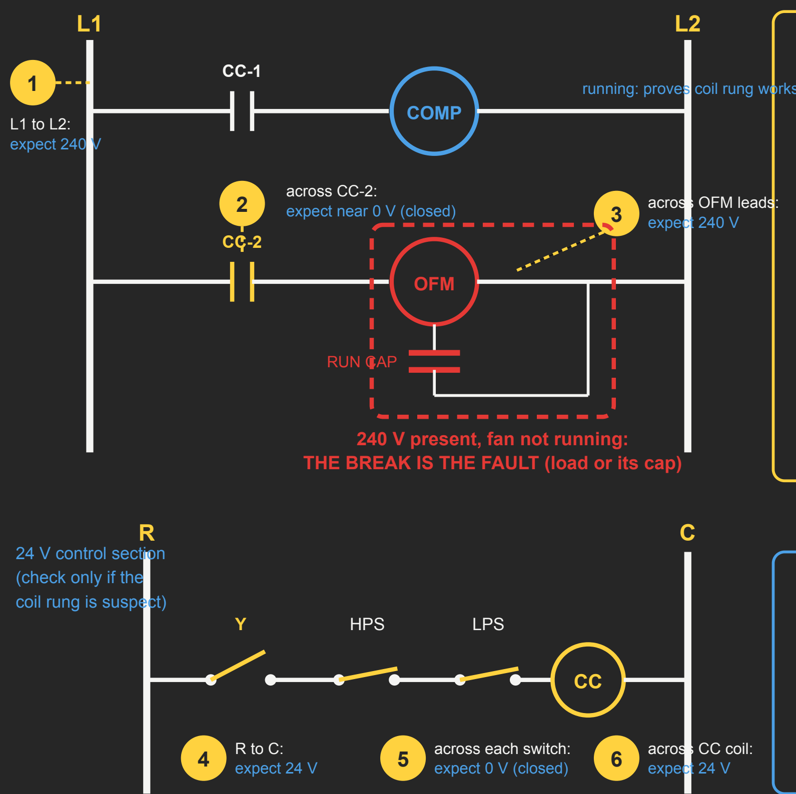


SEQUENCE OF A COOLING CALL:

Thermostat closes Y. 24 V crosses HPS and LPS (both closed), energizes the CC coil. CC-1 and CC-2 pull closed. COMP and OFM get 240 V in parallel and

THE FOUR-STEP METHOD: CONDENSER FAN NOT RUNNING

Compressor runs, fan does not. Numbered points show the measurement walk and the prediction at each point.



THE FOUR-STEP SCHEMATIC DIAGNOSIS METHOD

Step 1: Identify the failed load.
Here: OFM, the condenser fan motor.

Step 2: Find its rung and every switch that feeds it.
CC-2 contacts, plus the coil rung: Y, HPS, LPS, CC coil.

Step 3: Predict what should be present at each point.
Predictions listed at each number.

Step 4: Measure along the rung until the prediction breaks.
The break is the fault.

IN THIS CALL

The compressor runs through the same contactor, so points 4, 5, 6 are already proven good. The walk is 1, 2, 3.

Point 3 reads 240 V with a dead fan: voltage applied, no current flowing.
Kill power, test the run capacitor.

METER HABIT

Park one probe on a fixed reference (the far rail, or chassis on the 24 V side, since C is bonded to chassis).
Walk the other probe point to point in numbered order. Compare every reading to the prediction before moving on.
Voltage across a switch means the switch is open. Voltage across a load that is not running means the load path is broken.

SAY IT WITH THE MODULE

Step 1, identify the failed load. Step 2, find its rung and every switch that feeds it. Step 3, predict what should be present at each point. Step 4, measure along the rung until the prediction breaks. The break is the fault.

4 THERMOSTAT TERMINALS

THERMOSTAT TERMINAL MAP

The thermostat is just a switch panel. Each terminal connects 24 V from R to one job.

Wire colors are a convention, not a law. The terminal is the truth. Verify at both ends.

THERMOSTAT
terminal strip

- **R** — **24 V hot from the transformer**
  The power source every other terminal switches. Usually a red wire.
- **Rc / Rh** — **Split 24 V hot: cooling side / heating side**
  Used when separate transformers power cooling and heating. Jumpered together on single-transformer systems.
- **C** — **Common: the return path to the transformer**
  Energizes nothing. Completes every circuit and powers the stat itself. Usually blue or brown.
- **Y** — **Cooling, stage 1**
  Energizes the contactor coil outside → **CC COIL** (comp + fan start)
- **Y2** — **Cooling, stage 2**
  Second compressor stage or high speed on two-stage equipment.
- **G** — **Fan**
  Energizes the indoor blower relay or board input → **BLOWER** (indoor air moves)
- **W** — **Heat, stage 1**
  Furnace board W input or electric heat sequencer → **FURNACE** (ignition sequence)
- **W2** — **Heat, stage 2**
  High fire on a two-stage furnace, or auxiliary strip heat on a heat pump.
- **O/B** — **Reversing valve signal (heat pumps only)**
  O energizes the valve in cooling (most brands). B energizes in heating (a few brands).
  Configured wrong, the system heats on a cooling call.

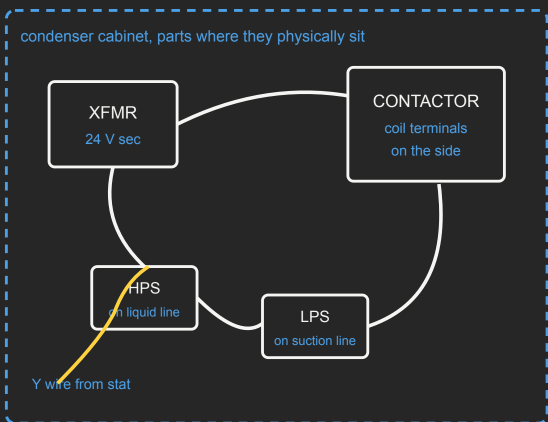
Cooling call on a standard split: R closes to Y and G together. Y pulls the contactor outside, G runs the blower inside. C carries everything home.

5 PICTORIAL VS LADDER

ONE CIRCUIT, TWO DRAWINGS

The contactor coil circuit drawn both ways. Same wires, same parts, different purpose.

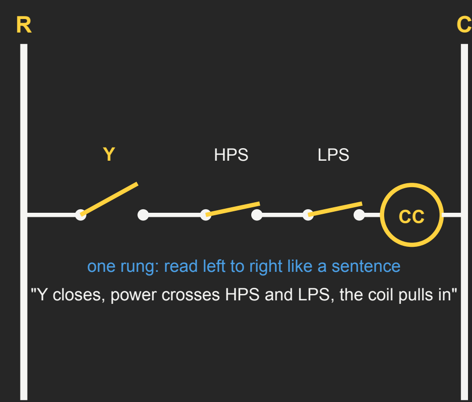
CONNECTION DIAGRAM (PICTORIAL)



Answers: where does this wire physically go?

Drawn by location. Good for installing and landing wires.

LADDER DIAGRAM (SCHEMATIC)



Answers: what has to happen for this load to run?

Drawn by logic. The tool of thought. Diagnose here.

Work both: think on the ladder to find the fault, then jump to the connection diagram to find the physical wire and terminal.