



COFFEE | ONE ROAST AT A TIME

GENE CAFÉ CBR-301

# OWNER'S FIELD GUIDE

An independent, practical guide built from real roasts,  
machine records and owner experience.

VERSION 1.0 • FIRST EDITION • AUGUST 2026

Written by Warren Matthews • Coffee | One Roast at a Time

# GENE CAFÉ CBR-301 OWNER'S FIELD GUIDE

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Written, photographed and compiled by Warren Matthews

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## Independent publication

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## Use and safety

Use the official manual supplied with your machine as the authority for safety, electrical, warranty and service instructions. This guide records practical owner experience and does not replace manufacturer guidance or qualified technical advice.

## Photography, diagrams and records

Unless a caption states otherwise, the photographs, diagrams and roast records were created within the Coffee | One Roast at a Time project. Cover artwork supplied by the author.

*Corrections and evidence updates should identify the guide version, section number and the source or observation supporting the change.*

# Front Matter

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## F.1 Welcome to the Field Guide

I wrote this because I stood at my CBR-301 more times than I can count, unsure whether what I was watching was normal, useful or a sign that I had missed something. The manual tells you how to operate the machine. It cannot tell you what your coffee will look, sound or smell like, or which clues will matter most when the roast is under way.

This guide sits alongside Gene Café's instructions rather than replacing them. It is built from real roasts, real mistakes, repairs, app records and the notes I kept while learning the machine. I am not offering one perfect profile. I am offering the practical understanding I wish I had when I started.

Read the safety and setup sections first. After that, use the guide as a companion rather than a punishment to be endured cover to cover, unless caffeine-induced insomnia has left you unusually ambitious.

My basic method is simple: set the roaster up carefully, observe what happens, write it down while it is fresh, taste the coffee and change one sensible thing next time. The rest of this guide is there to make that loop less lonely and less dependent on guesswork.

**About to roast for the first time?** Go straight to Appendix A for the quick-start sequence, then return to the fuller explanations when you need them.

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## F.2 How Evidence Is Handled

I keep four kinds of information separate. This is not to make the guide feel academic; it stops a useful observation from quietly turning into a universal fact.

- Gene Café guidance: what the manufacturer documents.
- Field observation: what happened on my machine or in a particular roast.
- Working interpretation: my best explanation of that observation, which may change as better evidence arrives.
- Open question: something I do not yet know well enough to answer honestly.

The detailed evidence identifiers are kept in Appendix K rather than interrupting the main text. Where the manual, the app, my observation and my interpretation differ, I try to say which is which.

## F.3 Safety, Responsibility and Scope

Read and follow the manual supplied with your own CBR-301. Check the rating plate, use the correct regional electrical supply and follow Gene Café's current safety, service and error guidance. A manual written for one voltage or market does not automatically apply to another.

This guide is about normal owner use: setup, cleaning, records, observation and the practical decisions made during a roast. It is not permission to carry out electrical work, bypass a safety function or attempt an internal repair you are not qualified to perform.

Coffee roasting involves high heat, hot glass and metal, smoke, chaff and combustible material. Stay with the machine, keep its air and chaff routes clear, and stop when something is outside the normal checks you can make safely.

## F.4 Quick Navigation

**Need to roast now?** Use Appendix A first. It gives the short operating sequence and the main temperature prompts without asking you to read the whole guide.

**Want to understand the machine?** Read Part One, then use Part Two for setup and Part Three for the normal operating sequence.

Part Four explains the app graph, temperature milestones, colour, aroma, smoke, first crack, total roast time and cooling. Part Five turns those observations into a repeatable method.

Cleaning, a warning or an error? Go to Part Six. Part Seven contains real-roast lessons. Part Eight covers optional tools, open questions and the approach that has helped me learn without getting swallowed by coffee theatre.

Sections ending in D are optional Deep Dives. Sections ending in R are short practical resources. The numbering remains stable even when the text develops.

Have a specific roasting question? Use the Roast Questions Index on the next page to jump straight to the relevant section.

## Roast Questions Index

Use this as a question-led shortcut. The section references are clickable in Word; the numbering also remains useful in printed or PDF copies.

| Question                                                     | Go to                                                                                                                                       |
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| I have just unboxed the machine. Where do I start?           | <a href="#">Appendix A Quick Start</a> ; <a href="#">2.6 Before Every Roast</a> ; <a href="#">3.3 A Complete Roast from Start to Finish</a> |
| What settings can I use as a first-roast reference?          | <a href="#">A first-roast starting reference</a> ; <a href="#">5.1 Establishing a Reference Roast</a>                                       |
| How much coffee can I load?                                  | <a href="#">1.1 The CBR-301 in Plain English</a> ; <a href="#">5.4 Batch Size and Chamber Loading</a>                                       |
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| What do TIME and TEMP actually do?                           | <a href="#">1.3 What the Controls Actually Control</a> ; <a href="#">3.1 Front-Panel Controls</a>                                           |
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| What does the Gene Café app add?                             | <a href="#">3.2 The Gene Café App</a>                                                                                                       |
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| What is TRT and why does it matter?                          | <a href="#">4.8 TRT, Weight Loss and Colour</a> ; <a href="#">4.1D Comparing Roasts with TRT and Milestones</a>                             |
| How do I cool the coffee and the machine?                    | <a href="#">3.5 Cooling Is Part of the Roast</a>                                                                                            |
| Can I use an external bean cooler?                           | <a href="#">3.5 Cooling Is Part of the Roast</a>                                                                                            |
| What should I record during a roast?                         | <a href="#">3.6 Completing the Roast Record</a> ; <a href="#">5.2R Roast Log</a> ; <a href="#">Appendix E Printable Roast Log</a>           |
| How do I compare two roasts?                                 | <a href="#">4.1D Comparing Roasts with TRT and Milestones</a> ; <a href="#">5.3 Change One Thing at a Time</a>                              |

| Question                                                    | Go to                                                                                                                                                          |
|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| How do I calculate weight loss?                             | <a href="#">4.8R Weight-Loss Calculator</a> ; <a href="#">Appendix F Weight-Loss Guide</a>                                                                     |
| How should I taste or cup the result?                       | <a href="#">5.7 Closing the Loop with the Cup</a>                                                                                                              |
| Why did the fan move to level 3?                            | <a href="#">4.5 Fan and Drum-Speed Changes</a>                                                                                                                 |
| What should I do about smoke or heavy chaff?                | <a href="#">2.3 Ventilation and Smoke Management</a> ; <a href="#">4.6 Chaff, Smoke and Processing Method</a> ; <a href="#">6.3 Troubleshooting by Symptom</a> |
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| I have an error code. What now?                             | <a href="#">6.4 Error Messages and Immediate Action</a> ; <a href="#">Appendix D Troubleshooting and Error Reference</a>                                       |
| When should I stop using the machine?                       | <a href="#">6.5 When to Stop Using the Machine</a>                                                                                                             |
| How do I export or analyse a saved JSON roast?              | <a href="#">8.3D.1 Understanding and Analysing Gene Café JSON</a>                                                                                              |
| What are RoastSignal, RoastAid and the other project tools? | <a href="#">8.3 Where the Owner Can Go Next</a> ; <a href="#">8.3D The Advanced Owner's Toolkit</a>                                                            |

# Part One: Understanding the Machine

## 1.1 The CBR-301 in Plain English

The Gene Café CBR-301 is an indirect hot-air coffee roaster built around a glass chamber that rotates off-axis. Hot air passes through the moving coffee and carries the chaff out into the chaff tray. The glass chamber gives you an unusually clear view of the roast, which is honestly one of the things I still enjoy most about it.

The front panel is simple: TIME powers the machine and sets the planned duration; TEMP sets the target temperature and starts roasting or cooling. The optional app connects over Bluetooth, shows elapsed time and displayed temperature, allows a few additional settings, and saves the roast afterwards.

The machine can roast up to 300 g of green coffee. For naturally processed coffees, often shortened to “naturals,” Gene Café gives a lower maximum of 240 g. “Natural” describes how the coffee was processed after harvest; it is not a roast style. These are capacity limits, not a promise that every coffee will behave well at the maximum.

The CBR-301 also has automatic cooling and protective behaviour. It can enter cooling when the set time is reached, when a required temperature prompt is not acknowledged, or when you start cooling yourself. The fan can also move automatically to level 3 during a detected overheat condition. These changes are part of normal operation unless the machine also shows a fault.

The machine is easy to misunderstand because the graph and adjustable settings look more like a profile system than they really are, and it took me longer than I'd like to admit to stop treating it as one. The app does not drive the roaster along a saved curve, and the displayed temperature is not bean temperature. That is not a criticism of the machine or the app. It simply tells you where the useful information really comes from.

**Set the roast up sensibly, then observe rather than fiddle. Record what happened, taste the coffee and iterate.**

In practice, total roast time, a clearly heard first crack plus development time, the machine's temperature milestones, finished weight loss and the cup have been more useful to me than trying to decode every bend in the app graph.

## 1.2 Machine Anatomy and Airflow Path

You do not need an engineering-level knowledge of the CBR-301. You do need to recognise the parts that affect loading, airflow, chaff removal, cooling and safe handling.

### The Parts You Handle

- Main body: contains the heater, fans, drive and controls.
- Glass chamber and chamber lid: used for loading, roasting and emptying.
- Chamber stand: supports the chamber when it is off the machine.
- Release button and handle: used to remove the chamber.
- Chamber cover: closes over the fitted chamber.
- Chaff tray or chaff box: collects material separated during roasting.
- Vent-pipe connector: the 75 mm outlet used to direct roasting exhaust outside.
- TEMP and TIME controls with their shared display.

### The Practical Air Path

Looking from the front, outside air enters through the fan on the right-hand side. The fan pushes it through the heater and the inlet manifold, where the heater-side temperature sensor sits before the roasting chamber. The heated air then travels through the rotating coffee from right to left. After

leaving the chamber, it passes the exhaust-side temperature sensor, enters the sealed chaff box, passes through its mesh and leaves through the top exhaust connection.

1. Outside air enters the fan on the right-hand side.
2. The fan pushes the air through the heater and inlet manifold.
3. The heated air passes the heater-side sensor and enters the rotating chamber.
4. Air travels through the coffee from right to left, then passes the exhaust-side sensor.
5. The air enters the sealed chaff box, passes through the mesh and exits through the top vent connection.

### Where the Temperature Sensors Sit

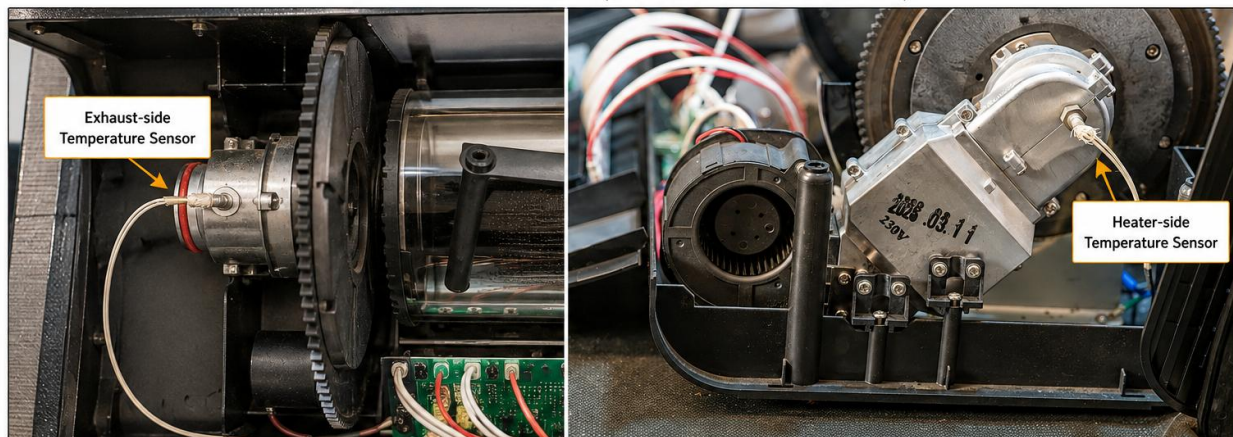
The supplied manuals do not show the internal sensor positions, but I have seen them directly while replacing heaters. On the project machine there is a sensing point at the heater outlet, before hot air enters the chamber, and another on the exhaust side where air leaves the chamber.

Knowing those locations is useful, but it does not turn the displayed value into bean temperature. It also does not reveal how the controller filters the readings or uses them internally.

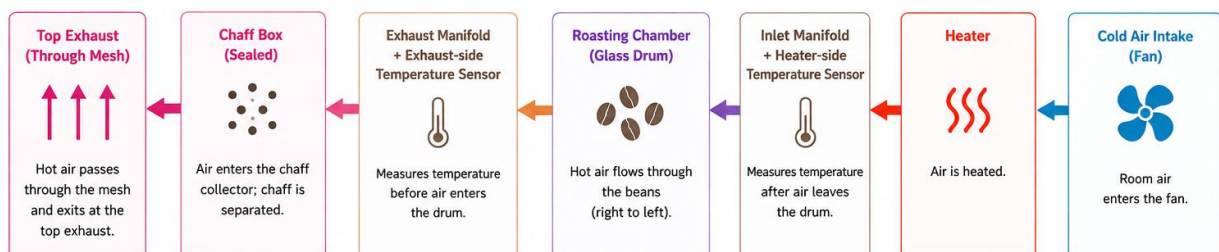
### What to Check Before Roasting

- The chamber is seated and cannot lift out.
- The chamber lid and outer cover are closed.
- The fan intake and chamber-cover intake are clear.
- The chamber inlet, outlet and chaff path are not visibly obstructed.
- The chaff tray is fitted and empty enough to use.
- Any external exhaust connection is secure and free-flowing.

#### 1. Sensor Locations (Photos – No Additions)



#### 2. Logical Airflow Path (Right to Left)



**Figure 1. Observed sensor locations and simplified airflow path. The photographs identify the heater-side temperature sensor before the roasting chamber and the exhaust-side temperature sensor after it. The logical diagram shows air moving from right to left through the fan, heater, chamber, sealed chaff box and top exhaust.**

## 1.3 What the Controls Actually Control

The CBR-301 gives you useful controls, but it helps to be clear about what each one changes, and what it does not decide for you.

### Front-panel controls

**TIME:** Sets the planned roast duration. When that time expires, cooling starts automatically. TIME does not tell you when the coffee is ready; I normally set it longer than I expect to need and start cooling myself.

**TEMP:** Sets the machine's target or ceiling temperature. Pressing it starts roasting or cooling. It is not a direct bean-temperature control.

### App controls and records

**Fan level:** The app offers levels 1, 2 and 3. Level 2 is the normal default; cooling and overheat protection can force level 3. The number is not a published airflow measurement.

**Drum rotation speed:** The app offers three levels, again with level 2 as the normal default. Cooling forces level 3. The app does not publish RPM or promise a particular flavour effect.

**Automatic end mode:** The app can use time or temperature as the automatic end condition. It still cannot judge colour, smell, sound or whether the coffee has reached the result you want.

**First- and second-crack buttons:** These create manual time markers when you press them. They do not listen for crack and they do not confirm that you identified the sound correctly.

**App graph and saved roast:** The graph shows elapsed time, displayed temperature and recorded settings. The saved record can also include notes and photographs. A previous graph is a reference, not a profile that instructs the roaster.

The full front-panel sequence is in 3.1. The practical rule is simpler: leave the controls alone unless you have a reason to change them, and write down any change you do make.

### A Few Terms Before We Go Further

- **Displayed temperature:** the machine value shown on the front panel and app. It is not bean temperature.
- **Target temperature:** the upper temperature setting you choose for the machine.
- **App graph or temperature trace:** the line showing displayed temperature against elapsed roast time.
- **TRT:** total roast time, from the start of roasting to the point at which cooling begins.
- **First crack:** popping activity from the coffee. On the CBR-301 it may be clear, uncertain or impossible to hear.
- **Natural coffee:** coffee processed with the fruit dried around the seed; Gene Café gives these coffees a lower maximum batch size.
- **D section:** an optional Deep Dive. You do not need it for normal operation.
- **R section:** a short practical resource, such as a checklist or calculator.

## 1.4 A Practical Operating Model

The most useful way I have found to think about the CBR-301 is this: you set an upper temperature target, rather than programming a bean-temperature curve. You choose the coffee, batch, starting condition, target, time and finish point. The machine decides how it manages its heater and protective behaviour within that framework.

In this guide, I call that the thermal-ceiling model. In practice, it means setting the operating boundaries, staying with the roast, observing the coffee and deciding when to cool.

I sometimes describe the approach as set and forget, but that needs one important translation. Set the controls and stop fiddling with them. Do not leave the room. Stay with the roaster and observe.

A practical roast has five parts:

1. Coffee and batch size: different coffees and loads do not behave identically.
2. Starting state: a cold machine and one carrying residual heat are different starting points.  
Intentional preheating is not recommended by Gene Café.
3. Settings: target time, target temperature and any app settings define the machine's operating boundaries.
4. Finish decision: total roast time, a confidently heard first crack plus development time, colour, aroma, smoke and previous experience all contribute.
5. Result: cooled colour, roasted weight, weight loss and the cup tell you what the roast actually produced.

The app graph is a high-level visual reference. I use it to see that the roast is progressing normally and to place events in time. I do not use every small movement in the line as an instruction to intervene.

Repeatability comes from comparing like with like: the same coffee and load, a known starting state, the same broad settings, total roast time, milestone times, finished weight loss and a later brewing result.

## 1.4D Testing the Thermal-Ceiling Model

### *Optional deep dive*

The thermal-ceiling model is a working way of understanding the machine, not a manufacturer description of its firmware. The most useful test is not to stare harder at the curve. It is to compare repeated roasts using information the machine and the coffee can actually give you.

For each comparison, keep the coffee, load and starting state as stable as practical and record:

- Starting displayed temperature and whether the machine was cold or carrying residual heat.
- Selected time and target temperature.
- Times at the 200°C (392°F) and 230°C (446°F) prompts, plus any later milestones you use consistently.
- Total roast time and the reason cooling began.
- First-crack time and confidence, where it was genuinely heard.
- Roasted weight, weight loss, cooled appearance and brewing result.

If those anchors remain reasonably repeatable while small graph movements vary, that is more useful than claiming to know every heater decision. Duplicate exports and mixed machine eras still need to be excluded from like-for-like analysis.

The model remains provisional. It describes observed behaviour well enough to organise a roast, but it does not reveal the controller algorithm or make the app graph a bean-temperature profile.

## 1.5 What the Temperature Display Represents

The manual calls the changing value the current temperature. The front panel alternates between current and target temperature, and the app plots a temperature line against elapsed time. Exported JSON records the value as `current_temp`. I've learned to read all three the same way, as one changing number, not three different truths.

Direct inspection during heater replacement identified two sensor locations on the project machine: one at the heater outlet and one at the exhaust side. The manual does not explain which reading is shown at each moment, how the values are filtered or how the controller uses them.

For that reason, I use the term displayed temperature throughout this guide. It is an air-path or machine reference, not the temperature at the centre of the beans.

The displayed temperature is useful for:

- Checking that the machine is heating in a familiar way.
- Recording the 200°C (392°F) and 230°C (446°F) prompts.
- Comparing broad milestone timing between similar roasts.
- Placing fan changes, crack notes and cooling against elapsed time.

- Spotting a roast that is behaving very differently from a genuine reference.

It does not tell you the exact bean temperature, and a small change in slope does not reveal heater power, internal control logic or a guaranteed flavour outcome. Combine it with time, colour, aroma, smoke, sound, weight loss and the cup.

## 1.5D Sensors, Telemetry and Measurement Limits

### *Optional deep dive*

The CBR-301 gives you more information than a simple kitchen timer, but less than an instrumented commercial roaster. I've found that middle ground perfectly usable once I keep the known and unknown parts separate in my own head.

### **Known**

- The project machine has a sensor at the heater outlet and another at the exhaust side.
- The front panel and app display a changing machine-temperature value.
- The app records `current_time`, `current_temp`, `fan_speed`, `stirring_strength` and manual crack markers in the observed JSON format.
- Fan and drum values are levels, not published physical units.

### **Still not established**

- Which sensor or calculation supplies each displayed value.
- Sampling and filtering before the value reaches the display or JSON.
- The app also labels a second display  $\Delta ET$ . In plain English, it appears intended to show how quickly the displayed temperature is changing, but Gene Café does not document the exact calculation.
- Internal heater commands and control logic.
- Whether every app version exports exactly the same schema or retains the full cooling tail.

Use the data as a consistent record of what the machine reported. Do not rename it bean temperature or treat the app's graph as a validated rate-of-rise profile.

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## Part Two: Safe Setup and Preparation

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### 2.1 Core Safety Principles

The CBR-301 is a hot appliance handling combustible material, and I treat it that way on every single roast, however many I've done. Use it indoors on a stable, level surface with clear airflow, suitable ventilation and your full attention throughout the roast. Do not use it outdoors, block its openings or leave it unattended. Keep children, pets and flammable material away from the hot outlet.

Use the chamber, cover and chaff tray as intended. No improvised substitutes, and nothing foreign in the machine.

I keep a fire extinguisher within reach every time I roast, no exceptions. If you see fire, electrical damage, an abnormal burning smell or a problem outside the normal visible checks, stop and use the manufacturer's service guidance rather than experimenting with another roast.

I don't preheat the CBR-301 intentionally, and Gene Café backs that up: a separate warm-up is unnecessary and may reduce durability.

### 2.2 Choosing the Roasting Location

I choose a stable, level indoor location where I can stay with the roaster from start to finish. It needs a well-ventilated setting, an unobstructed fan intake and a clear route for the heat, chaff and smoke leaving the machine.

Keep the outlet away from flammable material and make sure nobody can touch hot parts or interfere with the chamber while it's running. Use the CBR-301 only where the power supply matches the rating for your specific machine.

The supplied manuals don't set a minimum clearance distance, prescribe a room layout or specify a universal ventilation installation, and I'm not going to invent those numbers for you. What I do instead is make sure the machine's openings and the path to any external exhaust stay clear, and that I can see the whole roast from wherever I'm standing.

### 2.3 Ventilation and Smoke Management

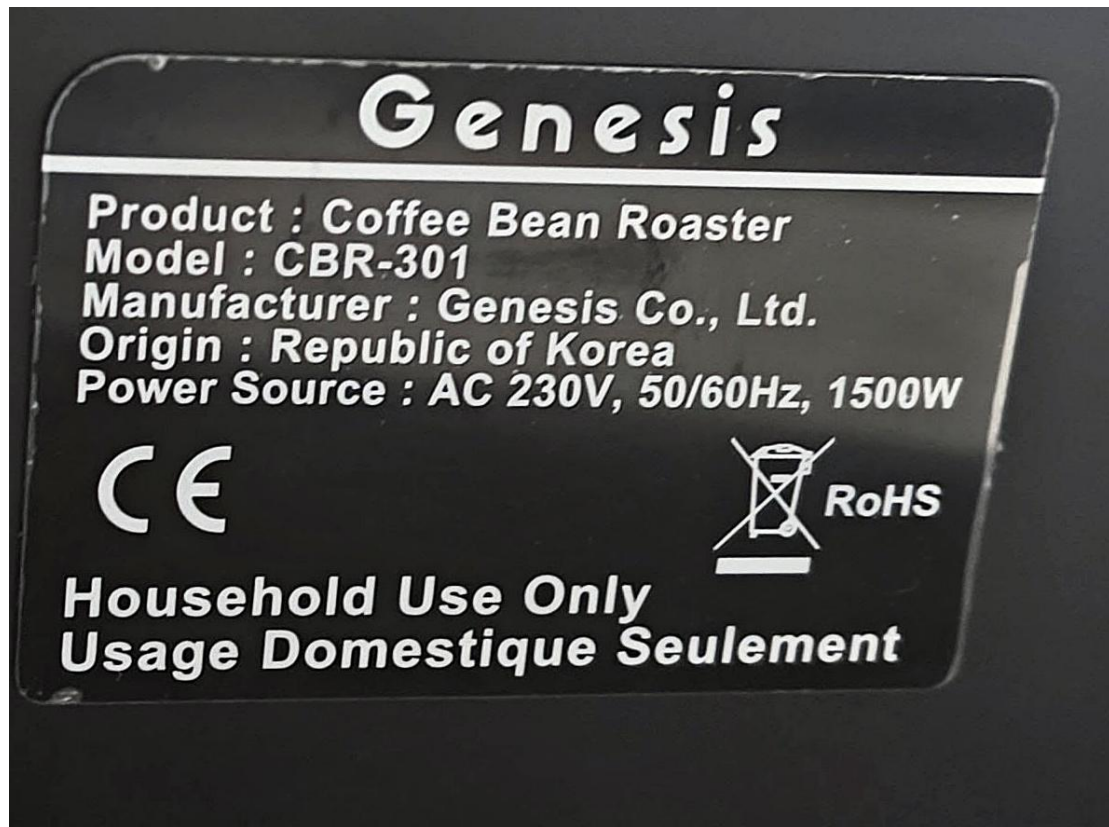
Roasting produces more smoke and odour than most people expect, myself included when I started. Gene Café says to use the CBR-301 in a well-ventilated area with a fan running, and the machine has a vent-pipe connector for exhausting roasting smoke outside.

Before each roast, I check the fan intake, chamber-cover intake, vent path and chaff-box openings, and it's worth doing every time rather than only when something looks off. Remove chaff from the tray after roasting and do not roast with a blocked chaff exit or mesh. A blockage can contribute to smoke, odour, dust, fire and roasting problems.

I can't specify duct design, airflow, room monitoring or an extraction arrangement for your space. Those details need a verified design for the actual location, not a guess from me. Until you have that, follow the official minimum, keep the route clear and stop if the roasting environment stops being safe to supervise.

### 2.4 Electrical Supply

Check the rating plate and use only the supply intended for your particular CBR-301. The published manual material includes regional voltage information, and Gene Café warns that using the wrong voltage is dangerous. Never assume the 120 V figures in one manual apply to an Irish or European machine.



**Figure 10. Rating plate on the project's 230 V Gene Café CBR-301. This machine is marked AC 230 V, 50/60 Hz, 1,500 W. Check the rating plate on your own roaster before use because regional versions may differ.**

The rating plate on my current project machine confirms AC 230 V, 50/60 Hz and 1,500 W. That is direct evidence for this particular roaster, not a substitute for checking the plate on another unit.

The manual also notes that input voltage can affect roast results and recommends supply within five percent of the rated voltage. That's a machine requirement, not something I'd ever try to improvise around.

Before roasting, I inspect the plug and lead for visible damage and make sure the connection is secure. If the supply, socket, plug or lead is in doubt, don't attempt electrical diagnosis yourself. I don't. Use a qualified electrician or authorised service route as appropriate.

## 2.5 Know the Parts Before Roasting

Before your first roast, get to know the parts you'll actually handle while the machine is cool: the front controls, chamber and lid, chamber cover and handle, release button, chaff tray or chaff box, intake points, chaff outlet and vent-pipe connector.

Translated manuals don't always use the same names, and that tripped me up more than once early on. This guide uses chaff tray for the removable collector and chaff path for the outlet, mesh and route towards it.

The practical checks matter more than the vocabulary. For me it comes down to this: the chamber must click fully into place, its lid and cover must be closed, the chaff tray must be fitted, and the air and chaff routes must be clear before heating starts.

## 2.6 Before Every Roast

Before every roast, I take a minute to check the room, machine, coffee and settings, the same minute every time. The aim isn't ceremony. It's to avoid discovering a blocked air path, an unseated chamber or the wrong recalled settings after the heater's already running, which is a much worse moment to find out.

### 1. Place and airflow

- Use a stable, level indoor surface and stay with the roaster.
- Make sure ventilation is running and the exhaust route is secure.
- Keep the fan intake, chamber-cover intake, vent and chaff openings clear.
- Keep children, pets and flammable material away from the outlet.

### 2. Chaff and cleanliness

- Fit the standard chaff tray and empty anything left from the previous roast.
- Check the wire mesh and chaff exit for visible blockage.
- Use washed parts only when they are completely dry.

### 3. Coffee and chamber

- Weigh the green coffee and remove any obvious foreign material.
- Stay within 100–300 g, with no more than 240 g for naturally processed coffee.
- Place the chamber on its stand, load the coffee and close the chamber lid.
- Push the chamber into the machine until it clicks, lift it slightly to confirm it is seated, then close the chamber cover.



**Figure 4. Correct chamber seating.** The chamber is fully aligned in its supports, with the retaining catch engaged before the clear cover is closed.

### 4. Power, settings and app

- Confirm that the power supply matches the machine's rating plate.
- Check the recalled time and target temperature rather than assuming they suit this roast.
- Do not intentionally preheat the machine.
- If using the app, confirm the Bluetooth connection and be ready to press TEMP on the machine within one minute of an app start request.

## 5. Be ready to finish the roast

Have heat-resistant gloves and the receiving tray or external bean cooler ready before you press start. I always record the starting displayed temperature so I can compare this roast later, though that's my own practice rather than a Gene Café requirement.

Start only when the chamber is seated, the cover is closed, the air and chaff routes are clear, the settings are intentional, and you're ready to stay with the machine the whole way through.

## 2.6R Pre-Roast Checklist

1. Level indoor surface, ventilation running and you will remain present.
  2. Intake, exhaust, chaff path and mesh clear.
  3. Chaff tray fitted, empty and dry.
  4. Coffee weighed, free of foreign material and inside the stated load limit.
  5. Chamber lid closed; chamber clicked into place; outer cover closed.
  6. Correct power supply; plug and lead appear sound.
  7. Time and target temperature checked; no intentional preheating.
  8. App connected if used; physical TEMP confirmation expected.
  9. Starting displayed temperature recorded if useful.
  10. Heat-resistant gloves and bean tray or external cooler ready.
- If any safety, airflow or fitment check fails, do not start.

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## Part Three: Operating the CBR-301

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### 3.1 Front-Panel Controls

The Gene Café CBR-301 has two front-panel controls: TEMP and TIME. Both can be turned and pressed, and their job changes with the machine's operating state.

#### The TIME Control

Press TIME to switch on the machine. It briefly shows the current displayed temperature, then the target, and recalls the settings used at the start of the previous roast.

Turn TIME to set a roast duration from 5 to 30 minutes. A normal turn changes one second at a time; a quick turn changes five seconds at a time. You can also change the time during roasting.

Turning TIME during cooling adds roast time and starts heating again. Avoid doing that accidentally. Pressing and holding TIME forces the machine to stop; wait for the chamber to return home and stop before handling it.

#### The TEMP Control

Turn TEMP to choose a target between 60°C (140°F) and 260°C (500°F). A normal turn changes one degree; a quick turn changes five degrees.

Press TEMP to start roasting once the settings are ready. Press it during roasting to begin cooling. Pressing it again during cooling ends cooling early, with the fans continuing briefly.

#### The Simple Version

1. Press TIME to power on.
2. Set the planned time with TIME.
3. Set the target temperature with TEMP.
4. Press TEMP to begin roasting.
5. Press TEMP when you decide to begin cooling.

The temperature prompts during the roast and the external-cooling workflow are covered in 3.3 and 3.5, where they make more sense than they do in a list of button functions.



**Figure 2. Front-panel controls and display. TEMP sets the target temperature and starts roasting or cooling; TIME powers the machine and sets the planned duration.**

### 3.2 The Gene Café App

The Gene Café app is optional. The roaster can be operated from its front panel, but the app connects over Bluetooth and adds a clearer view of elapsed time, displayed temperature, fan level and drum-rotation level. It can also send setting changes and cooling commands.

After the roast, the app can save the record as a profile. You can add a name, coffee details, green and roasted weights, roast level, a memo and photographs. Saved profiles can be reviewed, compared in pairs, exported and imported.

The useful distinction is this: the app's controls are active, but the graph and previous-roast comparison are references. A saved graph does not instruct the CBR-301 to follow the same path. It sits behind the current roast so you can compare the broad progress visually.

In my own roasting, the app is mainly a clock, a displayed-temperature reference and a convenient recorder. The end-of-roast decision still comes from the coffee: total roast time, colour, smoke, aroma, a confidently heard first crack and what happened on previous roasts.

Bluetooth can drop out, and the app guide tells you to continue using the machine controls if the connection becomes unstable. The app should support your attention, not replace it.



**Figure 3.** Gene Café app during an active roast. The upper graph plots ET and  $\Delta ET$  as high-level references, while the lower graph records fan and motor levels. The right-hand panel shows elapsed time, displayed temperature and the current settings. The 1st Crack and 2nd Crack buttons add manual markers, and Cooling sends a command to the roaster. The graph records and compares the roast; it does not instruct the machine to follow a profile.

### 3.2D What the App Graph Actually Shows

#### *Optional deep dive*

In this guide, the temperature trace simply means the line on the app graph that plots the CBR-301's displayed temperature against elapsed roast time. There is no need to make it grander than that.

The graph is useful for a high-level check: is the roast rising in a familiar way, when did the machine reach a milestone, when did the fan change, and when did cooling begin? It can also sit beside a previous saved graph for a visual comparison.

It is not a profile that guides the machine, a bean-temperature curve or a complete record of heater decisions. The app labels its graph ET and  $\Delta ET$ ; exported JSON records `current_temp`, but the supplied documentation does not explain the full calculation behind every visible line.

The saved record is more valuable than the live graph alone because it can combine telemetry with the notes, images and crack markers you entered. Those additions preserve what the graph cannot know.

The currently observed JSON format and practical ways to analyse it are covered in 8.3D.1.

### 3.3 A Complete Roast from Start to Finish

This is the sequence I follow for a normal CBR-301 roast: prepare, load, set, roast, cool and record. The full pre-roast check is in 2.6, so I do not repeat every safety step here.

#### **Set the roast**

I power on with TIME, check the recalled settings, then set the planned duration and target temperature. Because I normally want to make the finish decision myself, I set enough time that the machine will not enter cooling before I expect it to.

When I start through the app, I still press TEMP on the machine within one minute when prompted. The app prepares the start; the physical confirmation proves somebody is still at the roaster.

## Roast and observe

I press TEMP to start and, once the roast is running, I normally leave the settings alone unless I have a reason to change them. Set and forget means stop fiddling, not stop watching.

I use elapsed time and displayed temperature as references while watching colour, smoke and chaff, noticing changes in aroma and listening for crack-like activity. I make short notes as events happen rather than rebuilding the story afterwards.

## Acknowledge the machine milestones

The CBR-301 expects a response at two documented temperature points. At 200°C (392°F) it beeps; I press TEMP within 30 seconds to continue, otherwise the machine enters cooling. I do the same again at 230°C (446°F). These prompts are useful, repeatable roast milestones even though they are not bean-temperature or roast-phase boundaries.

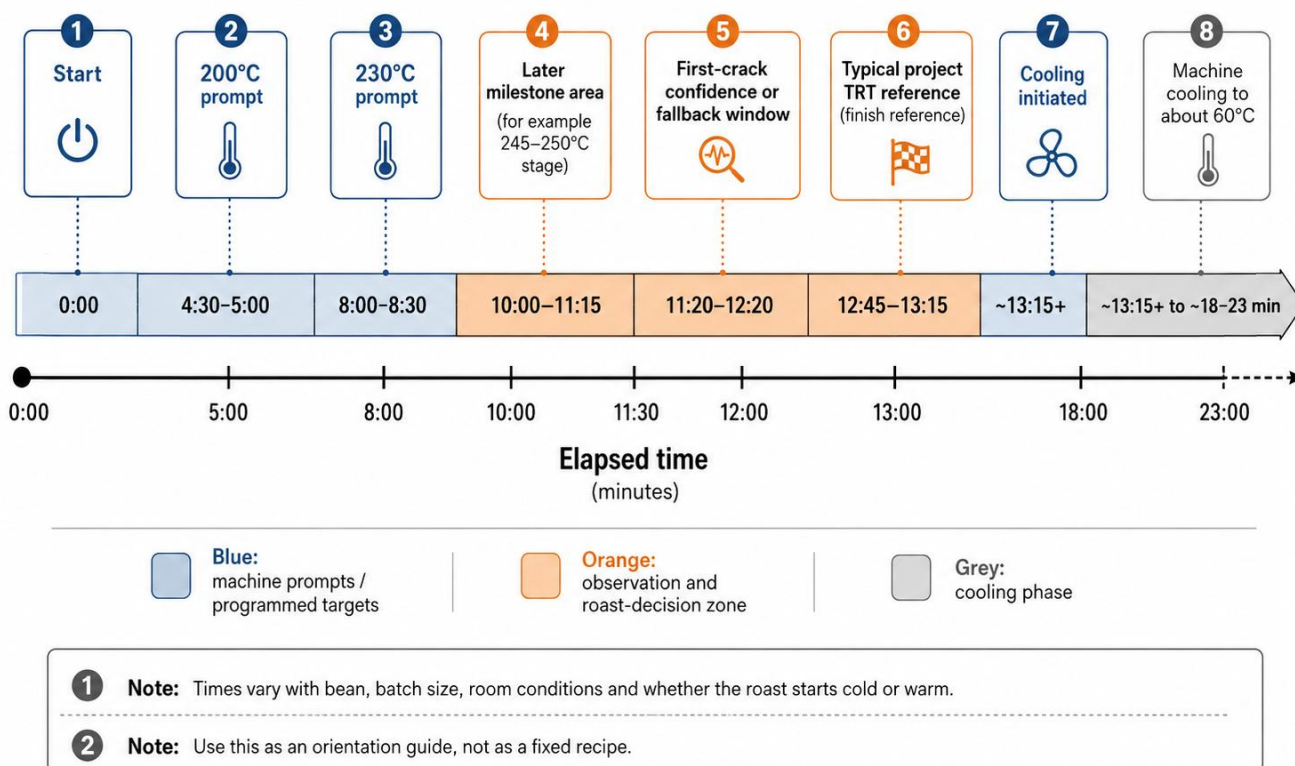
## Finish deliberately

My strongest practical anchors are total roast time, first crack plus development time when crack is genuinely heard, previous results, colour, aroma, smoke and the finish I planned before the roast. I press TEMP or use the app's cooling control when the roast reaches that decision point.

I have learned not to wait for one clue to become perfect. The CBR-301 does not remove judgement; it gives me a repeatable machine around which to improve it.

**Figure 5. A normal roast timeline: prompts, observations, finish and cooling**

*Example timings only — not a recipe*



**Figure 5. A normal roast timeline: prompts, observations, finish and cooling**

## 3.4 Changing Settings During a Roast

The CBR-301 allows time and target temperature to be changed during a roast. The app also allows changes to fan level, drum-rotation level and the automatic end condition.

That does not mean the best roast is the one with the most interventions. My normal approach is to leave fan and drum rotation at level 2 and let the machine manage its own protective changes.

Change a setting only when you can say what you are trying to correct. Write down the old value, new value and elapsed time. A drinkable roast with six unexplained adjustments teaches less than an imperfect roast with one clear change.

Two automatic changes should not be mistaken for your own intervention: overheat protection may raise the fan to level 3, and cooling moves both fan and drum rotation to level 3. Turning TIME during cooling is different again because it restarts heating.

### 3.5 Cooling Is Part of the Roast

Cooling is part of the roast because the coffee and the machine still contain heat after active roasting stops. The point at which you initiate cooling is therefore one of the main finish decisions.

#### The documented Gene Café route

Cooling starts when the set time expires, when an unacknowledged prompt sends the machine into cooling, or when you press TEMP or select cooling in the app. During cooling, fan and drum rotation move to level 3. The cycle ends automatically at about 60°C (140°F), although it can be ended early.

Wait for the chamber to return to its home position and stop before handling it. The chamber, beans and nearby metal can still be very hot.

#### Optional external bean-cooling method

This is my normal external-cooling method. It is an owner practice rather than the cooling method described in the Gene Café manual. The chamber, handle and surrounding parts will be extremely hot. Use properly fitting heat-resistant gloves, have the external cooler ready before you begin, and do not attempt the procedure unless you can handle the chamber securely.

1. Press **TEMP** to begin cooling and stop active roasting heat.
2. Press **TEMP** again to stop the cycle. The chamber will continue rotating until it reaches its home position for removal.
3. Lift the clear chamber cover to gain access to the roasting chamber.
4. Wearing heat-resistant gloves, support the chamber securely. Press the chamber-release catch and pull firmly using the chamber handle.
5. Once the chamber is clear of the roaster, hold it securely over the external bean cooler.
6. Release the chamber lid and tip the beans into the cooler. Some beans may remain around the internal dividers, so shake the chamber carefully until it is empty.
7. Close the chamber lid securely before returning the empty chamber to the roaster.
8. Reinsert the chamber with its guides correctly aligned. Push it fully into position until the retaining catch clicks into place.
9. Keep your hands clear of the chamber area, then lower the clear chamber cover.
10. Press **TEMP** to restart the machine. Heating will begin briefly as though another roast is starting.
11. Press **TEMP** again immediately to initiate the cooling cycle. The illuminated ring around the control should turn blue.
12. Allow the machine's cooling cycle to finish normally. Gene Café ends the cooling cycle when the displayed temperature reaches approximately **60°C (140°F)**. There is no fixed cooling duration; it takes however long the machine needs to reach that point.



**Figure 6. External bean-cooling setup. Have the external cooler and properly fitting heat-resistant gloves ready before removing the hot chamber; follow the complete procedure above.**

The chamber and surrounding components can still retain substantial heat. After the fan stops, residual heat may cause the displayed temperature to rise above 60°C (140°F) again, particularly if you try to begin another roast immediately.

After cooling, empty and clean the chaff tray and check the accessible airflow path. Record the actual starting temperature of the next roast. A follow-on roast will normally still be a **warm start**, even though the previous cooling cycle completed at approximately 60°C (140°F). Leave the machine longer if you want to return to a genuinely cold-start condition.

Externally cooling the beans does not replace cooling the roaster. Completing the machine cycle gives a safer, more understandable starting condition, but the next roast should still be recorded as a warm start unless the machine has been left to cool fully.

### 3.6 Completing the Roast Record

The best roast record begins while the roast is still happening. Contemporaneous notes, meaning notes made at the time, are much more useful than a tidy explanation reconstructed later.

At minimum, record the coffee, green weight, starting machine state, selected time and temperature, times at useful milestones, total roast time, finish decision, cooling method, roasted weight and anything unusual.

If first crack was clear, record the time and the development time that followed. If it was uncertain, say uncertain. A doubtful note is better evidence than a confident guess.

The app can save the graph and recorded telemetry, then add a profile name, coffee details, weights, a memo and photographs. Saved profiles can be compared, exported and imported as JSON.

Use the memo for things the telemetry cannot explain: a colour change, smoke, a quiet crack, an overheat popup, an external-cooling step or why you ended the roast. Add a brewing result later. The record only needs to be detailed enough to help you understand or reproduce the next roast.

# Part Four: Reading the Roast

## 4.1 The App Graph: A High-Level Reference

The phrase temperature trace can sound more scientific than the app really is. Here it simply means the line on the app graph showing displayed temperature against elapsed time.

Use it at a high level. Is the line rising in a familiar way? When did the machine reach 200°C (392°F) and 230°C (446°F)? When did the fan change or cooling begin? Those are practical questions.

Do not roast by trying to correct every wobble. The graph is not bean temperature, and the CBR-301 does not follow a previous graph as a programmed profile. Colour, aroma, smoke, sound, total roast time and the coffee in the cup still carry the finish decision.

I find the graph most useful after the roast, when it helps place my notes and compare broad timing with a previous record.

### 4.1D Comparing Roasts with TRT and Milestones

*Optional deep dive*

The most useful comparison on the CBR-301 is not a hunt for tiny curve differences. It is a comparison of total roast time, repeatable machine milestones and the result.

| Field                                 | Why it matters                                               | How to compare it                                                          |
|---------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------------------|
| Coffee and load                       | Different coffees and loads can behave differently.          | Compare the same coffee and batch wherever possible.                       |
| Machine state                         | Residual heat can change the start.                          | Record cold or residual-heat start and the starting display.               |
| 200°C (392°F) / 230°C (446°F) prompts | These are built-in, observable milestones.                   | Compare elapsed time to 200°C (392°F) and 230°C (446°F).                   |
| Later milestone                       | A consistent higher point helps describe the final approach. | Use the same value, such as 245°C (473°F) or 250°C (482°F), when relevant. |
| TRT                                   | Total roast time is available on every roast.                | Compare the time at which cooling began.                                   |
| First crack                           | Useful only when heard with confidence.                      | Record time, confidence and development time; otherwise use a fallback.    |
| Weight loss                           | A repeatable post-roast measure.                             | Compare like with like; do not treat it as a quality score.                |
| Brew result                           | The roast exists to make coffee.                             | Use the same brew method and record whether you would repeat it.           |

A previous app graph can help you see whether these milestones are broadly similar, but it is the timings, notes, weight loss and cup that make the comparison useful.

Exclude duplicate or uncertain exports from independent comparisons. A neat graph with uncertain provenance is still uncertain evidence.

## 4.2 Roast Phases as Seen in the CBR-301

The CBR-301 gives you a visible, audible and aromatic sequence rather than a laboratory account of roast phases. The chamber turns, the displayed temperature rises, the coffee changes colour and smell, chaff collects, and eventually you decide it's time to cool. I still find that sequence genuinely interesting to watch, roast after roast.

You may use familiar terms such as drying, yellowing, first crack and development as notebook labels if they help you compare your own roasts. This manuscript does not yet use them as precise scientific

boundaries: the supplied manufacturer material does not define them, and the present evidence set does not validate exact timing or causes on this machine.

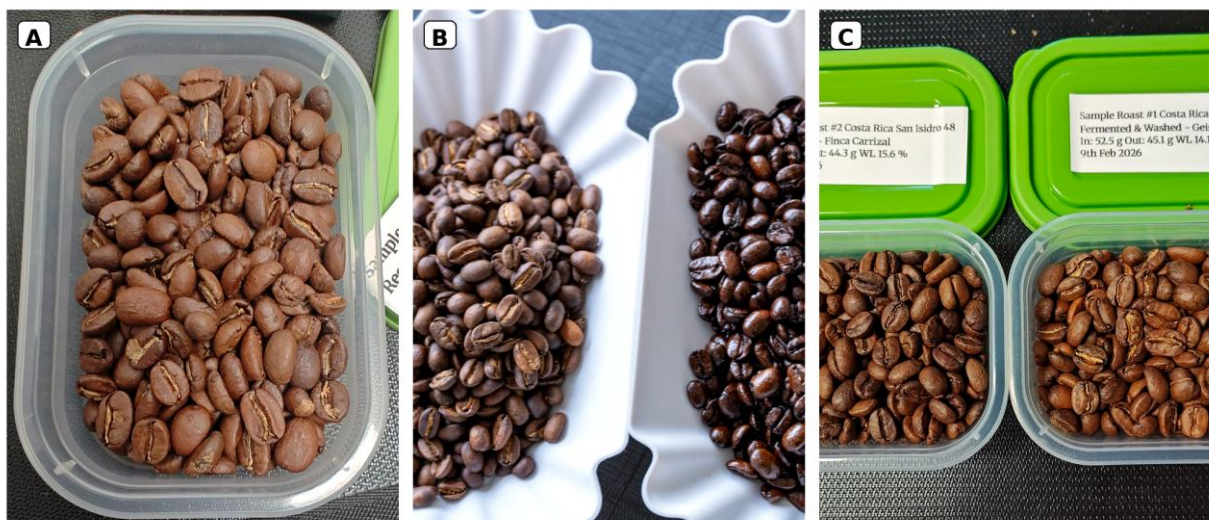
For now, describe what you can actually observe. Note the start condition, visible colour, smell, sound, chaff behaviour, displayed-temperature milestones and cooling point. These are useful anchors without pretending that one graph position means the same thing for every coffee.

### 4.3 Colour, Aroma and Visible Change

I look at the coffee throughout the roast, but I treat colour as a cue rather than a verdict. The chamber glass, room lighting, bean size and the moving coffee can make it look lighter or darker than it will after cooling. A roast that looks dark while it's moving is not automatically over-roasted. I've been caught out by that more than once.

Aroma and visible change are most useful when they are recorded together with time and the displayed temperature. Instead of writing only “smoky” or “brown”, note what you saw and smelled, when you noticed it and what you did next. The value is in the comparison with a later roast of the same coffee.

Do not use a personal observation as a universal colour threshold. The present pack contains notes, not a standardised colour-image set or verified colour measurements. Let cooled beans, weight loss and the rested cup add context before deciding what the chamber appearance meant.



**Figure 7. Cooled bean appearance from selected project roasts. These photographs show real project coffees under different lighting and photographic conditions. They illustrate the range of cooled appearance encountered, but they are not a calibrated colour scale and should not be used as universal roast-level references.**

### 4.4 First Crack: Useful, Imperfect and Sometimes Inaudible

First crack is useful when it is clear. On the CBR-301, it is not always clear. The fan, drive, rotating chamber and moving coffee can turn a simple idea into a recurring game of ‘was that the beans or the machine?’

I have tried a stethoscope on two occasions, a rolled-up cardboard tube as a makeshift hearing aid and active noise-cancelling headphones. None gave me a reliable answer. Mostly, they made different parts of the machine easier to hear.

Experience has helped. I am better at recognising crack-like activity and sustained clusters than I was at the beginning, but the uncertainty has not disappeared. That is exactly why first crack cannot be my only finish anchor.

When crack is obvious, record the time and use development time alongside the rest of the roast. When it is not obvious, record what you heard, how confident you were and what fallback finish point you used. Total roast time, colour, aroma, smoke, previous results and finished weight loss remain available even when crack is quiet.

The app crack buttons are manual markers. They record when you pressed them; they do not detect anything.

RoastAid grew from this problem. I hope it can make crack-like activity easier to recognise in real time, but it is intended as an aid to judgement, not a magic listener or a replacement for the other clues.

4.4D First-Crack Confidence and Event Analysis

Optional deep dive

A useful first-crack record needs a confidence label, not just a timestamp.

| Label     | What it means                                                                 | How to use it                                                         |
|-----------|-------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| Clear     | Sustained crack-like activity was easy to distinguish from the machine.       | Use as a development anchor and record the time.                      |
| Likely    | Several convincing sounds were heard, but the start was not perfectly clear.  | Use cautiously and preserve the note.                                 |
| Uncertain | An isolated pop or ambiguous cluster could have been coffee or machine noise. | Do not build a precise development calculation on it.                 |
| Not heard | No sound was convincing enough to mark.                                       | Use the planned TRT or fallback finish window and other observations. |

Make the note while the roast is happening. Do not promote an uncertain sound to a confirmed event later because the graph or final roast time looks convenient.

Audio tools and RoastAid can help review candidate activity, but any automated or assisted marker still needs context. The useful outcome is better confidence, not a false claim that one exact crack time has been proven.

4.5 Fan and Drum-Speed Changes

The Gene Café app lets you change both the fan speed and the drum rotation speed. Each has three levels, with level 2 as the normal default.

In my own roasting, I generally leave both settings at level 2. I have not tested the other settings systematically enough to recommend using them to shape a roast or to make firm claims about their effect on the cup.

During roasting, the fan may move automatically from level 2 to level 3. When this happens because of an overheat event, the app shows a popup and temporarily locks the fan control. Gene Café documents this automatic change as part of the overheat response. On my CBR-301, it happens during most roasts. There is usually nothing you need to do. Let the roaster manage it; the control becomes available again when the condition clears.

Cooling is another normal reason for the settings to change. When cooling starts, both the fan and drum rotation move to level 3. This is expected and does not indicate a fault.

You can also change either setting yourself through the app. Because I normally roast at level 2 and have not tested the alternatives in a structured way, this guide does not yet recommend a particular fan or drum-speed strategy.

A fault code is a separate matter and is covered in the troubleshooting section.

4.5D Multi-Roast Fan-Event Analysis

Optional deep dive

The app records fan levels as categories, not measured airflow. The useful question is therefore when the recorded level changed and what machine state or note accompanied it, not how many units of air moved.

The early records contain several patterns:

| Pattern                                               | Interpretation boundary                                                                                                              |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Level 2 followed by automatic level 3 during roasting | Consistent with the documented overheat response when the corresponding app state is present; not proof of a fault or flavour effect |
| Level 3 during cooling                                | Expected cooling behaviour                                                                                                           |
| Trace begins at level 3                               | No visible 2-to-3 transition can be inferred before the recording begins                                                             |
| No recorded transition                                | Absence in the export does not prove the machine never changed state                                                                 |
| Duplicate telemetry                                   | Count once for trace analysis until provenance is resolved                                                                           |

For a multi-roast table, record roast identity, start fan level, first verified change, machine state, cooling time, data-quality flag and any operator intervention. Keep automatic changes separate from manual app changes.

Across this evidence set, fan events help explain the app record and reassure the owner about expected behaviour. They do not support a recommended fan strategy or a causal cup claim.

## 4.6 Chaff, Smoke and Processing Method

Chaff and smoke are normal parts of coffee roasting, but I've learned they need real attention because they affect cleanliness, airflow and the roasting environment. Empty the chaff tray promptly and keep the chaff exit and mesh clear. A blocked path can contribute to smoke, odour, dust, fire and roasting problems.

Different coffees can appear to shed different amounts of chaff or produce different smoke, and naturally processed coffee has its own stated lower maximum load. That does not mean that processing method alone explains what you see. Batch size, coffee condition, machine cleanliness and ventilation also matter.

Use cautious notes: record the coffee, load, visible chaff, smoke and any cleaning need. If smoke becomes excessive or the environment is no longer safe to supervise, stop and follow the safety and troubleshooting route rather than trying to roast through it.

## 4.7 Cold Starts, Residual Heat and Warm Machines

I begin from a cold machine whenever I can. Gene Café says not to preheat the CBR-301, and I'm not going to turn residual heat from a recent roast into a substitute for an approved warm-up procedure.

Residual heat is simply the machine's starting condition after it has recently run. It may be worth recording because it can help explain why a later roast does not resemble an earlier cold start. It does not establish a controlled warm-machine method, and it does not prove a particular effect on the coffee.

If you want repeatable comparisons, allow the machine to return to your chosen starting condition and record it. Treat the supplied warm/cold observations as prompts for further work, not as evidence for a general practice.

### 4.7D Warm-Start and Machine-State Experiments

#### *Optional deep dive*

The current evidence contains one small-batch warm/cold comparison, but the coffees or processes differ. That makes it illustrative rather than controlled. A difference in the traces could reflect starting heat, coffee, process, load handling or another unrecorded condition.

The comparison can still show why machine state belongs in the roast log. Record whether the machine began cold or carried residual heat, the starting displayed temperature, time since the previous roast, coffee and load, selected settings and cooling decision.

A stronger experiment would repeat the same coffee and load across several verified cold and residual-heat starts while keeping settings and handling stable. It must not rely on intentional preheating, which Gene Café advises against.

Until matched records are available, do not turn this pair into a warm-start recommendation or a numerical correction rule. Its contribution is narrower: an unrecorded starting state can confound an otherwise tempting comparison.

4.8 TRT, Weight Loss and Colour

Total roast time, or TRT, has been one of the most useful anchors on the CBR-301. It is not perfect and it is not a roast level by itself, but it is available on every roast and becomes genuinely useful when the coffee, load, machine state and settings are known.

When first crack is clear, first-crack time plus development time adds another anchor. When it is quiet or uncertain, TRT and a planned fallback finish window prevent the roast from drifting indefinitely while you wait for a sound that may already have happened.

Weight loss is one of the simplest post-roast measures I use:

$$\text{Weight loss (\%)} = (\text{green weight} - \text{roasted weight}) \div \text{green weight} \times 100$$

Use accurate green and cooled roasted weights. Weight loss helps compare similar roasts, but it is not a standalone quality score or a substitute for tasting.

Colour belongs in the same practical group for me. I note what the coffee looked like in the chamber and again after cooling. The moving glass view can exaggerate darkness, so I let cooled appearance and the cup have the final word.

4.8R Weight-Loss Calculator

Record green weight and cooled roasted weight to the same practical precision.

$$(\text{Green weight} - \text{roasted weight}) \div \text{green weight} \times 100$$

Example:  $(250.0\text{ g} - 215.0\text{ g}) \div 250.0\text{ g} \times 100 = 14.0\%$ .

Save the result with the coffee, machine state, TRT and brewing note. Use it to compare like with like, not as a quality score.

| Roast / coffee | Green g | Roasted g | Weight loss % | TRT / note |
|----------------|---------|-----------|---------------|------------|
|                |         |           |               |            |
|                |         |           |               |            |
|                |         |           |               |            |
|                |         |           |               |            |
|                |         |           |               |            |
|                |         |           |               |            |

## Part Five: Building Repeatability

### 5.1 Establishing a Reference Roast

When I begin with a new coffee, I am not looking for a universal recipe. I am trying to create one well-recorded reference roast on my machine, so the next decision is easier.

I choose a coffee I can repeat, use a batch inside the stated limits and begin from a machine state I can describe. I record the start, settings, milestones, TRT, finish reason, roasted weight, weight loss and later brew result.

#### Project reference examples: starting points, not recipes

The table below uses real washed-coffee roasts from my project that stayed inside the official load limits. Several early natural-coffee roasts used 250 g, above Gene Café's stated 240 g maximum for naturals, so I have kept them in Appendix J as historical evidence rather than presenting them here as beginner starting points.

| Coffee / record                                | Load    | Start state       | Main settings | TRT   | WL    | Context                                       |
|------------------------------------------------|---------|-------------------|---------------|-------|-------|-----------------------------------------------|
| Roast 2: Guatemala La Soledad Bourbon, washed  | 250 g   | Cold, 21°C (70°F) | 240°C (464°F) | 12:58 | 14.5% | A lighter early reference.                    |
| Roast 5: Guatemala La Soledad Bourbon, washed  | 250 g   | Cold, 19°C (66°F) | 250°C (482°F) | 13:15 | 15.8% | A longer, higher-loss comparison.             |
| Roast 10: Guatemala Bourbon, washed            | 193.4 g | Cold, 21°C (70°F) | 250°C (482°F) | 12:31 | 14.6% | Reduced-load example inside the stated range. |
| Roast 16: Guatemala Acatenango Caturra, washed | 250 g   | Cold, 22°C (72°F) | 250°C (482°F) | 12:52 | 16.1% | Personal roast reference.                     |

What I take from these records is a useful range, not one magic number. The three 250 g washed examples finished between 12:52 and 13:15, with weight loss from 14.5% to 16.1%. The 193.4 g reduced-load example finished at 12:31. They are starting references from particular roasts, not instructions every coffee must follow.

Once I brew the reference, I decide what I would keep and what one thing I would change. That is the beginning of a repeatable method.

### 5.2 What to Record Every Time

I record enough to understand the roast later, but I do it while the information is still fresh in my head. A contemporaneous note is often worth more to me than a perfect graph.

At minimum, capture coffee identity, date, green weight, starting displayed temperature and machine state, target time and temperature, total roast time, cooling method, roasted weight and weight loss.

Add the 200°C (392°F) and 230°C (446°F) milestone times, first-crack time and confidence, fan changes, colour, aroma, smoke, chaff and any deliberate intervention when they matter.

The app can collect part of this automatically, but the app cannot know why you changed a setting, whether the crack was convincing or what the coffee tasted like. Your short notes and later brew result close that gap.

The record is not paperwork for its own sake. It is your best chance of returning to a roast you enjoyed.

#### 5.2R Roast Log

Use one entry per roast:

- Coffee, process, date and green weight.
- Cold or residual-heat start and starting displayed temperature.

- Target time and target temperature; fan and drum settings if changed.
- Times to 200°C (392°F), 230°C (446°F) and any later milestone you use.
- First crack: clear, likely, uncertain or not heard; development time if usable.
- TRT and reason cooling began.
- Cooling method, roasted weight and weight loss.
- Contemporaneous notes: colour, aroma, smoke, chaff, warnings or changes.
- Rested brew or cupping result and one question for next time.

Keep the minimum fields on ordinary roasts. Add detail only when it helps answer a real question.

### 5.3 Change One Thing at a Time

When I want to learn what a change actually did, I change one meaningful thing and keep the rest as stable as I can. That might mean batch size, target temperature, planned time, cooling decision or a fan setting, not several of them at once.

Write down the previous value, the new value and the reason for the change before starting. Afterwards, compare the record, the cooled beans and the rested cup. If other conditions also changed, say so; an imperfect comparison is still useful when its limits are visible.

Do not build conclusions on files whose provenance is unresolved. Some early records contain duplicated telemetry, so they cannot serve as independent demonstrations of profile differences until that issue is checked. Use a fresh, verified repeat when the question matters.

### 5.4 Batch Size and Chamber Loading

I start with Gene Café's stated loading range: 100 g to 300 g of green coffee. For naturally processed coffee, the stated maximum is 240 g.

Those limits come before personal preference or an appealing result from one small trial. A reduced load can be useful for exploration, but a successful roast outside the stated range does not establish that it is generally safe or suitable. Record the load precisely and note the coffee process, because the lower natural-coffee maximum is part of the official guidance.

Keep the chamber properly loaded, closed and seated. I compare similar loads before deciding that a change in timing, sound or colour came from a setting rather than the amount of coffee in the chamber.

#### 5.4D Maximum, Reduced and Sample-Batch Experiments

##### *Optional deep dive*

The records contain roasts at different loads, including a 52.5 g sample batch. Gene Café's published range is 100–300 g, with a stated maximum of 240 g for naturally processed coffee. A result outside that range is evidence that one roast occurred; it is not evidence that the load is generally safe, supported or repeatable.

Treat the available cases separately:

| Case type                                 | What may be recorded                                                      | Limit on interpretation                                           |
|-------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------|
| Higher-load roast within the stated range | Load, coffee, start state, settings, timing, weight loss and observations | Does not establish a universal maximum-result profile             |
| Reduced load within the stated range      | Same fields, compared with a genuinely similar roast where available      | Coffee and machine state may still confound the comparison        |
| 52.5 g sample roast                       | That the specific trial ran and what was observed                         | Below the stated range; not a recommendation or safety validation |
| Small warm/cold records                   | Starting state and broad observed differences                             | Coffees/processes differ; not a controlled batch-size experiment  |

For a useful batch-size test, keep coffee, process, settings, starting state and finish method as stable as practical. Change the load deliberately, retain the raw export and add cooled weight and cup notes. Do not combine unrelated maximum, reduced and warm-start trials into one causal series.

The practical conclusion is conservative: stay inside Gene Café's limits for normal guidance. Use out-of-range records only as bounded historical evidence unless primary guidance changes.

## 5.5 Development and Choosing When to Finish

The finish decision is where the CBR-301 still needs you. The machine can end by time or target temperature, but it cannot decide whether the coffee has reached the result you want.

When first crack is clear, its time plus the development period that follows gives you a useful anchor. When crack is uncertain or inaudible, do not keep roasting indefinitely. Use a planned TRT or fallback finish window, the machine milestones, colour, aroma, smoke and what previous roasts taught you.

I often set the programmed time longer than I expect to need so the machine does not make the finish decision before I do. That is personal practice, not a universal recipe.

Write down why you started cooling. Later, compare the cooled coffee, weight loss and cup with that decision. The goal is not a theoretically perfect development number; it is a finish you can understand and, when you like it, approach again.

## 5.6 Different Coffees Behave Differently

Different coffees can ask different questions of the same roaster. Bean size, density, process, age, batch size and starting condition may all change what you see and hear. Expect variation; do not treat one coffee's timing as a rule for another.

Begin a new coffee with a conservative, well-recorded reference roast. Watch the coffee and record its particular signs rather than forcing it to match a previous trace. If a natural coffee is involved, observe the lower official maximum load.

The current set includes observations from several coffees, but it is too small and too confounded to prove deterministic origin or process rules. Use it to sharpen attention, not to predict an outcome with false certainty.

### 5.6D Coffee-Specific Behaviour

#### *Optional deep dive*

The current records include coffees identified with Guatemala, Brazil, Ethiopia, Honduras and Costa Rica. They can support bounded descriptions of what was observed on those particular roasts. They cannot support rules such as “all naturals behave this way” or “this origin needs that setting”.

When I look back at a roast, I want to know what coffee it was, how much I loaded, the condition of the machine, what I saw and heard, where I chose to finish, and what the cooled coffee and cup eventually told me. Anything I failed to record stays missing; I do not fill it in afterwards just because it would make the comparison tidier.

The Brazilian-natural series supplies the clearest connected lesson: first crack was sometimes quiet, so a planned fallback finish window became more useful than waiting indefinitely for a convincing sound. That is a bounded experience, not a universal natural-coffee profile.

This edition uses the project records that were sufficiently complete and relevant to support the guidance presented. Decaf, Kenya, robusta and stronger like-for-like comparisons can be added in later revisions when the underlying roast and cup records are complete enough to carry the claim.

## 5.7 Closing the Loop with the Cup

The roast is not fully evaluated when the machine stops. The useful question is simple: would I happily drink this again, and what would I change if I roasted it tomorrow?

### A simple home cupping

When I want a more neutral comparison, I occasionally use a simplified cupping routine rather than my normal brewer. This is enough to compare roasts without pretending to run a professional calibration table:

1. Use the same coffee dose, grind, water and cup size for every sample. I use around 8.25 g of coffee to 150 mL of water as a practical starting point.
2. Smell the dry grounds and write down the first obvious impressions.
3. Add hot water, leave the coffee undisturbed for about four minutes, then break the crust and smell again.
4. Skim the surface and taste with a spoon as the coffee cools.
5. Keep the notes ordinary: sweetness, acidity, bitterness, body, aftertaste, defects and whether you enjoyed it.

A formal sensory assessment goes much further. For this guide, consistency matters more than theatre.

### The brew I am actually likely to drink

More often, I close the loop by brewing the coffee in a consistent way on equipment I use every day, typically the Fellow Aiden, the Lelit Elizabeth or another standard method I can repeat. That may be less formal than cupping, but it answers the question that matters at home: did this roast make the coffee I wanted to drink?

Keep the recipe stable enough that a change in the cup is more likely to belong to the roast. Link the note to the roast record and decide whether the next roast should change, or whether leaving it alone is the smarter move.

## 5.8 Defining Acceptable Repeatability

Repeatability does not mean producing identical graphs or identical beans. It means getting close enough to a result that the differences make sense and the next decision is deliberate.

On the CBR-301, I look first at whether the coffee and load were the same, the machine began in a comparable state, the milestone times and TRT were in the expected neighbourhood, the weight loss was plausible and the cup moved in the intended direction.

The machine has limits, and so do home observations. A roast does not need laboratory precision to be useful. If you liked it, would drink it again and kept enough information to get reasonably close next time, that is meaningful repeatability.

## Part Six: Cleaning, Maintenance and Problems

### 6.1 Routine Cleaning

The CBR-301 needs regular cleaning because chaff and coffee residue build up in places that affect airflow, smoke and how easy the machine is to inspect. I treat the manufacturer routine as the starting point, and the more often I roast, the more attention it earns.

Switch the roaster off, unplug it and let it cool before cleaning. I handle the chamber and chaff-box parts carefully. The glass can chip, and some edges are sharp enough to catch a finger if I'm not paying attention.

#### After each roast

- Empty the chaff tray once it is safe to handle.
- Check the chaff exit and wire mesh for visible build-up.

In my own use, the chaff tray and the surrounding chaff-box area collect far more material than the mesh itself. The mesh still needs checking and cleaning, but this guide does not present an artificially blocked example as though that were normal.

- Clean the chamber as required and dry it completely before refitting or storing it.

#### My regular cleaning practice

For normal chamber cleaning I use a mild, plant-based biodegradable washing liquid. Occasionally I use a branded coffee-equipment cleaner when ordinary washing is not enough, following the cleaner's instructions and rinsing thoroughly.

I also use a small vacuum cleaner regularly to remove loose chaff from accessible nooks and crannies inside the cool, unplugged roaster. The aim is to lift out loose material, not to push tools into the heater, fan, wiring or other restricted areas.

When I am roasting frequently, a meticulous clean is worthwhile. Chaff has a talent for finding places the main tray does not advertise.

#### Cleaning the chaff box and mesh

Allow the roaster to cool completely, switch it off and unplug it before beginning. Some edges may be sharp, so wearing gloves is sensible. Gene Café requires the machine to be unplugged before the left-side cover is opened.

**1. Remove any external venting.** Disconnect the ducting, then rotate and remove the vent-pipe connector at the top of the roaster.

**2. Remove the chaff tray — Photo 1.** On the left-hand side of the roaster, pull the chaff tray straight towards you until it is completely clear.

**3. Remove the left-side cover — Photo 2.** Slide the large slatted cover sideways and lift it away. This cover should normally only be removed for cleaning.

**4. Locate the chaff-box body — Photo 3.** The main chaff-box body is now exposed inside the roaster. The loose chaff visible around it shows why this area benefits from regular cleaning.

**5. Release the chaff-box body.** Press down gently on the top of the chaff-box body to release its retaining catch. Rock it carefully from side to side while pulling it out. Do not force it; a gentle rocking movement helps it clear the mounting points.

**6. Inspect the air outlet — Photo 4.** With the chaff-box body removed, the chamber outlet and surrounding chaff path are visible. Vacuum loose chaff only from areas you can safely reach. Do not push the vacuum nozzle or other tools into the fan, heater, wiring or internal openings.

**7. Inspect the mesh — Photo 5.** Check the curved wire mesh on the chaff-box body. Fine chaff can block the small openings even when the main tray does not look particularly full.

8. Clean the removable parts. Vacuum or brush away loose chaff. I also gently wipe accessible plastic surfaces with a slightly damp cloth to remove roast dust. For a deeper clean, use a mild detergent and allow every part to dry completely before refitting it.

**9. Reassemble in reverse order.**

- Refit the chaff-box body, pressing the top section until it clicks securely.
- Refit the left-side cover.
- Slide the chaff tray fully back into position.
- Refit the vent-pipe connector and reconnect any external ducting.

**10. Check before roasting.** Confirm that everything is fully dry, the mesh openings are clear and all components are seated securely.



**Figure 9. Chaff-box removal and cleaning sequence.** The numbered photographs show the left-side chaff tray and cover, the chaff-box body, the exposed air outlet after removal, and the mesh area that must be kept clear. Follow the written procedure and reassemble all parts securely before the next roast.

Gene Café suggests emptying the chaff after each roast and cleaning the wire-mesh holes after about ten uses, or sooner when visibly restricted. I treat that interval as a reminder, not permission to ignore a mesh that is already blocked.

**6.1R Maintenance Calendar**

| When                                       | Action                                                                                        | Basis                   |
|--------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------|
| After each roast                           | Cool the machine, empty the chaff tray, check the chaff path and clean the chamber as needed. | Gene Café baseline      |
| Before the next roast                      | Confirm the mesh and air path are clear and all washed parts are fully dry.                   | Gene Café baseline      |
| Regularly when roasting often              | Vacuum loose chaff from accessible areas of the cool, unplugged roaster.                      | Personal field practice |
| About every ten uses, or sooner if blocked | Clean the wire-mesh holes and chaff-box parts.                                                | Gene Café guidance      |

| When                                        | Action                                                                                 | Basis                   |
|---------------------------------------------|----------------------------------------------------------------------------------------|-------------------------|
| When residue persists                       | Use a suitable branded coffee-equipment cleaner as directed, rinse and dry thoroughly. | Personal field practice |
| Any damage, unsafe fit or unexplained fault | Stop using the machine and follow the service route.                                   | Safety boundary         |

Adjust the personal cleaning frequency to how often you roast and how much chaff the coffee produces. The machine should begin each roast dry, correctly assembled and visibly clear.

## 6.2 Preventive Inspection

Preventive inspection just means looking carefully at the parts you can reach safely while the machine is cool and unplugged. I check the chamber and lid, chamber cover, chaff tray, side cover, vent connector, intake openings, mesh and visible chaff path.

I use the small vacuum or a soft brush, and only for loose material in accessible areas. Nothing goes into the heater, fan, wiring or internal sensor areas.

Check the plug and lead for visible damage and make sure every removable part fits securely. If anything is damaged, loose or outside a normal cleaning check, stop and use an authorised service route.

## 6.3 Troubleshooting by Symptom

I always start with the simple, documented checks first. If the roaster won't begin, confirm it has power, the chamber is seated, the chamber lid and cover are closed, and the controls are set intentionally. The roaster will not operate with the cover open.

If smoke, odour, dust or poor roasting behaviour shows up alongside visible chaff build-up, stop and check the tray, chaff exit and wire mesh once the machine is cool. Never continue with a blocked chaff route.

If the app won't connect, check the phone's Bluetooth and location settings, the roaster's power and proximity, and whether another phone is already connected. The app is optional. A connection problem doesn't remove the need for the normal front-panel safety checks.

If a problem isn't resolved by these visible checks, don't invent a repair. Record the symptom, any message shown, the machine state and what you'd already checked, then use Gene Café's troubleshooting or service guidance.

## 6.4 Error Messages and Immediate Action

I treat an error message as a request to stop guessing. Note the exact message or code, what the roaster was doing, the displayed temperature and time, and whether cooling had begun. Don't rely on memory when contacting support. I've learned that one the hard way.

Use the official manual for the exact code-to-action mapping. The rendered error table on page 21 of the official English manual identifies E1 to E4; Appendix D reproduces that wording. If an error concerns heat, electrical supply, a damaged component or unsafe operation, stop using the roaster until the official guidance says it's safe to continue.

## 6.5 When to Stop Using the Machine

Stop immediately if you see fire, hear an abnormal electrical sound, smell burning that is not ordinary roasting smoke, find a damaged plug or lead, or see damage to the chamber or another safety-critical part. Unplug only if it is safe to do so, keep clear of the hot machine and follow the manufacturer's emergency or service guidance.

I also stop when a chaff blockage, unexplained smoke or a repeated error can't be resolved through the documented visible checks. I don't run another roast just to see whether the fault repeats.

I'm being deliberately conservative here. This guide can help you recognise a stop-use decision, but neither it nor I can diagnose internal electrical, thermal or mechanical faults.

## 6.6 Repair and Returning to Service

Gene Café's safety guidance directs owners to authorised service for faults that go beyond normal cleaning, fitting and visible pre-roast checks, and I follow that boundary myself. Don't treat a troubleshooting note as permission to dismantle, modify or repair the machine yourself.

When I seek service, I provide the model and regional rating information, a clear symptom description, the exact error message if any, roast conditions and photos of visible issues where it's safe to take them. I keep the service record with the machine's roast history.

After authorised work or a significant part replacement, I return to roasting cautiously. Check that all accessible parts are correctly fitted, follow the normal 2.6 pre-roast routine and make a fresh, well-recorded reference roast. Don't assume an earlier profile is automatically a comparable baseline after a repair. Mine wasn't, once the heater changed.

## 6.7 Storage and Long Periods Out of Use

The Gene Café CBR-301 does not need a complicated storage routine. Put it away clean, dry, cool and unplugged.

In truth, mine has had very little experience of being put away. It is usually on my work surface and back in use before it has had time to gather any real dust.

Before leaving it unused:

- allow the roaster to cool fully;
- unplug it from the power supply;
- empty any remaining chaff;
- make sure washed parts are completely dry;
- place the chamber securely on its dedicated stand if it is removed from the machine.

When returning it to use, check that the chamber, chaff box, tray, side cover and vent connector are correctly fitted.

There is no need to preheat or run an empty warm-up cycle after storage. Follow the normal checks in 2.6 Before Every Roast, then begin as usual.

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## Part Seven: Field Evidence and Case Studies

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### 7.1 Three Lessons from Real Roasts

These aren't model profiles. They're three times the coffee or the machine gave me an incomplete signal, and the better call came from writing down what I actually knew, rather than pretending I knew more.

The first is about an early sound too weak to carry a finish decision. The second, in 7.1.2, is about quiet Brazilian naturals and why I started planning a fallback. The third is about not trusting the colour I saw through a moving glass chamber as the final word.

Each case is small on purpose. It records what I saw and what I did about it. Not a universal rule, and not a cup result I never wrote down.

#### 7.1.1 Early Pops That Were Not a Reliable First Crack

In an early roast, I heard a few isolated pops and wanted them to settle the question of first crack. They didn't. The sound was brief, the CBR-301's fan and rotating chamber made listening hard, and honestly, the note I wrote at the time doesn't support calling those pops a confirmed event.

The fix was simple: write the sound down as uncertain, and keep watching the rest of the roast. Colour, aroma, elapsed time, the trace on the app: together they gave me context that one isolated noise couldn't.

I don't ignore a sound like that anymore, but I don't let it carry more weight than it's earned either. A few early pops are worth paying closer attention to. They're not a reason to invent a precise development clock.

#### 7.1.2 Quiet Brazilian Naturals

On the CBR-301, some coffees hit first crack without giving you a clean starting point. These Brazilian naturals are what taught me not to keep roasting while I waited for a sound that might never show up.

One Brazilian Topazio natural gave me little more than the odd pop. I kept waiting for something clearer and let the roast run longer than I'd meant to. It finished at 17.8% weight loss, darker and more developed than anything else in this small group.

The coffee wasn't ruined. But the roast showed me a real weakness in how I was working: I'd let one uncertain sound carry far too much of the finish decision.

A Yellow Bourbon natural was just as quiet. I marked what might have been first crack, but the note I saved with the roast is honest about how uncertain that was. The coffee stayed quiet; the fan, motor and rotating chamber didn't. That one finished at 13.3% weight loss.

I tried a stethoscope on another Topazio roast. Seemed promising at the time. Mostly it just made the CBR-301's own mechanical noise easier to hear. First crack was still unclear. That roast also came in at 13.3%.

For the next Brazilian natural, I stopped trying to listen harder and changed the method instead.

Before I started, I set a fallback finish window of 12:50 to 13:10 in case no convincing crack showed up. I listened as carefully as I could, and still heard nothing I trusted. At 12:50, I started cooling, exactly as planned. It finished at 13.8%.

That's the one I'd point to. The roast didn't depend on a sound I couldn't hear, because I'd already decided what I'd do if it never came.

First crack is still useful when it's obvious. It gives you a real reference point for development. But on a quiet coffee, on this machine, it shouldn't be the only thing deciding when you stop.

The 17.8% roast is how far I can drift when I’m waiting for certainty that isn’t coming. The 13.3–13.8% roasts gave me a lighter range to compare against. None of that is a recipe for anyone else’s coffee, but it gave me boundaries an uncertain crack never could.

First crack still matters. What doesn’t work is asking an uncertain one to make the whole finish decision for you.

So: listen for it, but decide before the roast starts what you’ll do if it never gets convincing. Lean on your planned finish window, elapsed time, past results and finished weight loss. Don’t keep roasting on the hope that the coffee will eventually confirm something that may have already happened quietly.

7.1.3 The Roast That Looked Too Dark in the Chamber

One roast looked darker than I expected while the beans were still turning in the chamber. That’s an uncomfortable moment. The pull is to treat the glass as an instant verdict and react before the rest of the evidence has had a chance to catch up.

I never got a verified rested-cup result on this one, so I can’t tell you whether that dark look meant a worse coffee or nothing at all. But it still taught me something practical: chamber appearance needs context. Moving beans, reflected light, smoke, what stage of the roast you’re at, hot coffee in the machine versus cooled beans on a tray: all of it can change what you think you’re seeing.

What I do now: note the worry, make the cooling call deliberately anyway, and look at the coffee again once it’s cooled. Let the actual brew decide whether that visual cue deserves more weight next time. One alarming glance shouldn’t get to become a conclusion on its own.

7.2D Learning Through the First Seven Roasts

Optional deep dive

The first seven records are most useful as a chronology of learning, not as seven polished experiments. They show an owner discovering which app fields mattered, how uncertain sound markers could be and why a roast note needed to preserve what was believed at the time.

| Stage                  | Developing practice                                          | Evidence limit                                 |
|------------------------|--------------------------------------------------------------|------------------------------------------------|
| Initial operation      | Learning the front controls, app record and cooling sequence | Early markers reflect developing judgement     |
| First comparisons      | Noticing timing, displayed-temperature and load differences  | Coffees and conditions were not always matched |
| Better notes           | Recording uncertainty instead of correcting it later         | Notes do not prove internal machine behaviour  |
| Repeatability question | Beginning to separate settings, starting state and result    | Cup outcomes remain sparse                     |

The chronology should be read in its original direction. An early pop that was uncertain then remains uncertain now. A later understanding can explain why the note was limited, but it cannot rewrite the source as though the owner had already reached that conclusion.

The practical gain was a better method: retain the raw record, describe the observation plainly and choose one useful question for the next roast.

7.3D The Quiet Brazilian Natural Series

Optional deep dive

The connected Brazilian-natural records show a problem that repeated in slightly different forms: first crack was difficult to hear with confidence. One Topazio natural continued while I waited for a clearer signal and finished at 17.8% weight loss. Later quiet examples finished around 13.3%, and a planned fallback finish produced 13.8%.

The useful change was procedural. Instead of relying on one sound, the later roast began with a fallback finish window to use if no convincing crack appeared. That bounded the decision without pretending that first crack did not matter.

The telemetry attached to Jo7 and Jo8 is identical. Jo8's trace therefore cannot be counted as independent comparative evidence unless the export duplication is explained. The original notes and separately verified weights can still support the experience-led lesson, but not a two-trace analysis.

These figures belong to this small series. They are not a general profile for Brazilian naturals or a universal weight-loss target.

## 7.5D Batch Size and Machine-State Experiments

### *Optional deep dive*

The available records include a higher-load case, a reduced or sample-load case and a small warm/cold pair. They should remain separate observations because they do not form one controlled experimental series.

The 52.5 g sample is below Gene Café's stated 100 g minimum. It can be recorded as a historical trial, but not recommended as a validated operating range. The warm/cold pair also uses different coffees or processes, so a trace difference cannot be assigned to residual heat alone.

For each case, retain coffee identity, process, green weight, starting displayed temperature, time since the previous roast, settings, cooling decision, roasted weight and cup outcome where available. Mark whether the export is independent and whether the load falls inside official guidance.

Taken together, the cases demonstrate why batch size and machine state belong in the log. They do not establish a numerical correction, an out-of-range recommendation or one causal model.

## Part Eight: Advanced Ownership, Limits and Future Work

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### 8.1 What Good Ownership Looks Like

Good ownership, for me, is not chasing a perfect graph or using every feature because it exists. It is understanding the machine well enough to make the next roast safer, clearer and more deliberate than the last one.

Run the basic checks. Keep the chaff and air paths clean. Stay with the roast. Then keep a note that is actually useful: the coffee, load, machine state, settings, TRT, what you saw and heard, how you cooled it and what the cup was like.

If you land on a roast you would happily drink again, that record is the only thing that gives you a fair chance of returning to it, as closely as this machine allows.

I am passionate about understanding how things work, and coffee roasting keeps rewarding that curiosity with another layer of complexity. The trick is to stay inquisitive without pretending every pattern is already an answer.

### 8.2 What Remains Uncertain

The CBR-301 gives you controls, prompts and records, but it does not explain every decision it makes. I know where the two temperature sensors sit on the project machine. I do not know every detail of how the controller filters those readings, switches the heater or calculates what the app displays.

My own evidence has limits too. Some early telemetry was duplicated, some comparisons changed more than one variable and plenty of roasts do not have a formal cupping result. A pattern can still be useful, but it should not be dressed up as proof.

That uncertainty does not weaken the project. It is the reason to keep testing. When a manufacturer document, direct measurement or repeated result answers an open question, the guide should change with it.

I read people with far more experience than me and take their work seriously. I also try not to outsource my judgement to a title, a piece of specialist language or a confident performance. Expertise matters; so does checking whether the idea applies to this machine, this coffee and the cup in front of you.

### 8.3 Where the Owner Can Go Next

The next step does not need to be technical. Repeat one coffee, keep a better note, use the same brew method and make one deliberate change. That loop teaches more than copying a complicated method whose purpose you do not understand.

Read widely and keep an open mind. Do not be intimidated by the language and theatre that can surround coffee. Ask what was actually measured, what was tasted, what changed and whether the conclusion survives on your own machine.

I have built software and hardware because I enjoy the questions and wanted better records: Green Bean Ledger, Range Finder, RoastSignal and RoastAid all came from practical frustrations. None of them is required to roast coffee well.

The simplest standard remains the most important. If you like the coffee and would drink it again, make sure you have the notes to give yourself the best opportunity to reproduce it. Be inquisitive, stay open, and most importantly, enjoy it.

## 8.3D The Advanced Owner's Toolkit

### *Optional deep dive*

The advanced toolkit is a collection of optional ways to answer specific questions. It is not a ladder that every owner is expected to climb.

My own tools grew because I wanted to preserve green-coffee details, compare roasts, inspect JSON, understand crack-like activity and make live observations easier. They should earn their place by making a decision clearer, not by making the roast look more technical.

Start with the cheapest and most reliable instrument in the room: a contemporaneous note linked to a roast you later tasted. Add software, external measurement or audio analysis only when it answers a question you can state plainly.

### 8.3D.1 Understanding and Analysing Gene Café JSON

#### *Optional deep dive*

When you export a saved Gene Café roast, the app produces a JSON file. JSON is simply structured text: labels and values that software can read more reliably than a screenshot.

The currently observed files contain these top-level fields:

| Field                       | What it contains                                                 |
|-----------------------------|------------------------------------------------------------------|
| name / time                 | Profile name and saved roast date/time.                          |
| coffeeBeans                 | Coffee description entered by the user.                          |
| input / output / weightLoss | Green weight, roasted weight and saved weight-loss value.        |
| roastingLevel               | Optional user-entered roast-level description.                   |
| targetTemp / targetTime     | Saved target settings.                                           |
| memo                        | Manual notes.                                                    |
| unit                        | Temperature unit used by the file.                               |
| images                      | Optional photographs, often embedded as very large encoded data. |
| data                        | The second-by-second or near-second-by-second roast record.      |

Each item in the data array currently uses:

| Field             | Meaning                                             |
|-------------------|-----------------------------------------------------|
| current_time      | Elapsed time in seconds.                            |
| current_temp      | The machine's recorded displayed-temperature value. |
| fan_speed         | Recorded fan level or OFF.                          |
| stirring_strength | The raw app field for drum-rotation level or OFF.   |
| isCrack           | A manual crack marker entered by the user.          |

Treat that as the currently observed schema, not a promise that every future app version will remain identical. Preserve the original file and work from a copy.

#### Useful analysis without overcomplicating it

1. Ignore or remove the images field from the working copy when you only need telemetry; it is usually what makes the file enormous.
2. Plot current\_temp against current\_time to recreate the high-level app graph.
3. Extract times to 200°C (392°F), 230°C (446°F) and any later milestone you use.
4. Record the last roasting timestamp as the available TRT or cooling transition, checking the notes for context.
5. Identify fan changes and manual crack markers.

6. Compare coffee, load, start state, settings, TRT, weight loss and cup result before comparing line shape.
7. Check for identical telemetry arrays so a duplicated export is not counted as two independent roasts. The JSON gives you a durable roast record. It does not tell you what the coffee smelled like, whether a sound was convincing or whether you enjoyed the cup. That is why the memo and your own notes matter.

### 8.3D.2 Green Bean Ledger and Range Finder

#### *Optional deep dive*

Green Bean Ledger and Range Finder grew from a simple problem: a roast is much easier to understand when the record still knows exactly which coffee went into it.

The ledger links supplier, lot, origin, process, cultivar or blend, stock and roast history. Range Finder helps locate previous examples with similar coffee, load, settings, TRT, weight loss or result.

These tools are there to retrieve my own evidence, not announce an optimum. A small history can suggest where to begin; it cannot guarantee what a different coffee or machine will do.

The useful design rule is the same as the roasting rule: preserve the original record, make corrections visible and keep the human reason for a decision alongside the numbers.

### 8.3D.3 Electrical and Environmental Monitoring

#### *Optional deep dive*

External monitoring may help record room temperature, supply voltage or other environmental context for comparisons. The measurement goal should be stated before equipment is installed: for example, whether voltage variation coincides with a materially different roast path.

Electrical installation and mains-connected monitoring belong with a qualified electrician and compliant equipment. Monitoring must not require opening, modifying or bypassing the CBR-301. The rating plate and regional manual remain authoritative for the machine's supply requirements.

The available source set does not include installer records, device configuration, calibration information or exported datasets. This guide therefore gives no wiring instructions, device endorsement or numerical conclusion.

### 8.3D.4 RoastSignal and RoastAid

#### *Optional deep dive*

RoastSignal and RoastAid came from the same stubborn problem described in 4.4: first crack can be difficult to separate from the CBR-301's own noise.

RoastSignal is for reviewing recorded audio and candidate crack-like activity after a roast. RoastAid is intended to bring that assistance into the roast in real time, helping me see when activity may be building and compare it with a planned finish.

Neither tool controls the roaster. Neither should turn an uncertain sound into a guaranteed first-crack time. The aim is more modest and more useful: give the owner another clue when their ears are asking, once again, whether that was the machine or the beans.

Any published version still needs clear inputs, exclusions, validation, failure modes and versioned output meaning. Until then, it remains an aid under development rather than a replacement for TRT, observation and judgement.

## 8.3D.5 Responsible Experimentation

### *Optional deep dive*

Begin with a question you can say in one sentence. Does a different finish time improve this coffee? Does the same coffee behave differently from a residual-heat start? Does a new note or measurement actually help you make a better decision?

Change one meaningful thing, keep the rest as stable as practical and preserve the original record. Include coffee, load, start state, settings, milestones, TRT, cooling, weight loss and cup result.

Do not be intimidated by an inconclusive result. It is often more valuable than a neat answer built on two changes, a missing note and a graph that happened to look convincing.

Curiosity does not remove the safety boundary. Stay within normal operation unless a separate, properly designed project has established a safe and qualified method.

## 8.3D.6 Future Measurement Work

### *Optional deep dive*

The next useful work is not automatically another sensor. Better notes, preserved JSON, verified identities, consistent start-state records and linked brewing results can answer a surprising number of questions.

External measurements such as room temperature, supply voltage, energy use or audio become worthwhile when they test a defined question. Internal modification or new sensor work belongs to a separate safety and engineering process, not casual owner guidance.

The roadmap will keep changing because the project keeps learning. That is the point. Tools should follow the question, and the question should always come back to a better understood roast and a coffee worth drinking.

# Appendices

## Appendix A Quick Start

1. Set the roaster on a stable, level indoor surface with ventilation running; stay with it.
2. Check the intake, exhaust, chaff path and mesh. Fit and empty the chaff tray.
3. Load 100–300 g of green coffee, or no more than 240 g for naturals. Remove obvious foreign material.
4. Close the chamber lid, click the chamber into place and close the chamber cover.
5. Check the power supply, recalled time and target temperature. Do not intentionally preheat.
6. Start from the front panel, or confirm an app start by pressing TEMP on the machine within one minute.
7. Acknowledge the 200°C (392°F) and 230°C (446°F) prompts within 30 seconds if you want the roast to continue.
8. Observe colour, aroma, smoke, sound, elapsed time and displayed temperature. Leave settings alone unless you have a reason to change them.
9. Begin cooling deliberately using TRT, first crack plus development when clear, previous results and the coffee in front of you.
10. For a first roast, use the documented route and let the CBR-301 complete its cooling cycle to about 60°C (140°F).
11. Record TRT, cooling method, roasted weight, weight loss and short notes while the details are fresh.
12. Taste with a consistent brew or simplified cupping method and decide what, if anything, changes next time.

Using an external bean cooler? Follow the complete hot-chamber procedure in Section 3.5, then refit the empty chamber and allow the CBR-301’s own cooling cycle to finish normally before beginning another roast.

### A first-roast starting reference

For a first roast, this is the starting point I would use from the project records. It is a starting reference, not a guaranteed recipe, and you should stay with the machine and cool earlier if the coffee or roasting environment gives you a reason.

| Item               | Starting reference                                                                                                          |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Coffee             | Washed coffee; do not use this load as a natural-coffee reference.                                                          |
| Load               | 250 g                                                                                                                       |
| Machine state      | Cold or fully cooled; record the starting displayed temperature.                                                            |
| Target temperature | 250°C (482°F)                                                                                                               |
| Programmed time    | 15:00, leaving you room to make the finish decision yourself.                                                               |
| Prompts            | Press TEMP at 200°C (392°F) and 230°C (446°F) within 30 seconds to continue.                                                |
| Finish assessment  | Begin paying close attention around 12:00. The comparable 250 g washed project roasts cooled between 12:52 and 13:15.       |
| Finish decision    | Use TRT, colour, aroma, smoke, crack if clear, and the result you planned. Do not wait indefinitely for one perfect signal. |

For the full safety and operating detail, see 2.6 and Part Three.

## Appendix B Pre-Roast and Post-Roast Checklists

### Before roasting

- Level indoor location; ventilation ready; you will remain present.

- Intake, exhaust, chaff path and mesh clear.
- Chaff tray fitted, empty and dry.
- Coffee weighed and within the stated load limit.
- Chamber clicked in; lid and cover closed.
- Correct power supply; time and target temperature intentional.
- App connected if used; physical TEMP confirmation expected.
- Starting displayed temperature noted; heat-resistant gloves and cooler or tray ready.

### After roasting

- Record TRT, finish reason and cooling method.
- If using an external bean cooler, refit the empty chamber and let the machine's cooling cycle finish normally; record a prompt follow-on roast as a warm start.
- Record roasted weight, weight loss and any contemporaneous notes.
- Empty chaff and clean accessible parts when cool.
- Add a consistent brewing or cupping result later.
- Choose one question, or no change, for the next roast.

## Appendix C Cleaning and Maintenance Schedule

| When                                       | Action                                                                  | Basis                          |
|--------------------------------------------|-------------------------------------------------------------------------|--------------------------------|
| After each roast                           | Cool, empty chaff tray and clean chamber as directed.                   | Gene Café guidance             |
| Before the next roast                      | Check that chaff route and mesh are clear; ensure washed parts are dry. | Gene Café guidance             |
| About every ten uses, or sooner if blocked | Clean wire-mesh holes.                                                  | Gene Café guidance [M18] [M19] |
| Whenever damage or unsafe fitment is seen  | Stop use and use authorised service guidance.                           | Safety boundary                |

Additional routines may be useful for an individual machine, but are project practice unless Gene Café documents the interval.

## Appendix D Troubleshooting and Error Reference

| What you see                                                    | Safe first check                                                                 | Next action                                                    |
|-----------------------------------------------------------------|----------------------------------------------------------------------------------|----------------------------------------------------------------|
| Roaster will not start                                          | Confirm power, seated chamber, closed lid and cover, and intentional settings.   | Use official troubleshooting if unresolved.                    |
| Smoke, odour or dust with chaff build-up                        | Stop when safe; inspect tray, exit and mesh after cooling.                       | Do not roast with a blocked chaff route.                       |
| App will not connect                                            | Check Bluetooth, location settings, power, proximity and other-phone connection. | Continue with normal front-panel safety checks.                |
| Error message                                                   | Record exact message, machine state, time and displayed temperature.             | Consult the supplied manual or authorised support.             |
| Fire, electrical damage, abnormal burning smell or damaged part | Stop use immediately.                                                            | Follow emergency/service guidance; do not diagnose internally. |

| Code | Official English-manual wording     |
|------|-------------------------------------|
| E1   | Check the outlet temperature sensor |
| E2   | Exit temperature overheat detection |
| E3   | Check the motor                     |
| E4   | Check the heater or fan             |

Gene Café directs the reader to clear the error with the TIME switch, turn off power and contact its service centre.

## Appendix E Printable Roast Log

Use one sheet per roast. Complete the live fields while the roast is happening, then add the cup result after an appropriate rest.

| Date / roast no.           |  | Coffee / lot               |  |
|----------------------------|--|----------------------------|--|
| Process / origin           |  | Green weight               |  |
| Machine state / start temp |  | Target temp / planned time |  |
| Fan / drum / app version   |  | Cooling method             |  |

### Milestones and observations

| Event                    | Elapsed time | Displayed temp | What I noticed / did |
|--------------------------|--------------|----------------|----------------------|
| Start                    |              |                |                      |
| 200°C (392°F)            |              |                |                      |
| 230°C (446°F)            |              |                |                      |
| Later milestone          |              |                |                      |
| First crack / confidence |              |                |                      |
| Cooling / TRT            |              |                |                      |
| Other                    |              |                |                      |

### Roast notes and finish decision

|                                                                                      |
|--------------------------------------------------------------------------------------|
| Colour, aroma, smoke, chaff, sound, warnings, setting changes and why cooling began: |
|                                                                                      |
|                                                                                      |

### Post-roast and cup

| Roasted weight       |  | Weight loss            |  |
|----------------------|--|------------------------|--|
| Cooled appearance    |  | Rest / brew date       |  |
| Brew method / recipe |  | Cup result             |  |
| Would I repeat it?   |  | One question or change |  |

## Appendix F Weight-Loss Guide

Calculate weight loss after the beans have cooled:

$$\text{Weight loss (\%)} = (\text{green weight} - \text{roasted weight}) \div \text{green weight} \times 100$$

Example:  $(250.0 \text{ g} - 215.0 \text{ g}) \div 250.0 \text{ g} \times 100 = 14.0\%$ .

Use a consistent scale and method. Record weight loss with coffee, start state, TRT and cup result. It is a comparison tool, not a quality score or precise colour grade.

For a 250 g starting load, the following table is a quick arithmetic reference. It does not define roast quality or the correct finish for a coffee.

| Roasted weight | Weight loss |
|----------------|-------------|
| 220.0 g        | 12%         |
| 217.5 g        | 13%         |
| 215.0 g        | 14%         |
| 212.5 g        | 15%         |
| 210.0 g        | 16%         |
| 207.5 g        | 17%         |
| 205.0 g        | 18%         |

## Appendix G Glossary

- App graph / temperature trace: the high-level line plotting displayed temperature against elapsed time; not a programmed roast profile.
- Chaff tray: removable collector for material released during roasting.
- Chaff path: the outlet, mesh and route that must remain clear.
- Contemporaneous note: a note made while the roast is happening or immediately afterwards.
- Displayed temperature: the changing machine value; useful as a reference but not bean temperature.
- External bean cooling: transferring hot beans to a separate cooler after initiating cooling, then refitting the chamber and completing the machine cooling cycle.
- Fan level / drum rotation speed: app settings with three levels; not published airflow or RPM measurements.
- JSON: the structured text file exported from a saved Gene Café profile.
- Reference roast: a well-recorded starting point for one coffee and machine state.
- TRT: total roast time, measured to the point cooling begins.
- Target temperature / time: selected machine settings, not guarantees of bean condition or flavour.

## Appendix H Specifications and Regional Differences

Use the rating plate and the manual supplied with your own machine as the authority for voltage, frequency, plug, electrical requirements and any regional specification.

### European specifications

The Gene Café Europe product page lists the CBR-301 for a 220–240 V, 50/60 Hz supply, with power consumption of 1,300 W and a separately listed 1,500 W heater. It gives a temperature-control range of 60–260°C (140–500°F), a maximum chamber capacity of 300 g, dimensions of 496 × 276 × 277 mm and a net weight of 7.3 kg.

The rating plate on the project's current machine states AC 230 V, 50/60 Hz and 1,500 W. This direct machine-specific evidence takes precedence for that unit. The regional product page separately lists 1,300 W power consumption and a 1,500 W heater, so those website figures should not be silently combined or treated as interchangeable. Owners should use the plate on their own machine as the final authority.

Temperature-conversion note: the official English manual pairs 230°C with 428°F. The mathematical conversion is 446°F, which is the value used throughout this guide. The manufacturer's Celsius instruction remains unchanged.

## Appendix I Manufacturer Guidance and Field Findings Register

This register keeps manufacturer guidance, field observation and working interpretation separate. A difference is recorded rather than hidden.

| Topic               | Manufacturer or app guidance                                                                         | Field or data finding                                                                                                          | Treatment in this guide                                                                                                                                                                                     |
|---------------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Batch size          | 100–300 g; maximum 240 g for naturally processed coffee. [M03] [M04] [M10]                           | Two 52.5 g sample roasts and five 250 g natural-processed roasts (J08, J09, J11, J12 and J13) exist outside the stated limits. | Keep official limits in normal guidance. Retain the small samples and the 250 g natural roasts only as clearly labelled, out-of-range historical evidence; do not present them as beginner starting points. |
| Sensor locations    | The manuals do not show the internal sensor positions.                                               | Direct inspection during heater replacement found one at the heater outlet and one at the exhaust side.                        | State the observed locations but do not call the display bean temperature or infer the control algorithm.                                                                                                   |
| App and graph       | Bluetooth monitoring/control, saved profiles, comparison, notes, photos and export/import. [A03–A13] | The graph is most useful as a clock and high-level reference.                                                                  | Explain active controls separately from the passive graph and previous-roast comparison.                                                                                                                    |
| Temperature prompts | At 200°C (392°F) and 230°C (446°F) the user must press TEMP within 30 seconds to continue. [M14]     | The prompts are repeatable machine milestones.                                                                                 | Use 200°C (392°F) and 230°C (446°F) as timing anchors, not bean-temperature phases.                                                                                                                         |
| Cooling             | Internal cooling ends at about 60°C (140°F). [M15]                                                   | External bean cooler is normal project practice; empty chamber is refitted and machine cooling completed.                      | Present it clearly as owner practice and retain the full machine-cooling step.                                                                                                                              |
| Fan behaviour       | Overheat response and cooling can force level 3. [A08] [A09]                                         | Automatic changes are common in the project records.                                                                           | Do not treat every fan change as a fault or a flavour intervention.                                                                                                                                         |
| Machine state       | Gene Café says not to preheat. [M07]                                                                 | Residual heat exists after a recent roast.                                                                                     | Record it as a starting condition, not a preheating recommendation.                                                                                                                                         |
| First crack         | App buttons create manual markers. [A08]                                                             | Stethoscope, cardboard tube and noise-cancelling headphones did not provide a reliable solution.                               | Use crack confidence plus TRT and fallback finish points.                                                                                                                                                   |
| Duplicate records   | No manufacturer claim applies.                                                                       | J07/J08 and J14/J15 contain identical telemetry.                                                                               | Do not count either pair as independent traces until provenance is resolved.                                                                                                                                |
| Roast outcome       | App can store weights, notes and images. [A10] [A11]                                                 | Formal cup notes are incomplete; normal brews are often more practical than cupping.                                           | Link the roast to a consistent brewing or cupping result before drawing flavour conclusions.                                                                                                                |

## Appendix J Roast Case-Study Tables

The early evidence set contains 18 JSON records. Weight loss is reproduced from the registered inputs and outputs; it is a comparison field, not a quality score.

| ID  | Coffee / case                             | Green g | Roasted g | WL    | Start<br>°C / °F | Data-quality note                                                  | Workbook data-quality flags                                                                                                      |
|-----|-------------------------------------------|---------|-----------|-------|------------------|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| J01 | Guatemala Bourbon, first roast            | 250.0   | 213.0     | 14.8% | 18 / 64          | Early record; embedded image                                       | 1 embedded image(s); excluded from analysis                                                                                      |
| J02 | Guatemala La Soledad Bourbon              | 250.0   | 213.7     | 14.5% | 21 / 70          | Early record; embedded image                                       | 1 embedded image(s); excluded from analysis                                                                                      |
| J03 | Guatemala La Soledad Bourbon              | 250.0   | 201.6     | 19.4% | 20 / 68          | Early record; embedded image                                       | 1 embedded image(s); excluded from analysis                                                                                      |
| J04 | Guatemala La Soledad Bourbon              | 250.0   | 212.3     | 15.1% | 28 / 82          | Early record; embedded image                                       | 1 embedded image(s); excluded from analysis                                                                                      |
| J05 | Guatemala La Soledad Bourbon              | 250.0   | 210.5     | 15.8% | 19 / 66          | Early record; embedded image                                       | 1 embedded image(s); excluded from analysis                                                                                      |
| J06 | Guatemala La Soledad Bourbon              | 250.1   | 213.9     | 14.5% | 25 / 77          | No recorded fan 2→3 transition                                     | 2 embedded image(s); excluded from analysis; No recorded fan 2→3 transition                                                      |
| J07 | Guatemala La Soledad, 300 g               | 300.0   | 252.6     | 15.8% | 21 / 70          | Telemetry identical to J08; exclude as independent pair            | Telemetry identical to Roast 8 Brazilian (1).json; 2 embedded image(s); excluded from analysis                                   |
| J08 | Brazilian Topazio natural                 | 250.0   | 205.4     | 17.8% | 21 / 70          | Telemetry identical to J07; notes/weights remain separately usable | Telemetry identical to Roast 7 300g (1).json                                                                                     |
| J09 | Brazilian Yellow Bourbon natural          | 250.0   | 216.8     | 13.3% | 20 / 68          | Quiet-crack case; embedded images                                  | 2 embedded image(s); excluded from analysis                                                                                      |
| J10 | Guatemala Bourbon, reduced load           | 193.4   | 165.2     | 14.6% | 21 / 70          | Reduced-load observation                                           | 2 embedded image(s); excluded from analysis                                                                                      |
| J11 | Brazilian Topazio                         | 250.0   | 216.7     | 13.3% | 21 / 70          | Quiet-crack/stethoscope case                                       | 1 embedded image(s); excluded from analysis                                                                                      |
| J12 | Brazilian Yellow Bourbon natural          | 250.0   | 215.4     | 13.8% | 20 / 68          | No app crack marker; planned fallback finish                       | No app crack marker; 1 embedded image(s); excluded from analysis                                                                 |
| J13 | Ethiopia Karume natural                   | 250.0   | 213.2     | 14.7% | 22 / 72          | Coffee-specific observation                                        | 3 embedded image(s); excluded from analysis                                                                                      |
| J14 | Honduras Catuai natural                   | 250.0   | 217.0     | 13.2% | 21 / 70          | Telemetry identical to J15; matched contrast blocked               | Telemetry identical to Roast 15 Honduras Catuai Natural (Development Contrast).json; 2 embedded image(s); excluded from analysis |
| J15 | Honduras Catuai natural contrast          | 250.0   | 213.4     | 14.6% | 21 / 70          | Telemetry identical to J14; cup outcome absent                     | Telemetry identical to Roast 14 Honduras Catuai Natural .json; 2 embedded image(s); excluded from analysis                       |
| J16 | Guatemala Acatenango Caturra              | 250.0   | 209.7     | 16.1% | 22 / 72          | Personal-roast observation                                         | 2 embedded image(s); excluded from analysis                                                                                      |
| J17 | Costa Rica fermented washed Geisha sample | 52.5    | 45.1      | 14.1% | 21 / 70          | Below official 100 g minimum; not a recommendation                 | 3 embedded image(s); excluded from analysis                                                                                      |

| ID  | Coffee / case                             | Green g | Roasted g | WL    | Start<br>°C / °F | Data-quality note                                                         | Workbook data-quality flags                                      |
|-----|-------------------------------------------|---------|-----------|-------|------------------|---------------------------------------------------------------------------|------------------------------------------------------------------|
| J18 | Costa Rica San Isidro 48 Red Honey sample | 52.5    | 44.3      | 15.6% | 52 /<br>126      | Below official minimum; warm start; different coffee; no app crack marker | No app crack marker; 2 embedded image(s); excluded from analysis |

Later case tables must preserve raw IDs, machine era, export provenance, exclusions and missing outcomes. A row may support a narrative observation even when its telemetry is excluded from an independent comparison.

## Appendix K Evidence Register

The evidence map contains 52 original source records. This edition also uses one official regional source and four author observation, practice and correspondence records:

| Source class                           | IDs                                                                                                                               | Count | Authority and use                                                                                                                        |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------|------------------------------------------------------------------------------------------------------------------------------------------|
| Official CBR-301 manual                | M03–M21                                                                                                                           | 19    | Manufacturer operation, safety, controls, cooling, cleaning and troubleshooting                                                          |
| Official Gene Café Europe product page | M22                                                                                                                               | 1     | Manufacturer-published European power, temperature, size, weight and chamber specifications; accessed 2 August 2026.                     |
| Official app guide                     | A03–A14                                                                                                                           | 12    | App screens, controls, markers, cooling, save and export functions                                                                       |
| Project records                        | P01–P03                                                                                                                           | 3     | Working model, data workflow and wider project context; not automatically manufacturer fact                                              |
| Roast JSON records                     | J01–J18                                                                                                                           | 18    | Direct early-roast data and operator-entered context, subject to provenance and completeness checks                                      |
| Author observation and correspondence  | AUTHOR-OBS-SENSOR-001; AUTHOR-OBS-COOLING-001; AUTHOR-CORR-COOLING-001; AUTHOR-PRACTICE-CLEANING-001; AUTHOR-OBS-RATING-PLATE-001 | 5     | Direct inspection, personal cooling and cleaning practice, Gene Café contact, and the project machine's photographed 230 V rating plate. |

Every claim prepared for publication should record:

- claim or section reference;
- source ID and exact location or field;
- evidence class: manufacturer, observation, interpretation or open question;
- confidence and known limitation;
- whether the source is independent, duplicated, incomplete or excluded;
- review status, revision date and affected chapters.

New evidence does not silently replace an earlier contradiction. Add the source, record the conflict, identify affected claims and run proportionate review. Approved text remains locked until the project's exception protocol is followed.

Evidence reserved for later revisions includes broader ventilation records, later machine-era exports, repair documentation, verified Honduras provenance and cup outcomes, matched warm/cold records, and RoastSignal/RoastAid validation files.

Deferred evidence topics for a later revision: matched development contrasts, the Honduras development comparison, heater-replacement and machine-era analysis, and the repair-to-replacement chronology. The available records do not yet support those case studies, so they have been removed from the reader-facing edition rather than padded with speculation.

### Evidence key by section

The main text is kept readable by moving production identifiers here. The source-class register above explains the prefixes: M for official manual and manufacturer material, A for the app guide, J for roast JSON records, P for project records, and AUTHOR for direct observation, practice or correspondence. Section-specific MFG, OBS, INT, NOTE and BOUND identifiers retain the original audit trail.

| Section                                                    | Evidence identifiers                                                    |
|------------------------------------------------------------|-------------------------------------------------------------------------|
| 1.1 The CBR-301 in Plain English                           | Mo3; Mo4; Mo8; Mo9; M12; M13; A03–A14; M10; M14; M15; A08; A09          |
| The Parts You Handle                                       | Mo5; Mo8; Mo9                                                           |
| The Practical Air Path                                     | Mo8; Mo9; AUTHOR-OBS-SENSOR-001                                         |
| Where the Temperature Sensors Sit                          | AUTHOR-OBS-SENSOR-001                                                   |
| What to Check Before Roasting                              | Mo6; Mo8; M10; M11; M18; M19                                            |
| 1.4 A Practical Operating Model                            | Mo7; Po1                                                                |
| 1.5 What the Temperature Display Represents                | M14; A06; Jo1–J18; AUTHOR-OBS-SENSOR-001                                |
| Known                                                      | AUTHOR-OBS-SENSOR-001                                                   |
| 2.1 Core Safety Principles                                 | Mo6; Mo7; M10; M11; M21                                                 |
| 2.2 Choosing the Roasting Location                         | Mo6; Mo7; Mo8; M12                                                      |
| 2.3 Ventilation and Smoke Management                       | Mo7; Mo8; Mo6; M18; M19                                                 |
| 2.4 Electrical Supply                                      | M12; AUTHOR-OBS-RATING-PLATE-001; Mo7; Mo6; M20                         |
| 2.5 Know the Parts Before Roasting                         | Mo5; Mo8; Mo9; M11                                                      |
| 1. Place and airflow                                       | Mo6; Mo7; Mo8                                                           |
| 2. Chaff and cleanliness                                   | Mo8; M18; M19                                                           |
| 3. Coffee and chamber                                      | M10; M11                                                                |
| 4. Power, settings and app                                 | Mo7; M12; A03; A07                                                      |
| 2.6R Pre-Roast Checklist                                   | Mo6; Mo7; M10; M11; M12                                                 |
| 3.1 Front-Panel Controls                                   | 3.1-MFG-001                                                             |
| The TIME Control                                           | 3.1-MFG-002; 3.1-MFG-003; 3.1-MFG-004; 3.1-MFG-005                      |
| The TEMP Control                                           | 3.1-MFG-006; 3.1-MFG-007; 3.1-MFG-008; 3.1-MFG-009                      |
| 3.2 The Gene Café App                                      | A03–A09; A10–A13; A03                                                   |
| 3.2D What the App Graph Actually Shows                     | A06; A10–A13                                                            |
| Set the roast                                              | A07                                                                     |
| Acknowledge the machine milestones                         | M14                                                                     |
| 3.4 Changing Settings During a Roast                       | M13; A08                                                                |
| The documented Gene Café route                             | M15; A09                                                                |
| Optional external bean-cooling method                      | AUTHOR-OBS-COOLING-001                                                  |
| 3.6 Completing the Roast Record                            | A10–A13                                                                 |
| 4.4 First Crack: Useful, Imperfect and Sometimes Inaudible | A08                                                                     |
| 4.5 Fan and Drum-Speed Changes                             | 4.5-GC-003; 4.5-GC-005; 4.5-OBS-017; 4.5-GC-006; 4.5-GC-004; 4.5-GC-008 |
| 4.6 Chaff, Smoke and Processing Method                     | Mo8; M18; M19; M10                                                      |
| 4.7 Cold Starts, Residual Heat and Warm Machines           | Mo7                                                                     |

| Section                                               | Evidence identifiers                                                                                                                                                    |
|-------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4.7D Warm-Start and Machine-State Experiments         | M07                                                                                                                                                                     |
| 5.4 Batch Size and Chamber Loading                    | M03; M04; M10                                                                                                                                                           |
| 5.4D Maximum, Reduced and Sample-Batch Experiments    | M10                                                                                                                                                                     |
| 5.6 Different Coffees Behave Differently              | M10                                                                                                                                                                     |
| 6.1 Routine Cleaning                                  | 6.1-MFG-006; 6.1-MFG-012                                                                                                                                                |
| After each roast                                      | 6.1-MFG-004; 6.1-MFG-011                                                                                                                                                |
| My regular cleaning practice                          | AUTHOR-PRACTICE-CLEANING-001                                                                                                                                            |
| Cleaning the chaff box and mesh                       | 6.1-MFG-006; 6.1-MFG-012; 6.1-MFG-007; 6.1-MFG-008; 6.1-MFG-009; 6.1-MFG-005                                                                                            |
| 6.3 Troubleshooting by Symptom                        | M11; M12; M18; M19; A03; A07; M20; M21                                                                                                                                  |
| 6.4 Error Messages and Immediate Action               | M20; M21                                                                                                                                                                |
| 6.5 When to Stop Using the Machine                    | M06; M07; M21                                                                                                                                                           |
| 6.6 Repair and Returning to Service                   | M06; M07; M20; M21                                                                                                                                                      |
| 6.7 Storage and Long Periods Out of Use               | 6.7-MFG-001; 6.7-MFG-002; 6.7-OBS-001; 6.7-BOUND-002; 6.7-MFG-004; 6.7-MFG-003; 6.7-MFG-005; 6.7-MFG-006; 6.7-MFG-007; 6.7-MFG-008                                      |
| 7.1.1 Early Pops That Were Not a Reliable First Crack | J01                                                                                                                                                                     |
| 7.1.2 Quiet Brazilian Naturals                        | 7.1.2-NOTE-001; 7.1.2-NOTE-002; 7.1.2-OBS-001; 7.1.2-INT-002; 7.1.2-OBS-002; 7.1.2-OBS-003; 7.1.2-NOTE-003; 7.1.2-OBS-004; 7.1.2-NOTE-004; 7.1.2-INT-003; 7.1.2-INT-004 |
| 7.1.3 The Roast That Looked Too Dark in the Chamber   | J15                                                                                                                                                                     |
| 7.2D Learning Through the First Seven Roasts          | J01–J07                                                                                                                                                                 |
| 7.3D The Quiet Brazilian Natural Series               | J08; J09; J11; J12                                                                                                                                                      |
| 7.5D Batch Size and Machine-State Experiments         | J07; J10; J17; J18                                                                                                                                                      |
| 8.3D.3 Electrical and Environmental Monitoring        | M06; M07                                                                                                                                                                |
| Appendix A Quick Start                                | M10                                                                                                                                                                     |
| Appendix D Troubleshooting and Error Reference        | M21                                                                                                                                                                     |
| European specifications                               | M22; AUTHOR-OBS-RATING-PLATE-001                                                                                                                                        |

## Appendix L Sources, Acknowledgements and Publication Information

### About this guide

This independent field guide was written by Warren Matthews for Coffee | One Roast at a Time. It brings together the official Gene Café CBR-301 manuals and app guidance, direct inspection of the project machine, recorded roast data and the practical lessons learned through repeated home roasting. It is written for ordinary owners who want to understand what the machine is doing without pretending it offers laboratory certainty.

### Independence and trademarks

Coffee | One Roast at a Time is independent of Genesis Co., Ltd., Gene Café and their distributors. Gene Café, Genesis and CBR-301 names and marks belong to their respective owners. Their use here identifies the machine discussed; it does not imply sponsorship, approval or manufacturer authorship. Where this guide describes my own practice, it is labelled and should not be mistaken for manufacturer instruction.

### Sources and evidence

The guide uses the official CBR-301 owner's manual, the official Gene Café app guide, manufacturer-published European specifications, the project evidence map, registered JSON roast exports, direct photographs and documented owner observations. Manufacturer guidance, direct observation, interpretation and open questions are kept separate. The section-by-section evidence key in Appendix K preserves the detailed identifiers without cluttering the reading text.

### Photographs and diagrams

Unless a caption states otherwise, photographs and diagrams were created from the Coffee | One Roast at a Time project machine and project roast records. Manufacturer manual artwork has not been reproduced as project photography. Image captions identify where a photograph is illustrative rather than calibrated or universally representative.

### Acknowledgements

Thanks are due to the Gene Café owner community and to the people who shared practical questions, comparisons and observations that helped sharpen this guide. Particular thanks go to David Meyer for thoughtful peer discussion around repeatability, machine behaviour and the realities of learning the CBR-301 by use rather than by theatre.

### Edition and contact

Edition: Version 1.0, first edition, August 2026. Project: Coffee | One Roast at a Time. Website: oneroastatotime.com. Corrections and evidence updates should identify the guide version, section number and the source or observation supporting the change.

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