

Test Results for Lotus Elise heater by-pass

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Subject: Testing of the effectiveness of the heater bypass modification

Conditions:

94-96 degrees ambient

Testing from 3:30 PM to 6PM

Heat Index 108 degrees (very high humidity)

**Used dual temperature thermometer – one probe 4-5 inches in AC vent,
other probe in cockpit (ambient cockpit temp)**

Non contact thermometer used for checking various temps in cockpit area

I made several tests with and without the bypass valve engaged. Most tests lasted between 10 and 20 minutes (hopefully enough to stabilize results).

Begin Bypass Valve Effectiveness Testing

Test 1 – 15 minutes easy driving (45-55)

Bypass engaged. Temp control to full hot. Check vent temperature.

Results – Temp leveled out at 104.2

Test 2 - 15 minutes easy driving (45-55)

Bypass engaged. Turned Temp switch to off (cool). Check vent temperature

Results – Temp approximately 104.2

Test 3 - 15 minutes easy driving (45-55)

Bypass disengaged. Temp control off (cool). Check vent temperature

Results – Temp leveled out around 109.2

Test 4 - 5-7 minutes of moderate to hard acceleration and deceleration.

Bypass disengaged. Temp control off (cool). Check vent temperature

Results - Highest temp was 111.4

Worst case temp difference was 104.4 (bypass engaged) to 111.4 (bypass disengaged)

End Bypass Valve effectiveness testing

Begin Bypass Valve effectiveness when combined with AC

**Test 1 – Begin test with cockpit temp 102.3, vent temp 110
Engage bypass. Turn on AC. Drive 20 minutes
Results – Cockpit temp 81.7, vent temp 55.9 (at the lowest)**

Observation – Compressor must have cycled off two times. Saw vent temp pop up to 61-62. Lasted a minute or so each time.

**Test 2 - Extended run (20 more minutes added onto Test 1 (bypass engaged, steady driving).
Results - Vent temp 55.7 (best)**

**Test 3 – Repeat test 2 with bypass disengaged
Results - Vent temperature 58.8 (best)**

**Test 4 - 3-4 minute idle (had to get gas!), then 10 minute easy driving
Results - Vent temp from 59 to 68 degrees at end of idle period
After 10 minutes of easy driving vent temp 59.8 (best)**

**Test 5 – Repeat test 4 (idle for 3-4 minutes or until vent temp is 68).
Results - Vent temp reached 68 in less than two minutes! Engaged bypass. After 10 minutes of easy driving vent temp 57 degrees (best)**

**Test 6 – Idle 2-3 minutes with bypass engaged, then 10 minutes of easy driving
Results - Vent temp came up while idling, but much slower than when bypass was disengaged. After idle time, drove-off and noted that vent temp recovered to 59.8 within 1 mile. This had taken a full 10 minutes in a similar test with bypass disengaged (test 4 above).**

Observations

- 1) Indicated engine temperature varied only between 187 and 192 regardless of circumstances.**
- 2) Bypass resulted in a range of AVERAGE improvement from 4 to 6.5 degrees depending on the circumstances.**
- 2) The vent temps were always cooler with the bypass engaged**
- 3) The recovery time from idle (how long to get back to best vent temp after drive-off) was significantly quicker when the bypass was engaged**
- 4) The firewall temperature, especially around the top of the driver's left foot was 6 degrees cooler on average when the bypass was engaged (110 vs. 104).**

Conclusion:

- 1) 5+ degree improvement on average using the bypass (steady speed, hard running, idling)**
- 2) Quicker recovery time from heat soak during idle periods (3x better in the one test made, may be a bit optimistic)**

3) Firewall is cooler when bypass is engaged (6 degrees cooler consistently in front of my left foot)

So for me, it was definitely worth making the mod. 5 degrees when you're talking about a possible AC cabin range of maybe 20 degrees is a large improvement. While it doesn't freeze you out, it is now comfortable, even on one of the worst days here in central Florida. Add on that the firewall was cooler, making the starting (no AC) cabin temp cooler. This will raise the effectiveness of the AC considerably. If you start from a lower cabin temperature, you have a better chance of getting a lower ultimate cabin temp). Using that same statement I made about the AC having an effective range of 20 degrees or so, makes this factor big ($100-20 = 80$ vs. $94-20 = 74$). Plus that hot temp is right on your lower legs and feet making it very uncomfortable. Those lefty driving Brit Bastids probably did this on purpose!

I actually saw 77 degrees in the cabin at 5:45 when the outside temp was still 94. I can live with that.

Fin.