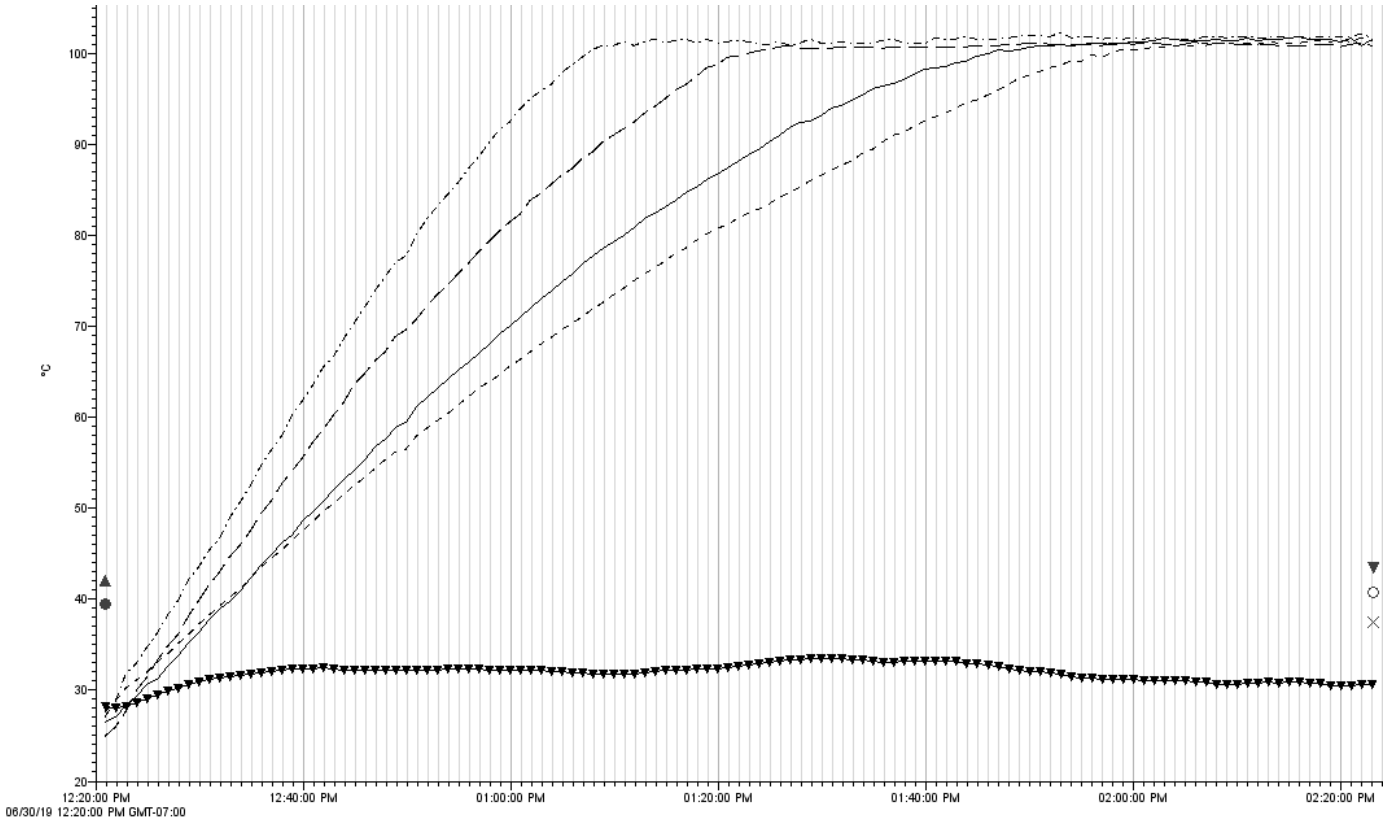
Haines 1 and 2 Heat 60% and 100% Faster than CooKit and Hot Pot
Roger Haines Del Mar California June 30-July 1, 2019

First test: At noon on June 30, 2019, in Del Mar, California, we conducted a side-by side test of a Haines 1 and 2 solar cooker, and two CooKits. The four cookers were set up on a single piece of cardboard in the shade. The sun was about 80 degrees directly overhead. The sky was clear with an occasional breeze.

Identical 4 ½ liter stainless steel Haines Dutch ovens with glass lids were placed in each cooker. Each pot had one liter of water from a common bucket. The two Haines cookers and one CooKit used a Haines cooking sleeve and circular cover, though the cover did not fit the CooKit well. The other CooKit enclosed the pot in a plastic cooking bag, on a 1-inch-high wooden trivet, with no Haines cover. Both CooKits were set for high sun—the front flap was up as high as it would go. The Haines 2 was set for high sun (red snaps). The Haines 1 was not adjusted in any way.

A thermocouple wire was inserted through the steam vent in each glass lid, into the water. The wires were connected to a HOBO Onset 4-channel thermocouple logger. The logger was started at 12:21 p.m., and the cardboard with the four cookers was pulled into the sun.

Observations: As shown by the bottom line of the graph below, the ambient temperature was around 30 C. throughout the test,. The Haines 2 boiled the water in 48 minutes, followed by the Haines 1 in 65 minutes, the CooKit with the Haines cooking sleeve and circular cover in 86 minutes, and the CooKit with the plastic bag in 100 minutes. The cardboard was turned four times during the test, to follow the sun. Note that below 40 C., the CooKit *with* the circular cover heated more slowly than the Cooker *without* the circular cover. But above 40 C. the CooKit with the cover heated faster—apparently because the cover retains more heat than it blocks at temperatures above 40 C. This confirms earlier tests showing similar results. Thus it appears that the performance of the CooKit can be improved by replacing the plastic bag with a Haines Cooking sleeve and circular cover. However, even with these improvements, the CooKit took 21 minutes longer than the Haines 1 to boil the water.

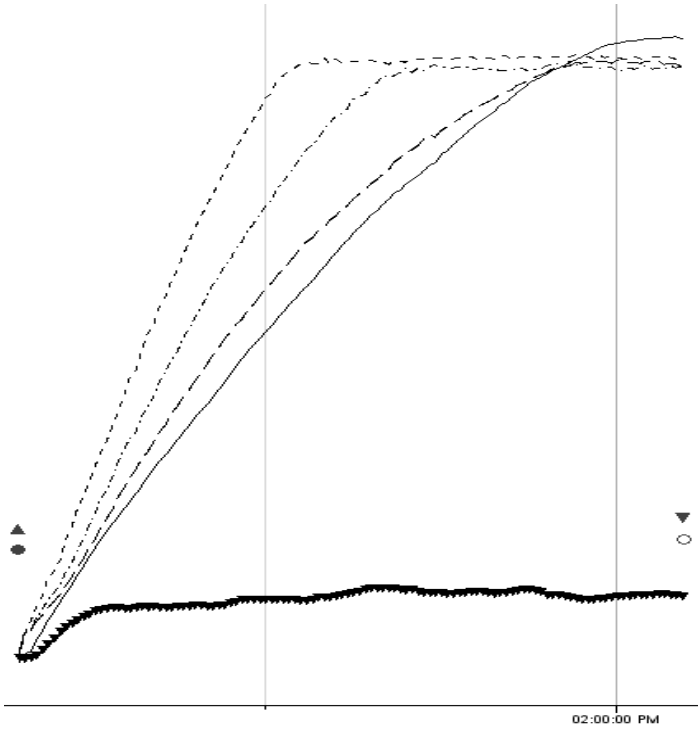


Conclusion: When the sun is high in the sky, the Haines 2 can boil a liter of water in 48 minutes—more than twice as fast as the CooKit with a plastic cooking bag. In the same conditions, the Haines 1 can boil a liter of water in 65 minutes, i.e., in only 65 percent of the 100 minutes it takes for the CooKit with a plastic bag.

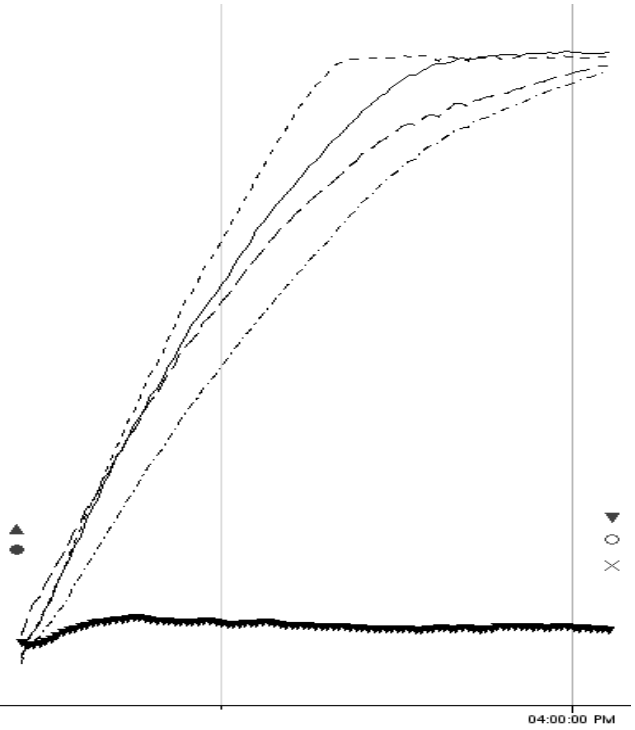
Second test: We wanted to see whether these results could be replicated, and we also wanted to add a Hot Pot to the test. Accordingly, the next day, July 1, 2019, we conducted a side-by-side test of the Haines 1 and 2 compared to a Hot Pot and CooKit. Again, the pots in each cooker were identical—a 4 ½ liter Haines Dutch oven with a glass lid. Three of the pots were enclosed in a Haines cooking sleeve. The CooKit pot was enclosed in its recommended plastic cooking bag. Because the June 30 test indicated that the performance of the CooKit could be improved by the addition of a Haines circular cover, we added Haines covers to the CooKit and Hot Pot. The covers did not fit well, and we did not connect them in any way to the cookers. Fortunately, there was no wind, so the covers stayed on during the test. The cookers were set up in the shade, with a liter of water in each pot. Thermocouple wires were inserted through the steam vent in each lid, into the water. The wires were connected to a 4-channel HOBO Onset thermocouple logger. At 12: 18 pm, the logger was started and the cardboard with the four cookers was pulled into the sun.

Observations: As shown by the dark line at the bottom of the left graph below, the ambient temperature during the test was around 33 C. At 1:05 p.m., the Haines 2 reached boiling in 47 minutes, followed by the Haines 1 in 69 minutes. The Hot Pot heated faster than the CooKit, but halfway through the test, the CooKit's thermocouple began to show a gradual increase, so that it registered boiling at the same time as the Hot Pot—in 92 minutes—and then continued upward to 104 C. Based on our experience from previous tests, we believe that—in turning the cookers to follow the sun—we jostled the CooKit's thermocouple wire so that it became partially exposed to the air. Otherwise, the CooKit would likely have taken longer than 92 minutes to reach boiling.

Conclusions: At midday on a hot summer day, the Haines 2 boiled a liter of water in 47 minutes—about twice as fast as a "Haines cover-assisted" CooKit and Hot Pot. At the same time, the Haines 1 boiled the water in 69 minutes—about 65% faster than the CooKit and Hot Pot.



Second Test 12:18 p.m.



Third test 2:26 p.m.

Third test: We wanted to know whether these results would be similar if the test were conducted later in the day, when the sun was lower. Accordingly, the first test was stopped at 2:11 pm, and the cardboard with the cookers was pulled into the shade. The pots were emptied and refilled with cold water from a common bucket. Because of the earlier malfunction, the thermocouple wires for the Haines 1 and CooKit were swapped. The Haines 2 was set for low sun (blue snaps). The front of the Haines 1 was pushed down with a stick and a brick (see

photo), and the front panel of the CooKit was lowered. The Hot Pot could not be adjusted. At 2:26 p.m., the thermocouple logger was started, and the cardboard with the four cookers was again pulled into the sun.

Observations: The ambient temperature during the second test was around 29 C., as shown by the dark line on the bottom of the "Third Test" graph. At 3:18 p.m., the Haines 2 reached boiling in 52 minutes, followed by the Haines 1 in 69 minutes, and the Hot Pot and CooKit in about 96 minutes. Once again, the Hot Pot heated faster than the CooKit, but it faded near the end. This may have been because the Hot Pot could not be adjusted for the lower sun angle as the sun descended, and/or because the "Haines cover" did not fit the Hot Pot as effectively as the CooKit, and therefore did not retain heat as effectively at high temperatures.

Conclusion: In the mid-afternoon on a hot summer day, the Haines 2 boiled a liter of water in 52 minutes—almost twice as fast as a "Haines cover-assisted" CooKit and Hot Pot. At the same time, the Haines 1 boiled the water in 69 minutes—about 60 % faster than the CooKit and Hot Pot.

Overall conclusion: The Haines 2 consistently heats a liter of water 100 percent faster and the Haines 1 heats water 60 percent faster than the CooKit and Hot Pot. These results are consistent regardless of whether the sun is directly overhead, or in the mid-afternoon when the sun angle is lower.