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## PROTECT HARD DRIVES AGAINST COLD WATHER HAZARDS

HP INC

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## Protect Hard Drives Against Cold Weather Hazards

Regular laptops have been designed to work within a safe temperature range - normally 10 - 35 degrees C. This range refers both to optimal usage temperature of the outside environment and the temperature the laptop should be warmed to before using. (Your life in cold environment.) Protecting laptop from cold weather is important and you should know how to protect laptop from cold weather.

Hard drive can exist perfectly well in extremely cold temperatures in a nonoperational state. But the issue is when it is made operational -- or spun up. That is where the window of failure opportunity exists.

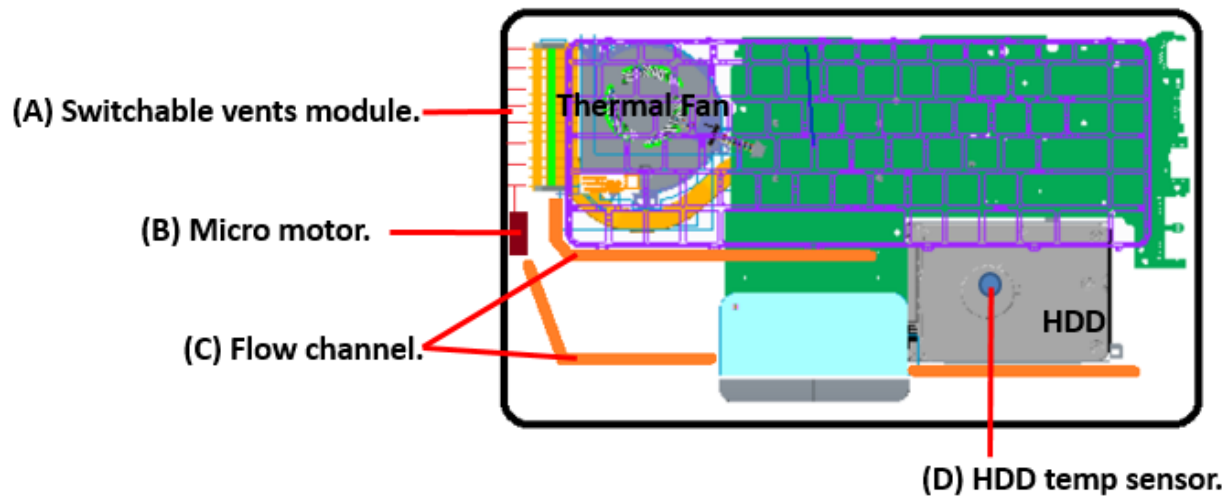
We are developing one solution to protect Hard Drives against cold weather hazards.

By using this solution of protect hard drives against cold weather hazards, you will;

- 1) Protect Hard Drives against cold weather hazards.
- 2) Without heater → (a) No cost addition. (b) No impact system Z height dimension.
- 3) Good user feeling. Palm-rest area has been kept in relatively warm temperature.

Hard Drives protection solution for cold weather:

- Concept:

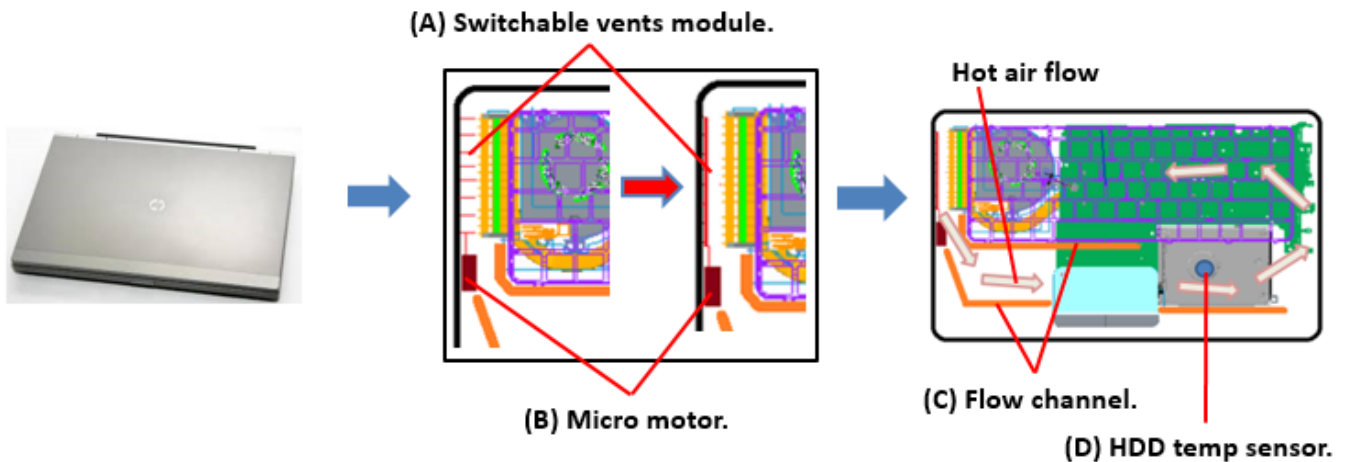


- (A) Switchable vents module.
  - Open: Exhaust hot air through vents.
  - Closed: - Closed: Channeling hot air to stay at system room.
- (B) Micro motor: Controlling switchable vents module.
- (C) Flow channel.
- (D) HDD temp sensor.

● Operating principles:

By changing the power settings from power save mode will help keep the laptop warm as it continues to run. Keep CPU in light loading, and keep thermal fan spinning then guide thermal air flow to HDD.

- (1) When end user closed hinge-up.
- (2) Micro Motor (B) control Switchable vents module (A) into closed mode.
- (3) Hot air will follow Flow channel (C) to HDD area.
- (4) HDD temp sensor (D) will monitor HDD temp. (Let HDD temp stay in 10 - 35 degrees C.)

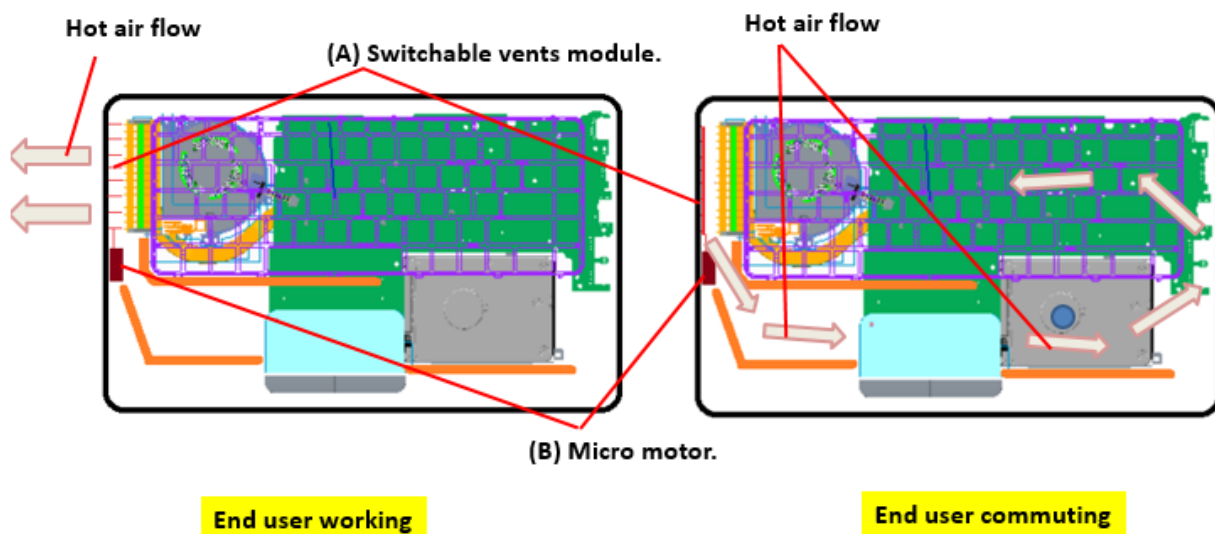


- End user commuting

Micro Motor (B) control Switchable vents module (A) into closed mode.

- End user working

Micro Motor (B) control Switchable vents module (A) into open mode.



***Disclosed by Ben Chuang, Edward Chen and Wen-Hsiang Chen, HP Inc.***