

OE-3: 2018-02

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Hard Drives Soldered to Logic Boards Pose Potential Issues at Computer End-of-Life

PURPOSE

This Operating Experience Level 3 (OE-3) document provides information on potential environmental, health and safety, and security concerns related to removal of computer hard drives that are soldered to logic boards.

BACKGROUND

In May 2017, staff from Sandia National Laboratories provided information from their Information Technology staff that certain computer laptop products had the main storage device (i.e., hard drive or solid state drive) welded to the main computer circuit board (i.e., logic board or motherboard).

This information was confirmed in discussions with electronics reuse and repair experts, and manufacturers.

DISCUSSION

There are two circumstances which may require the removal of a hard drive from a computer. One occurs with early failure or corruption of the hard drive. In this circumstance, the hard drive needs to be replaced but the remainder of the computer is likely operable. The second occurs at end-of-life. As a security precaution, hard drives may be removed from computers, prior to reuse or recycling, to facilitate media sanitization and, in some cases, complete destruction (e.g., shredding).

Typically, hard drives are slotted and/or screwed into the logic board, framing, or casing of a computer, and can easily be removed with commonly available tools. If a hard drive is soldered to the logic board, removing, disposing of, and replacing the hard drive necessitates removing, disposing of, and replacing the logic board as well.

In the case of hard drive early failure, the remainder of the product could likely continue to function as new with a replacement hard drive. While paying to replace a hard drive may be relatively inexpensive and cost effective, paying for a new hard drive/logic board combination begins to approach the cost of a new computer, and therefore may not be cost effective. Replacing the main logic board is also significantly more complicated than replacing a hard drive, and such technical expertise may not be available on site, adding to the replacement cost.

In the case of preparing for product reuse and recycling, removal of a soldered hard drive/logic board combination presents problems throughout the disposition process. Logic boards contain potentially hazardous materials which are generally not present in hard drives. In cases where security protocols require shredding of computer hard drives, shredding of a permanently attached logic board poses risks and necessitates additional management. Intact circuit boards must be stored in containers which prevent release of hazardous materials, and cannot be stored for more than one year. Mercury switches and batteries must be removed from

circuit boards prior to shredding, and those removed components must be handled as hazardous waste. Occupational health and safety precautions are necessary when preparing and shredding circuit boards. On-site equipment for hard drive shredding, and private contractors which provide shredding services on-site, may not be equipped to handle circuit boards and may not be able to provide the necessary precautions and protections for handling potentially hazardous materials.

Additionally, the removal of the logic board significantly reduces the value of the computer, for both reuse and recycling. A computer without a logic board and hard drive is not a good candidate for donation or sale. The logic board also contains some of the most valuable materials for recyclers, so the removal of the logic board makes a computer less valuable for a recycler as well. This may have implications for recycling contracts where the presence of valuable materials offsets the costs of transportation, handling and processing of less valuable materials.

CONCLUSION

Purchasing computer products in which the hard drive is soldered to the logic board may present environmental, health and safety, and security concerns when attempting to handle the hard drive at its end-of-life.

RECOMMENDATIONS

If your computer inventory currently includes products with hard drives soldered to the logic board, develop procedures and protocols for handling the hard drive/logic board combination, should it need to be removed. This may require handling these products under the procedures and protocols developed for media sanitization and reuse/recycling of tablets, which also typically do not have removable hard drives.

For future Federal procurement of computer products, work with your Federal contracting staff to develop requirements and specifications, where appropriate, to address the risks and consequences associated with having the hard drive soldered to the logic board.

For current Federal contracts that require contractors to purchase computer products on an ongoing basis, work with your Federal contracting staff to provide prospective in-scope direction to the contractors to address the risks and consequences associated with having the hard drive soldered to the logic board or, consistent with applicable laws and regulations, modify existing contracts to achieve that end.

REFERENCES

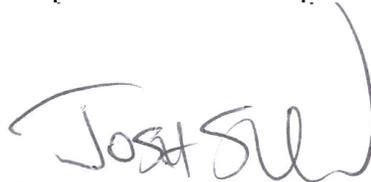
U.S. Environmental Protection Agency, Sustainable Management of Electronics, <https://www.epa.gov/smm-electronics>

iFixit, Teardowns, <https://www.ifixit.com/Teardown>

ADDITIONAL SOURCES OF INFORMATION

Questions regarding this OE-3 document can be directed to Cate Berard at (202) 586-2334 or e-mail cate.berard@hq.doe.gov.

This OE-3 document requires no follow-up report or written response.



Josh Silverman
Acting Director
Office of Environmental Protection and
ES&H Reporting
Office of Environment, Health, Safety and Security

