

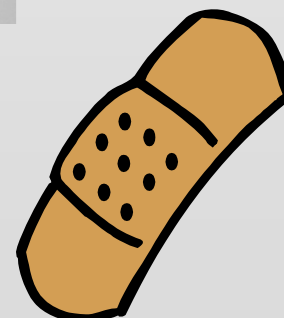
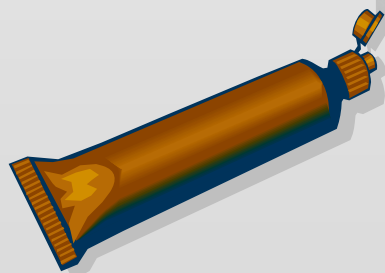
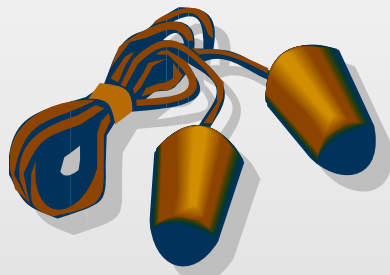


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Medical Consumables Tracking (MCT) ISS Science Symposium

June 10, 2014





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Project Overview



The Exploration Medical Capability (ExMC) Element of the Human Research Program (HRP) works to mitigate the inability to adequately treat an ill or injured crewmember.

In order to treat an ill or injured crewmember, the proper supplies have to be available in the necessary quantities. As a result, HRP desires a system which tracks medication and medical consumables usage during both ISS and exploration missions to develop a baseline for use in planning long duration missions.

The Medical Consumables Tracking (MCT) system will track medications and medial supplies located in CHeCS RSR (Resource Supply Rack) locker on ISS to provide a baseline for medication and medical consumable planning for long duration missions.

The MCT system will utilize a Radio Frequency Identification (RFID) system comprising of a reader/scanner/interrogator, antennas, a transponder, and a single board computer.



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HRP Gap that MCT Addresses



Gap 4.14 - We do not have the capability to track medical inventory in a manner that integrates securely with the medical system during exploration missions



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Concept of Operations (on-orbit)

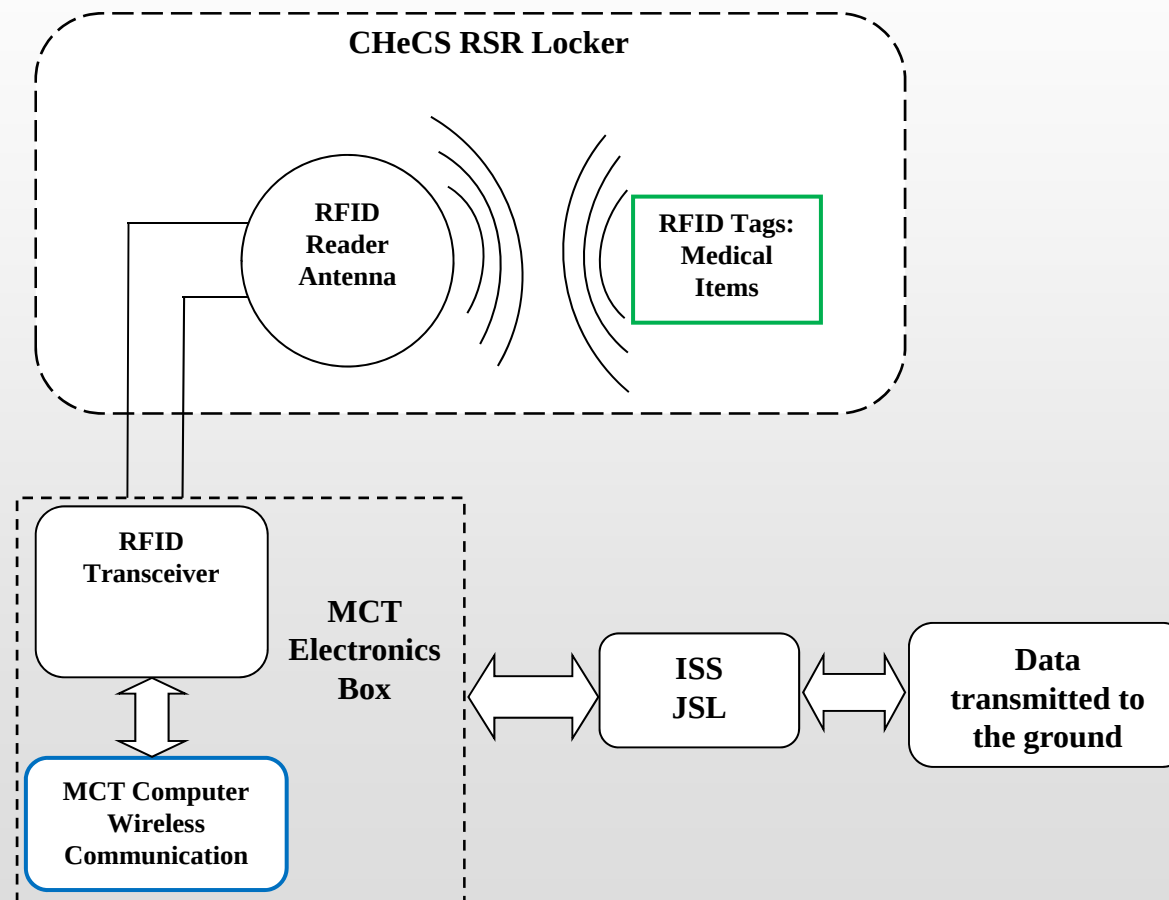


- RFID tags are attached to the contents of the Convenience Medications Pack (pharmaceuticals), and foam ear plugs, which are kept in a CHeCS RSR (Resource Supply Rack) locker
- MCT Hardware installed inside the CHeCS RSR locker and on the outside of the locker door
- The crew will access medications and consumables as before (no procedural changes)
- MCT system will turn on and read (perform inventory) RFID tagged items in the locker once every 30 days
- The inventory report (RFID tag numbers only) is transmitted wirelessly to the Joint Station LAN then downlinked to the HMS Inventory Tracking Tool (HITT) database that has tag id to item id cross-reference info
- The crew can perform an immediate inventory via a switch located on the Electronic Box



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MCT Technology



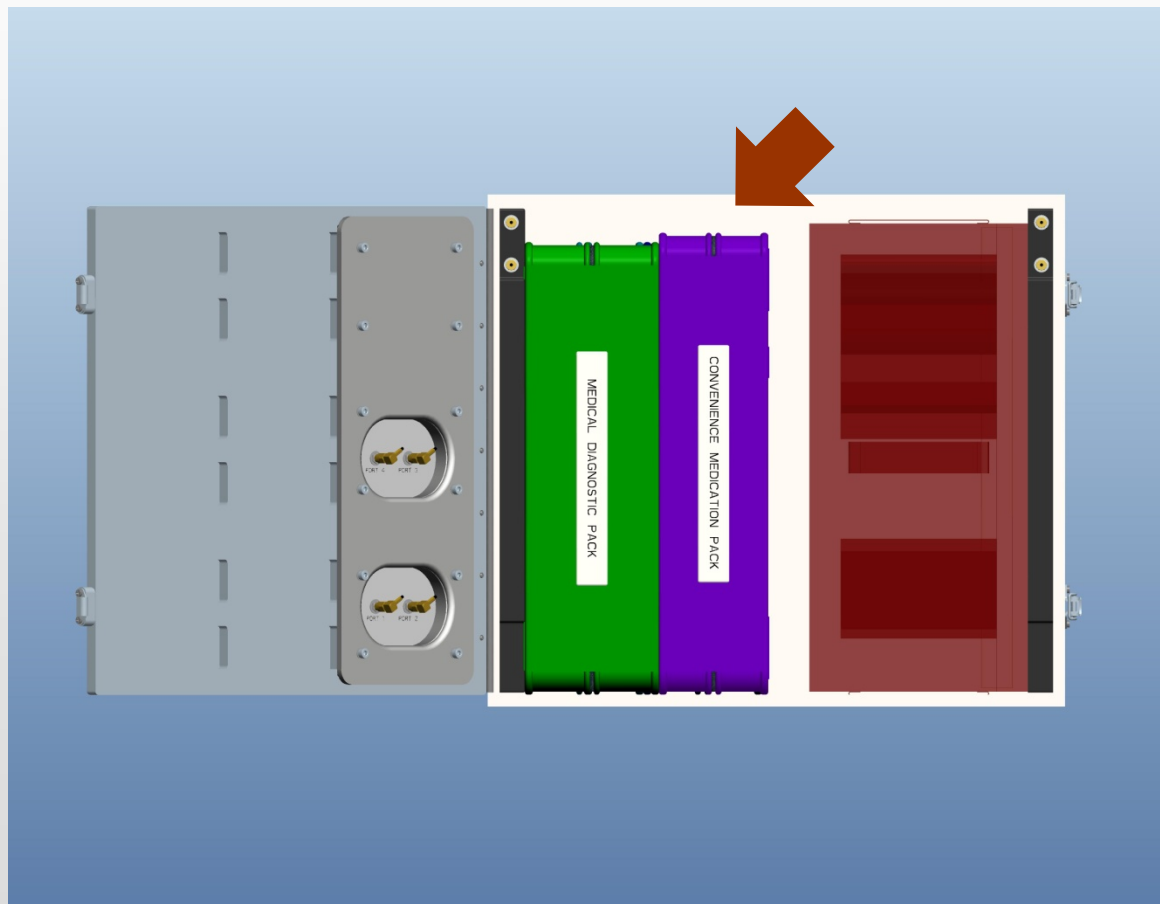


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What will MCT track?

CHeCS RSR Locker D2



- The MCT System is currently tasked to track the Convenience Medications Pack and Ear Plugs
- The above items were selected for tracking because they are items most frequently used by the crew
- Tagging - individual items or dose levels for pills
- 503 items = 503 RFID tags



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MCT Hardware Overview



The MCT Hardware consists of:

- Embedded Computer System
- RFID Near-field Antennas (2)
- RFID Reader/Writer
- Inventory Control and Power Converter Assembly
- RFID Tags



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MCT Hardware Overview



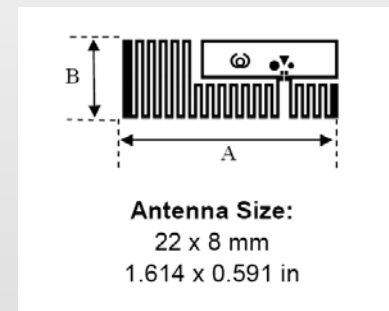
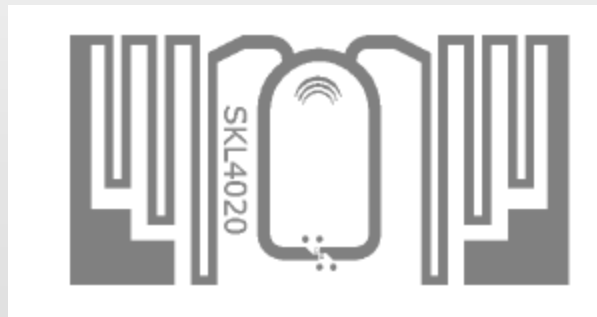
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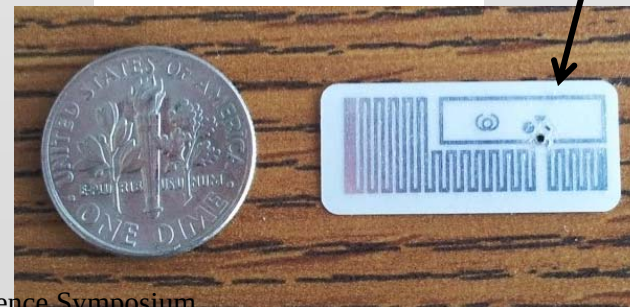


RFID Tags

- RFID Tags
 - Consist of a RFID chip and small antenna
 - Tag antenna is energized from the system reader and antenna
 - Chip is activated and transmits its Electronic Product Code (EPC) Value back to the reader
 - At present, the MCT system is tasked to read ~500 tags, but may increase depending on future Med Kit packing densities



← RFID Tag



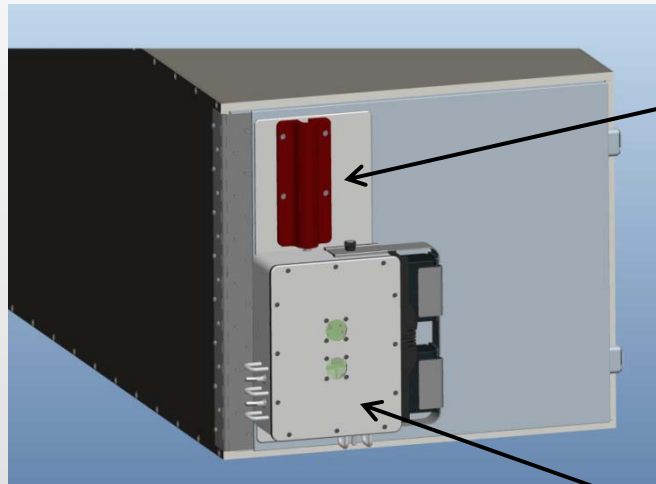


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Hardware Installed on the Door



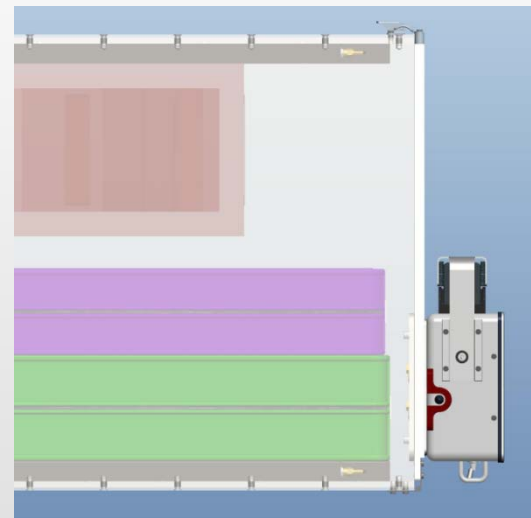
A thermal gasket will heat sink the electronics box to the panel that attaches to the locker door.



Front of D2 Locker Door
(hardware installed)

Wi-Fi Antenna

Electronics Box



Profile with locker door closed
(top down view)



RFID Tag Installation



Objectives when tagging items:

- MCT team will provide instructions as to the tag type, optimum orientation, and position of the RFID tag on each medical item
- RFID tags placed on packaging must not interfere with ease of opening
- RFID tags must not obscure labeling of unit dose
- Addition of RFID tags must add minimal bulk to existing item packages
- Where possible place the RFID tag on the item itself, if not then RFID tag will be placed on re-closable bag.



System Inventory



- Inventory schedule once every 30 days
- Inventory takes less than 5 minutes
- Crew have the ability to initiate an inventory cycle manually
- Crew can access medications at any time
- If during a crew access MCT initiates an inventory period or during an inventory period there is crew access, MCT will automatically terminate the inventory period and start another period once no access activity is detected
- Inventory is only performed when the locker door is closed
- LED indicator on the Electronic Box will illuminate when an inventory cycle is being performed
- All items detected are recorded and sent to the JSL server