**System Description Document**

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# Modes

## Initializing

1. Calculate CRC of primary and secondary partitions
2. Do not mount partition with failed CRC
3. If primary is valid, mount primary
4. If primary is invalid and secondary is valid, mount secondary
5. Set env variable containing mount info (partition name, CRC of both partitions)
6. Note: primary becomes the partition that was mounted (tracked with env var)

## POST

1. If partition CRC check has failed during Init,
   1. Raise error event
   2. Copy (dd) from primary to secondary
2. Request status and CRC from router. Wait for return.
3. If no router is detected:
   1. Raise fault event
   2. Disable messages virtual bus
4. Request status and CRC from MCU.
5. If no MCU is detected:
   1. Raise fault event
   2. Critical fault mode entry
6. Update status items

## Setup

## Normal Operation

## Critical Fault

### Entry During Post

Not currently active or in non recoverable situation. Can safely do nothing but disable action events.

### Entry During Normal Operation

1. Update status items
2. Disable non-critical functions (lights, motors, camera)
3. Open solenoid to fill inner tube

## Software Updating

### Main image

1. Extract archive contents
2. SW config file copied to temporary location
3. CRC checksum is calculated for partition image file
4. CRC checksum is calculated for update.hex and runtime.hex
5. IF: All CRC checks pass, write SW config file to configuration folder
6. IF: CRC check of image passes: write image to Primary partition ELSE: Fail SW upload
7. IF: CRC check of hex files pass: upload update.hex to MCU. ELSE: Fail SW upload
8. Send runtime.hex CRC until ACK is received
9. update.hex waits for CRC value from SBC then overwrites EEPROM bits (same length always)
10. Sends completion message to SBC and waits
11. runtime.hex is uploaded to MCU
12. SBC requests CRC info and waits
13. IF: CRC doesn’t match SW config file: Indicate failure. No resolution actions
14. Reboot MPC

# SW Components

## Common

* Common data dictionary
* Sqlite utility

## Fault Event Controller (FEC)

* Logger functionality
* All actions ERROR or above will be logged
* Pass error code IDs (L1, L2, L3)

## Hardware Controller

* Hardware related state machines (motors, lights, solenoids)
* Communication with other components
  + Router/SBC 2
  + Arduino
* Dataload functionality

## Net Controller

* Socket IO messages
* POST actions
* Camera functionality

## Motion Controller

* Motion algorithm(s)
* Smooth out XYZ motion
* Run clibration routines