Lead

Important Note:
Tasks for Mission Control are underlined. Mission Control needs to be told every underlined instruction.
Ensuring that tasks on your checklist are done is **your** responsibility.
Always request acknowledgement from Mission Control and verify yourself if possible.

Legend:

CAN	Controller Area Network; Data bus (orange cable)
ECU	Engine Control Unit
ECUI	Engine Control User Interface
GSE	Ground Support Equipment
iperf	Network testing tool
LCO	Launch Control Officer
LRR	Launch Readiness Review
MC	Mission Control
PMU	Power Management Unit
PoE	Power over Ethernet
RBF	Remove Before Flight
RCU	Radio Control Unit
TRS	Total Recovery System (Eggtimer)
T<number>	Torx driver of specified size

Requests	Always wait for acknowledgement
Instruct	Acknowledgment comes later
Check	Only assessment, no corrective actions
Verify	Corrective action included

L1. READ THE WHOLE CHECKLIST BEFORE STARTING ☐

Required tools, materials and personnel

L2. Personnel

L2.1. Mission Lead: Georg Mikula

L3. Tools

L3.1. Pen ☐

Pre-Launch Prep

L4. Instruct Pad Prep personnel to start with Pad Prep checklist. (PP5.-PP36.) ☐

L5. Instruct Rocket prep personnel to start non-energetic rocket assembly (R47.-R75.). ☐

Launch Day

L6. Request igniter preparation(R5.-R18.). ☐

L7. Instruct Pad prep personnel to start with Pad prep checklist (PP5.-PP36.) if not already done, otherwise instruct Pad personnel to start On-Day pad prep checklist (P24.-P28.). ☐

L8. Request Mission Control Area Clearance from EuRoC staff, if clearance is given, instruct MC preps (P4.-P11.). ☐

L9. Wait for non-energetic rocket assembly completion (R75.. ☐

L10. Request energetics rocket assembly clearance from EuRoC staff. ☐

L11. Instruct energetics rocket assembly (R76.-R90.). ☐

L12. Wait for pad prep completion (PP36.). ☐

L13. Wait for energetics rocket assembly(R90.). ☐

L14. Request LRR. ☐

L15. PASS LRR. ☐

L16. If MC clearance wasn't given before, request clearance from EuRoC staff and if given, instruct MC preps (P4.-P11.). ☐

L17. Wait for On-Day electronics check to be completed (P28.). ☐

L18. Request clearance for final rocket assembly from EuRoC staff. ☐

L19. Request final rocket assembly (R92.-R106.). ☐

L20. Request rocket mounting from Pad personnel (P29.-P46.). ☐

L21. Request Fueling from pad personnel (P47.-P57.). ☐

- Wait for fueling request from Lead. ☐
- Verify fuel main valve is closed. ☐
- Fill fueling syringe with $950\,\mathrm{mL}$ ethanol ☐
- Fuel $900\,\mathrm{mL}$ ☐
- Clean up spills ☐
- Mount fincan to rocket ☐
- Secure fincan with 8 screws ☐
- Remove cover from oxidizer loading port ☐
- Connect Ox umbilical ☐
- Verify Ox umbilical mechanical connection (pull umbilical), reconnect if loose ☐
- Report that fueling is completed to Mission Lead. ☐

L22. Clear Flash ☐

Oxidizer Filling

L23. Verify ox tanking closed ☐

L24. Verify ox vent open ☐

L25. Verify pressurant tanking closed ☐

L26. Verify pressurant vent open ☐

L27. Cycle Holddown servo (open, then close) ☐

L28. Preliminary internal Go/NoGo Poll ☐

L28.1. Pad ☐

L28.2. Mission Control ☐

L29. Wait for Launch Window imminent ($30\,\mathrm{min}$) ☐

L30. Internal Go/NoGo Poll ☐

L30.1. Pad ☐

L30.2. Mission Control ☐

L31. Request Final Preps from pad personnel (P58.-P76.). ☐

- Wait for Mission Lead to request Final Preps ☐
- Unfold emergency umbilical release line and extend line away from pad ☐
- Clean intake filters for water pumps ☐
- Put on safety glasses, gloves, hearing protection and long sleeved shirt and trousers. ☐
- Verify holddown closed ☐
- Start pad cams ☐
- Request Pressurization clearance from EuRoC LCO ☐
- Raise red pendant ☐
- Open Ox bottle ☐
- Open Pressurant bottle ☐
- Read out pressurant bottle pressure and forward to Mission Lead. ☐
- Start flight on TRS ☐
- Remove RBF zip tie ☐
- Remove RBF umbilical locking device ☐
- Pull RBF pin ☐
- Report Final preps complete to Mission Lead. ☐
- Vacate pad ☐

L32. Verify igniter continuity. Igniter indicators should be yellow in ECUI ☐

L33. Verify ox main closed ☐

L34. Set Supercharge 30bar, Hysteresis 1bar ☐

L35. Enable Supercharge pressure control ☐

L36. Close pressurant vent ☐

L37. Pre-Pressurize tanks ☐

- L37.1. Open pressurant tanking ☐
- L37.2. After supercharge opens, close pressurant tanking immediately ☐

L38. Close ox vent ☐

L39. Open ox tanking over a duration of $10\,\mathrm{s}$ ☐

L40. Activate heating cycle ☐

L41. After first plume, close ox tanking immediately ☐

L42. Activate cooling cycle ☐

L43. Top off Oxidizer

- L43.1. Wait for stable vent frequency ☐
- L43.2. Open ox tanking over a duration of $10\,\mathrm{s}$ ☐
- L43.3. After first plume, close ox tanking immediately ☐

L44. In case of Hold or Delay of launch window, repeat L43. until final GO.

L45. Open Ox vent ☐

L46. Wait for Launch Window ☐

L47. Set Supercharge 60bar, Hysteresis 1bar ☐

L48. Open pressurant tanking ☐

L49. Wait for stable pressures ☐

L50. Close pressurant tanking ☐

L51. Open pressurant vent ☐

Launch

L52. Go/NoGo for launch from EuRoC staff
(TRS camera points to receiver) ☐

L53. Activate umbilical retract ☐

L54. Verify clean separation visually (network camera) ☐

L55. Launch ☐

Safe GSE

L56. Request GSE Safing from Pad crew (P77.-P82.). ☐

L57. Open ox tanking ☐

L58. Open pressurant tanking ☐

L59. Verify all pressures are ambient ☐

L60. Announce "safe state" ☐

L61. Stop network cameras ☐

L62. Stop pad cameras ☐

Safe GSE and Rocket after Abort
Rocket is fully pressurized

L63. Open supercharge ☐

L64. Close supercharge after pressure in tank is ambient ☐

L65. Open fuel main OR Wait for fuel bleed to vent ☐

L66. Go to L56. ☐

Pad Preparation

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IF A CHECK FAILS AND NO OTHER MEASURE IS SPECIFIED OR THE SPECIFIED MEASURE FAILS TOO, INFORM MISSION LEAD AND AWAIT FURTHER INSTRUCTIONS

PP1. READ THE WHOLE CHECKLIST BEFORE STARTING ☐

Required tools, materials and personnel

PP2. Personnel

- PP2.1. GSE lead: Johann Breyner
- PP2.2. 1 Electronics crew as temporary MC: Markus Pinter
- PP2.3. Pad prep crew 1: Florian Dellekart
- PP2.4. Pad prep crew 2: Amir Vafaie
- PP2.5. Pad prep crew 3: Bernhard Hansemann

PP3. Tools

- PP3.1. Hammer ☐
- PP3.2. T10 Key ☐
- PP3.3. T30 Key ☐
- PP3.4. Allen Key $2.5\,\mathrm{mm}$ ☐

PP4. Materials

- PP4.1. 1x Launch rail base ☐
- PP4.2. 2x Launch rail truss ☐

PP4.3. 2x $2\,\mathrm{m}$ rail section ☐
PP4.4. 1x $1\,\mathrm{m}$ rail section ☐
PP4.5. 2x Launch rail struts ☐
PP4.6. Propellant loading cart ☐
PP4.7. Server rack ☐
PP4.8. Flame deflector + safety wires
PP4.9. 3x Guy Cable (ratchet strap + rope + carabiner) ☐
PP4.10. 6x Truss connection pins + cross pins ☐
PP4.11. 3x Tent pegs ☐
PP4.12. 6x Sliding blocks ☐
PP4.13. 6x Rail mounting screws ☐
PP4.14. $50\,\mathrm{L}$ water in water tanks. ☐
PP4.15. $10\,\mathrm{L}$ Water for pad crew. (Canisters & small bottles) ☐
PP4.16. Blue trailer tarp ☐
PP4.17. Garbage Bag ☐

Pad preparation

PP5. Place trailer towards the left side of the launch pad (apply breaks, extend legs, extend trolley wheel) ☐
PP6. Remove all equipment except launch rail and tanking cart from trailer ☐
PP7. Check if all equipment listed in section PP4. is present and in working order ☐
PP8. Shift oxidiser loading cart to correct position ☐
PP9. Assemble launch rail in horizontal position ☐
PP10. Install guy cables on launch rail truss ☐
PP11. Raise rail to launch angle (84°+-1° pitch, 0°+-1° roll, see bubble levels) ☐
PP12. Tension and secure guy cables ☐
PP13. Check launch rail angle, alignment and straightness, adjust to values specified in point PP11. and restraighten if necessary ☐
PP14. Install strongback on launch rail (red markings) ☐
PP15. Connect retraction line and decouplers to strongback ☐
PP16. Install umbilicals ☐
PP17. Fill hot water reservoir ☐
PP18. Fill cold water reservoir ☐
PP19. Place Server Rack next to trailer and open for access. ☐
PP20. Connect cable reel to generator and plug in GSE ☐

PP21. Connect CAN cable to GSE. ☐

PP22. Plug CAN cable into server ☐

PP23. Check proper cable connections in server rack (ethernet, power), plug in properly if loose ☐

PP24. Connect server rack power distributor to cable reel ☐

PP25. Prepare directed radio link

- PP25.1. Set up radio dish labeled "Pad" ☐
- PP25.2. Connect PoE for radio ☐
- PP25.3. Check if radio link is connected to router correctly (Data link LED & Power LED), if not working disconnect and reconnect ☐

PP26. Connect laptop to router as temporary mission control. ☐

PP27. Prepare network cameras

- PP27.1. Connect network cameras to PoE switch ☐
- PP27.2. Check network cameras for working video on temp MC ☐
- PP27.3. If risk of rain, prepare network cams for setup by pad crew on launch day, if not set them up for view at launch rail directly. ☐

Pre-Flight System Check only if Pad Prep is sufficiently far before launch window (several hours/day before)

PP28. Man temporary MC for electronics check ☐

PP29. Temporary MC: Check functionality of following individual sensors, No Software errors

- PP29.1. Hot water temperature ☐
- PP29.2. Cold water temperature ☐
- PP29.3. Pressurant pressure ☐
- PP29.4. Ox pressure ☐

PP30. Temporary MC: check functionality of actuators (verify movement and calibration), Software reports no errors and visual inspection of actuator movement

- PP30.1. Ox tanking valve ☐
- PP30.2. Ox vent valve ☐
- PP30.3. Pressurant tanking valve ☐
- PP30.4. Pressurant vent valve ☐
- PP30.5. Umbilical retract ☐
- PP30.6. Hot water pump ☐
- PP30.7. Cold water pump ☐
- PP30.8. Solenoid valves ☐
- PP30.9. Holddown ☐

PP31. In case of expected high humidity and over night storage on pad, put dry rice in the server rack and seal it as best as possible. ☐

Pad Prep completed

PP32. Cover trailer with blue tarp. ☐

PP33. Cover GSE external electronics with garbage bag. ☐

PP34. GSE Lead: report to Mission Lead that pad preparation is complete ☐

PP35. If Pad prep is on launch day, instruct pad personnel to start On-Day Pad Preparation. ☐

PP36. Vacate area. ☐

Rocket

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R1. READ THE WHOLE CHECKLIST BEFORE STARTING ☐

Required tools, materials and personnel

R2. Personnel

- R2.1. Propulsion 1: Daniel Frank
- R2.2. Propulsion 2: Luis Büchi
- R2.3. Recovery 1: Georg Mikula
- R2.4. Recovery 2: Michael Pohn

R3. Tools

- R3.1. Faceshields ☐
- R3.2. Igniter Tools ☐
  - R3.2.1. Box Cutter ☐
  - R3.2.2. White Permanent Marker ☐
  - R3.2.3. Thin Stick ☐
  - R3.2.4. Scale ☐
  - R3.2.5. Safety Glasses ☐
  - R3.2.6. Hand Gloves ☐
  - R3.2.7. Small Spoon ☐
  - R3.2.8. Hot Plate ☐
- R3.3. Airframe Assembly Tools ☐
  - R3.3.1. Hex and Torx for M4 screws ☐
- R3.4. Side Cutters ☐

- R3.5. Torx 6, 8, 20 ☐
- R3.6. Ibus 2.5 ☐
- R3.7. Masking Tape ☐

R4. Materials

- R4.1. Igniter Materials ☐
  - R4.1.1. 6x E-Matches ☐
  - R4.1.2. 6x 3D-printed Cartridges ☐
  - R4.1.3. 6x Teflon Seal Discs ☐
  - R4.1.4. KNO3 ☐
  - R4.1.5. Sugar ☐
  - R4.1.6. Mg ☐
- R4.2. Airframe Materials ☐
  - R4.2.1. 8x black M4 screws ($8\,\mathrm{mm}$) for bodytube & nosecone coupler ☐
  - R4.2.2. 8x black M4 screws(4x$8\,\mathrm{mm}$, 4x$10\,\mathrm{mm}$) for bodytube & fincan coupler ☐
  - R4.2.3. Railbutton, T-nut and M4 screw ($20\,\mathrm{mm}$) ☐
  - R4.2.4. 4x M4 screws ($10\,\mathrm{mm}$) ☐
- R4.3. Main Battery, Backup Battery ☐
- R4.4. Assortment of zip ties ☐
- R4.5. Clampband ☐
- R4.6. Reserve Shock Absorber ☐
- R4.7. Payload ☐
- R4.8. SD cards for cameras ☐
- R4.9. Loctite ☐
- R4.10. 5.5 Wrench ☐
- R4.11. Altimax Cover ☐
- R4.12. Felt tip pen (can be permanent marker) ☐

Recovery Assembly

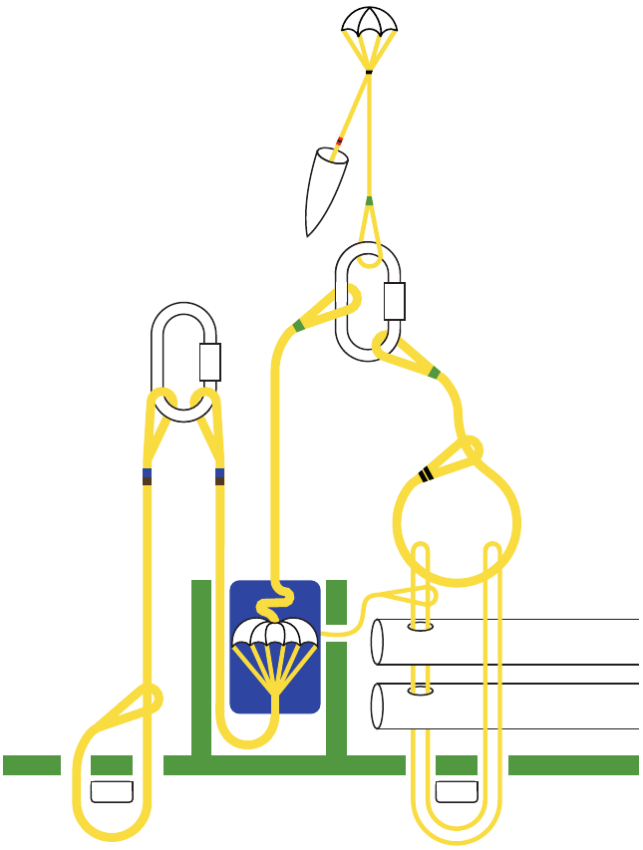

Figure 1: Recovery line setup

R5. Using loctite, screw upper clampband screws into upper clampband coupler without threads sticking out ☐

R6. Push rubber bands onto screws and fix in place with cable ties ☐

R7. Mount clampband line to lower coupler ☐

R8. Mount shockbar to Recovery main tube ☐

R9. Slide main shock cord onto shockbar ☐

R10. Slide main deployment line onto shockbar (twice) ☐

R11. Thread main deployment line through both main deployment linecutters ☐

R12. Mount lower clampband coupler to main tube ☐

R13. Slide both drogue deployment linecutter through main tube ☐

R14. Mount RCU to RCU cover ☐

R15. Mount RCU to main tube (cables connected) ☐

R16. Tape antenna to main tube ☐

R17. Ensure shock absorber is intact. No more than the first stitched fold shall be loose. ☐

R18. Fold main shock cord ☐

R19. Thread deployment bag onto deployment bag line ☐

R20. Fold main chute like in this video: www.youtube.com/watch?v=g_v6V4a9-PA ☐

R21. Insert main chute into deployment bag ☐

R22. Connect main shock cord to main chute (blue-brown) ☐

R23. Secure shackle with masking tape ☐

R24. Insert main shock cords into deployment bag ☐

R25. Close deployment bag ☐

R26. Insert deployment bag into main tube ☐

R27. Thread deployment bag holdback line through main tube ☐

R28. Connect line 2, drogue line and deployment bag line according to figure 1 ☐

R29. Connect line 2 and deployment bag line to drogue line (green) ☐

R30. Secure shackle with masking tape ☐

R31. Connect nosecone line to drogue chute (black) ☐

R32. Wrap drogue shock lines around drogue chute, add two additional turns of the drogue line ☐

R33. Fold remaining drogue line and nose cone line individualy in a figure eight pattern ☐

R34. Lay drogue chute and folded lines on top off main chute ☐

R35. Place drogue tube on top off main tube and make sure TRS charging connector is connected ☐

R36. Temporarily tape together with masking tape (mark tape as RBF) ☐

R37. Connect clampband to clampband line ☐

R38. Mount payload bay to recovery section ☐

R39. Connect RCU to PMU (CAN/Power) ☐

R40. Mount main battery with zip ties ☐

R41. Mount backup battery with zip ties ☐

R42. Insert temporary RBF pin into PMU ☐

R43. Mount PMU ☐

R44. Connect cameras to PMU ☐

R45. Connect payload cable to PMU ☐

R46. Zip tie cables ☐

Non-energetic Rocket Assembly

R47. Check if cable management is done properly and fix if necessary ☐

R48. Make photos of internals for Launch Readiness Review ☐

R49. Mount airframe-fincan coupler to propulsion system (4 M4x10 screws) ☐

R50. Rotate propulsion system until connectors are on top ☐

R51. Ensure upper rail button T-nut is mounted to propulsion system ☐

R52. Slot propulsion system into body tube ☐

R53. Verify alignment of ox pressurant fill and vent to the respective openings in the body tube ☐

R54. Screw body tube to thrust structure (4 M4x10 screws) ☐

R55. Screw body tube to airframe-fincan coupler (4 M4x8 screws) ☐

R56. Rotate fuel tank assembly to correct orientation (threaded inserts aligned with holes in body tube) ☐

R57. Screw fuel tank assembly in place (8 M4x8 screws) ☐

R58. Mount upper rail button to T-nut using threadlocker ☐

R59. Align fuel pressurant fill with opening in body tube ☐

R60. Verify temporary RBF is inserted ☐

R61. Connect linecutters to Altimax ☐

R62. Verify batteries connected properly ☐

R63. Verify Altimax connected properly ☐

R64. Verify RCU connected properly ☐

R65. Verify SD-cards in cameras ☐

R66. Verify payload inserted and connected properly ☐

R67. Verify if clampband screws are tight ☐

R68. Remove runcam covers ☐

R69. Connect propulsion cables to recovery section ☐

R70. Connect umbilical cables to recovery section ☐

R71. Slot recovery system into body tube and fix with 8 screws ☐

R72. Verify that the cameras and RBF pin align with the holes in the airframe. ☐

R73. Cover rocket with opaque cover ☐

R74. Swap temporary RBF pin with final RBF pin ☐

R75. Report non-energetic rocket assembly completed to Mission Lead. ☐

Energetic Rocket Assembly

R76. Prepare tools for assembly ☐

(a) Ibus size 2.5 ☐
(b) Torx size 6 ☐
(c) Torx size 8 ☐
(d) Torx size 20 ☐
(e) Face shields ☐

R77. Remove nosecone from upper clampband ☐

R78. Put upper clampband onto lower clampband (ensure clampband line is not pinched) ☐

R79. Prepare drogue deployment line ☐

R80. Thread drogue deployment line through drogue deployment linecutter ☐

R81. Open clampband tensioner ☐

R82. Thread drogue deployment line through both clampband halves and knot together (as tight as possible) ☐

R83. Thread clampband line inbetween the couplers ☐

R84. Put on face shields ☐

R85. Temporarely affix clampband to coupler with zip tie ☐

R86. Connect clampband halves with tensioner (T6) ☐

R87. Ensure clampband halves are connectet securely ☐

R88. Remove zip tie ☐

R89. Tighten clampband (H2.5) ☐

R90. Mount RBF zip tie around clampband ☐

R91. Report energetic rocket assembly complete to Mission Lead. ☐

Final Rocket Assembly

R92. Connect TRS battery to charger ☐

R93. Connect TRS battery to TRS ☐

R94. Secure TRS battery to TRS with masking tape ☐

R95. Install TRS in TRS tube (T20) ☐

R96. Tension slingshot ☐

R97. Mount slingshot retainer (T8) ☐

R98. Remove RBF tape ☐

R99. Mount nosecone onto upper clampband ☐

R100. Secure nosecone (8 screws, H2.5) ☐

R101. Install RBF zip tie on clampband ☐

R102. Connect nosecone (including upper clampband coupler) to nosecone line (red-black) ☐

Igniter Installation

R103. Securely screw in Igniters. ☐

R104. Connect igniters to igniter cables. ☐

R105. Properly cable manage igniter cables. ☐

R106. Report Rocket Final Assembly comlete to Mission Lead ☐

Pad

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- P2.2. Pad 2: Michael Pohn
- P2.3. Pad 3: Florian Dellekart
- P2.4. Pad 4: Bernhard Hansemann
- P2.5. Documentation: Liana Gferer

P3. Tools ☐

- P3.1. Hammer ☐
- P3.2. T10 Key ☐

- P3.3. T30 Key ☐
- P3.4. Allen Key $2.5\,\mathrm{mm}$ ☐
- P3.5. Ethanol Fueling Syringe ☐
- P3.6. Tweezers ☐
- P3.7. Fire extinguisher ☐

P4. Materials ☐

- P4.1. Red pendant ☐
- P4.2. Ice or dry ice (min. $3\,\mathrm{kg}$)
- P4.3. Oxidizer bottle mounting plate ☐
- P4.4. Heat exchanger tube ☐
- P4.5. Oxidizer Bottle ☐
- P4.6. Ethanol Bottles ($2\,\mathrm{L}$) ☐
- P4.7. Flame Diverter ☐
- P4.8. Rocket (without fincan) ☐
- P4.9. Fincan ☐
- P4.10. 8x black M4 screws(4x8 mm, 4x10 mm) for fincan ☐
- P4.11. RBF umbilical locking device ☐
- P4.12. TRS-box (ALWAYS stays with rocket) ☐

On-day pad prep

P5. If not already at correct position, place trailer at final launch site. ☐

P6. Recheck position and angles of launch rail and realign if necessary. ☐

P7. Voice radio check with MC. ☐

P8. Open server rack and remove cover from bottom air intake. ☐

P9. Remove masking tape from cable outlet at the back. ☐

P10. Connect server rack power distributor to power. ☐

P11. Set up pad cams if not already done. ☐

P12. Verify that all Ethernet and power cables are connected correctly. ☐

P13. Start server if not already starting automatically. ☐

P14. Start heating hot water reservoir. ☐

P15. Start cooling cold water reservoir, refill ice periodically until P76.. ☐

P16. Place oxidizer bottle next to trailer ☐

P17. Install mounting plate on oxidizer bottle ☐

P18. Install Ox bottle on tanking cart ☐

P19. Install heat exchanger on oxidizer bottle ☐

P20. Connect water hoses to heat exchanger ☐

P21. Install Pressurant bottle ☐

P22. Install flame diverter ☐

P23. Report on-day pad preparation complete to Mission Lead ☐

On-day electronics check

P24. Wait for MC to start aligning directed radio link. ☐

P25. MC: check functionality of following individual sensors, no software errors

- P25.1. Hot water temperature ☐
- P25.2. Cold water temperature ☐
- P25.3. Mantle water temperature ☐
- P25.4. Pressurant pressure ☐
- P25.5. Ox pressure ☐

P26. MC: check functionality of actuators (verify movement and calibration) Software reports no errors and visual inspection of actuator movement

- P26.1. Ox tanking valve ☐
- P26.2. Ox vent valve ☐
- P26.3. Pressurant tanking valve ☐
- P26.4. Pressurant vent valve ☐
- P26.5. Umbilical retract ☐
- P26.6. Clean water pump intake filters ☐
- P26.7. Hot water pump ☐
- P26.8. Cold water pump ☐
- P26.9. Holddown ☐

P27. Report On-Day electronics check complete to Mission Lead. ☐

P28. Vacate area. ☐

Rocket mounting

P29. Pad 1 & 2 get rocket, fincan and TRS-box to pad. ☐

P30. Remove sliding block from launch rail. ☐

P31. Verify holddown open, if not request MC to open it. ☐

P32. Slide rocket (without fincan) onto rail (from bottom). ☐

P33. Secure rocket with sliding block underneath lower rail button. ☐

P34. Secure holddown above lower rail button. ☐

P35. Verify holddown is closed and locked. ☐

P36. Swivel strongback into position ☐

P37. Attach RBF umbilical locking device ☐

P38. Remove cover from pressurant loading ports. ☐

P39. Connect Ox pressurant umbilical. ☐

P40. Connect Fuel pressurant umbilical. ☐

P41. Verify pressurant umbilicals' mechanical connection (pull umbilical), reconnect if loose ☐

P42. Connect Electrical umbilical and secure with masking tape. ☐

P43. Request active charging. ☐

P44. Pull RBF Pin halfway ☐

P45. Cover rocket in space blanket ☐

P46. Report rocket mounting completed to Mission Lead ☐

Fueling

P47. Wait for fueling request from Lead. ☐

P48. Verify fuel main valve is closed. ☐

P49. Fill fueling syringe with $950\,\mathrm{mL}$ ethanol ☐

P50. Fuel $900\,\mathrm{mL}$ ☐

P51. Clean up spills ☐

P52. Mount fincan to rocket ☐

P53. Secure fincan with 8 screws ☐

P54. Remove cover from oxidizer loading port ☐

P55. Connect Ox umbilical ☐

P56. Verify Ox umbilical mechanical connection (pull umbilical), reconnect if loose ☐

P57. Report that fueling is completed to Mission Lead. ☐

Final Preps

P58. Wait for Mission Lead to request Final Preps ☐

P59. Unfold emergency umbilical release line and extend line away from pad ☐

P60. Clean intake filters for water pumps ☐

P61. Put on safety glasses, gloves, hearing protection and long sleeved shirt and trousers. ☐

P62. Verify holddown closed ☐

P63. Start pad cams ☐

P64. Request Pressurization clearance from EuRoC LCO ☐

P65. Raise red pendant ☐

P66. Open Ox bottle ☐

P67. Check for leaks (feel for air current on connections), if found inform Mission Lead, close bottle, retighten connection and goto P66. ☐

P68. Open Pressurant bottle ☐

P69. Check for leaks (feel for air current on connections), if found inform MC, close bottle, retighten connection and goto P68. ☐

P70. Read out pressurant bottle pressure and forward to Mission Lead. ☐

P71. Start flight on TRS ☐

P72. Remove RBF zip tie ☐

P73. Remove RBF umbilical locking device ☐

P74. Pull RBF pin ☐

P75. Report Final preps complete to Mission Lead. ☐

P76. Vacate pad ☐

GSE Safing

P77. Verify no heat sources except heating element ☐

P78. Close Ox bottle ☐

P79. Close Pressurant bottle. ☐

P80. Unplug heating element. ☐

P81. Verify heating cycle is deactivated. ☐

P82. Vacate area. ☐

P83. Report GSE Safing done to Mission Lead. ☐

Mission Control

Legend:

CAN	Controller Area Network; Data bus (orange cable)
ECU	Engine Control Unit
ECUI	Engine Control User Interface
GSE	Ground Support Equipment
iperf	Network testing tool
LCO	Launch Control Officer
LRR	Launch Readiness Review
MC	Mission Control
PMU	Power Management Unit
PoE	Power over Ethernet
RBF	Remove Before Flight
RCU	Radio Control Unit
TRS	Total Recovery System (Eggtimer)
T<number>	Torx driver of specified size

Requests	Always wait for acknowledgement
Instruct	Acknowledgment comes later
Check	Only assessment, no corrective actions
Verify	Corrective action included

P1. READ THE WHOLE CHECKLIST BEFORE STARTING ☐

Required tools, materials and personnel

P2. Personnel

- P2.1. Mission Control: Markus Pinter ☐

P3. Materials

- P3.1. 2x External Screen + Power Adapter & Cable ☐
- P3.2. 16-port Switch + Power Adapter ☐
- P3.3. Ethernet Cables (1x$10\,\mathrm{m}$, 2x short (1-$2\,\mathrm{m}$), 1x$20\,\mathrm{m}$) ☐
- P3.4. Cable Reel ☐
- P3.5. 6-port power distributor ☐
- P3.6. Mission Control Laptop + Charger + Mouse ☐
- P3.7. Directed Radio Link dish ☐

Mission Control Prep

P4. Get power with cable reel and power distributor ☐

P5. Set up external screens, laptop and switch. ☐

P6. Connect the radio link and laptop to switch. ☐

P7. Request On-Day electronics check from Pad crew. ☐

P8. Verify bandwidth with iperf. Min: 10Mb/s, Target: >50Mb/s, if insufficient, request realignment. ☐

P9. Start software infrastructure. ☐

P10. Confirm network with sensor readings and actuator movements. ☐

P11. Check Holddown Servo start and end point. ☐

Igniter

Legend:

CAN	Controller Area Network; Data bus (orange cable)
ECU	Engine Control Unit
ECUI	Engine Control User Interface
GSE	Ground Support Equipment
iperf	Network testing tool
LCO	Launch Control Officer
LRR	Launch Readiness Review
MC	Mission Control
PMU	Power Management Unit
PoE	Power over Ethernet
RBF	Remove Before Flight
RCU	Radio Control Unit
TRS	Total Recovery System (Eggtimer)
T<number>	Torx driver of specified size

Requests	Always wait for acknowledgement
Instruct	Acknowledgment comes later
Check	Only assessment, no corrective actions
Verify	Corrective action included

R1. READ THE WHOLE CHECKLIST BEFORE STARTING ☐

Required tools, materials and personnel

R2. Personnel

- R2.1. Igniter 1: Liana Gfrerer
- R2.2. Igniter 2: Marianne Röchling

R3. Tools

- R3.1. Box Cutter ☐
- R3.2. White Permanent Marker ☐
- R3.3. Thin Stick ☐
- R3.4. Scale ☐
- R3.5. Safety Glasses ☐
- R3.6. Hand Gloves ☐
- R3.7. Small Spoon ☐
- R3.8. Hot Plate ☐

R4. Materials

- R4.1. 6x E-Matches ☐
- R4.2. 6x 3D-printed Cartridges ☐
- R4.3. 6x Teflon Seal Discs ☐
- R4.4. KNO3 ☐

R4.5. Sugar ☐
R4.6. Mg ☐

Prepare Igniters

R5. Wait for request igniter preparation from Mission Lead ☐
R6. Request igniter preparation clearance from EuRoC staff. ☐
R7. Insert e-matches into cartridges ☐
R8. strip insulation, cut e-match wires to length, bend wires ☐
R9. Label each igniter with a number ☐
R10. Weigh each cartridge with e-match, note masses ☐
R11. Mix powdered ingredients ☐

- $3.0\,\mathrm{g}$ KNO3
- $2.0\,\mathrm{g}$ Sugar
- $1.5\,\mathrm{g}$ Mg

R12. Cook mixture at $230\,^{\circ}\mathrm{C}$ until sticky/mushy, stirring constantly ☐

- Wear safety glasses, mixture could ignite.
- Wear hand gloves
- If mixture starts smoking, turn down the heat, else it will ignite.

R13. Fill cartridges with mixture ☐

- Avoid leaving voids, use thin stick.
- Make contact with but don't fully cover e-matches

R14. Let igniters cool down ☐
R15. Weigh each igniter, note masses ☐
R16. Photograph each igniter with the top and number visible ☐
R17. Request igniter test clearance from EuRoC staff ☐
R18. Test batch, document on video ☐

- Burn excess mixture
- Test one igniter (note number)

Streaming

Legend:

CAN	Controller Area Network; Data bus (orange cable)
ECU	Engine Control Unit
ECUI	Engine Control User Interface
GSE	Ground Support Equipment
iperf	Network testing tool
LCO	Launch Control Officer
LRR	Launch Readiness Review
MC	Mission Control
PMU	Power Management Unit
PoE	Power over Ethernet
RBF	Remove Before Flight
RCU	Radio Control Unit
TRS	Total Recovery System (Eggtimer)
T<number>	Torx driver of specified size

Requests	Always wait for acknowledgement
Instruct	Acknowledgment comes later
Check	Only assessment, no corrective actions
Verify	Corrective action included

S1. READ THE WHOLE CHECKLIST ☐

Required tools, materials and personnel

S2. Streamer: Luis Büchi

S3. Stream Support: Paula-Maria Handle

S4. Streaming Laptop ☐

S5. Power extension cord ☐

S6. Webcam and Microphone ☐

S7. 1x $10\,\mathrm{m}$ Ethernet cable ☐

Streaming

S8. Take place as far away as possible from MC while still being able to connect to power and network. ☐

S9. Lay extension cord & networking cable to laptop and connect. ☐

S10. Check network camera streams working and prepare VLC media player for direct recording. ☐

S11. Start OBS and set up stream info. ☐

S12. Test Network Camera Recording as bandwidth check. ☐

S13. Wait for proper time to start streaming. ☐

S14. On OxFill Go/NoGo, start Network Camera Recording. ☐