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NAR 896 L2
TAR 11583 L2

Pre-Flight Checklist for SLIPSTICK III

NAR/TAR
Level 3
Certification

Advanced Planning

- [ ] **1** **Schedule**
  - [ ] **a** Check that waivers are available at the intended launch site and date.
  - [ ] **b** Check weather forecast for wind and temperature conditions at the site.
  - [ ] **c** Have TAP members approved that launch date?
  - [ ] **d** Has sponsoring club officer been notified of your intended flight?
  - [ ] **e** Is there a launch rail compatible with the rocket available at the site?
  - [ ] **f** Do you need to volunteer your truck to help tow the equipment to insure you'll be able to fly?
  - [ ] **g** Are there support people available for that date?
  - [ ] **h** Is all paperwork needed been filled out and submitted?
  - [ ] **i** If needed, has a hotel been booked for that weekend?
  - [ ] **j** Is the rocket hauler vehicle serviced and ready for the trip?
  - [ ] **k** Have all sponsors and interested friends been notified of the date and know how to get there?
  - [ ] **l** Will toilet facilities be available at the site?
  - [ ] **m** If toilets are available/nearby, Is there a Starbucks along the way to the site?

- [ ] **2** **Re-Check Flight Profile Predictions**
  - [ ] **a** Does Rocksim predict that the rocket/motor will stay below the waiver altitude?
  - [ ] **b** Does Rocksim predict that the rocket will land within the waiver radius on that date?
  - [ ] **c** If original motor might break the waiver, does a different motor need to be ordered?
  - [ ] **d** If not in possession, will the the motor and hardware be available at the launch site?
  - [ ] **e** Have arrangements been made to pay for the motors and other costs?

Shop Pre-Flight

- [ ] **3** **Altimeters (Two Missileworks RRC2X)**
  - [ ] **a** Are all both sets of dip switches set properly per manual Ref: **[1 0 0 1 0]**
    - [ ] SW1 ON - Main deploys at 1000 feet
    - [ ] SW2 OFF - Standard two stage deployment, Drogue at apogee, Main altitude selected
    - [ ] SW3 OFF - 0 seconds added to Mach delay Timer total
    - [ ] SW4 ON - 8 seconds added to Mach delay Timer total
    - [ ] SW5 OFF - Hi range Main deployment (1000 feet)
  - [ ] **b** Are mounting screws secure?
  - [ ] **c** All wires secure in terminal blocks?
  - [ ] **d** No frayed wires or whiskers?
  - [ ] **e** Are the Circuit boards clean of debris, especially the sensors?

- [ ] **4** **Batteries (two 9V Alkaline Batteries Req'd)**
  - [ ] **a** Measure voltage of new Batteries. > 9.5V?
  - [ ] **b** Install new 9V batteries
  - [ ] **c** Is polarity correct?
  - [ ] **d** Install battery restraint

- [ ] **5** **Arming switches (four on the avbay)**
  - [ ] **a** Do they rotate freely with positive detents?
  - [ ] **b** In the safe position are all circuits open? (VOM from Altimeter TB to Charge TB)

- [ ] **c** In the safe position are all keys restrained?
- [ ] **d** In the armed position are the circuits closed? (VOM from Altimeter TB to Charge TB)
- [ ] **e** Is the armed position are all key removable?

- [ ] **6** **Altimeter Power Check**
  - [ ] **a** Enable primary altimeter switch
  - [ ] **b** Does primary Altimeter power up?
  - [ ] **c** Do the first 5 beeps represent the dip switch positions Short-long-long-short-long?
  - [ ] **d** In ready mode, is there one long beep (no charges present)?
  - [ ] **e** Disable primary altimeter.
  - [ ] **f** Enable back up altimeter.
  - [ ] **g** Does Backup Altimeter power up?
  - [ ] **h** Do the first 5 beeps represent the dip switch positions Short-long-long-short-long?
  - [ ] **i** In ready mode, is there one long beep (no charges present)?
  - [ ] **j** Disable Backup altimeter.

- [ ] **7** **Deployment Charges**
  - [ ] **a** Are terminal blocks properly marked as to Primary, Backup, Main and Drogue?
  - [ ] **b** Rotate charge switches CCW into arm position.
  - [ ] **b** Do continuity checks indicate that terminal blocks are aligned with altimeter TB's?
  - [ ] **c** Select 4 e-matches. verify that all measure 1.1 to 1.3 ohms.
  - [ ] **d** Rotate charge switches CW into safe position.
  - [ ] **e** Load BP charges into charge cylinders using latex fingers and tape method.
    - [ ] - Primary Drogue - 5 grams of 4F BP
    - [ ] - Backup Drogue - 6 grams of 4F BP
    - [ ] - Primary Main - 7 grams of 4F BP
    - [ ] - Backup Main - 8 grams of 4F BP
  - [ ] **f** Attach charge wires to terminal blocks using the following method
    - [ ] - Cut leads to 2 inches long from base of tape
    - [ ] - Insulation stripped back to form pigtail 3/8” long
    - [ ] - Pigtail folded back in half
    - [ ] - Pigtails inserted into proper terminal blocks and screws snugged down

    CAUTION - overtightening will cut leads through
  - [ ] **g** Are all 4 pairs of charge wires restrained within terminal blocks?
  - [ ] **h** Rotate altimeter power switches CCW into armed position.
  - [ ] **i** Rotate charge switches CCW into armed position.
  - [ ] **j** Verify that both altimeters indicate 3-beeps (continuity to all charges)
  - [ ] **k** Rotate altimeter power switches CW into off position.
  - [ ] **l** Rotate charge switches CW into safe position.

- [ ] **8** **Close Avionics Bay**
  - [ ] **a** Slide altimeter sled into position
  - [ ] **b** Are all wires free and not captured between hardware or all thread?
  - [ ] **c** secure sled into position with two 5/16-18 nuts
  - [ ] **d** slide avbay together and restrain with 5/16-18 nuts.

- [ ] **9** **Assemble GPS to Nose Cone**
  - [ ] **a** Are all wires secure and plugged into switches?
  - [ ] **b** Is GPS/TX attached securely to Nose cone Bulkhead with 4 M3 screws?

- [ ] **c** Is GPS fully Charged?
- [ ] **d** Is GPS set to transmit only once every 30 seconds? (set with handheld unit)
- [ ] **e** Attach NC bulkhead to nose cone inner ring with eight #8-32x1/2 screws
- [ ] **f** Does nose cone assembly slip freely into upper airframe (the 46" long section)?

- [ ] **10** **Assemble Upper Airframe to Avbay and Nose Cone**
  - [ ] **a** Hook 1/4 quick-links to nose cone and on both ends of avbay.
  - [ ] **b** Attach shock cord to avbay quick-links on Main side. Screw tightly.
  - [ ] **c** Is main chute loop in the shock cord closer to nose cone than the avbay?
  - [ ] **d** Stuff shock cord through upper airframe
  - [ ] **e** slip upper airframe (46" long) over main side of avbay and align index marks.
  - [ ] **f** secure upper airframe to avbay using six 6-32x3/8 pan head screws
  - [ ] **g** sprinkle baby powder or corn starch into upper airframe
  - [ ] **h** slip medium Kevlar blanket down shock cord toward avbay
  - [ ] **i** slip large Kevlar blanket down shock cord to just below loop
  - [ ] **j** Hook a 1/4 quick-link to shock cord loop
  - [ ] **k** Fold bottom 2/3's of shock cord and wrap with Medium Kevlar blanket
  - [ ] **l** Insert shock cord and blanket into upper airframe (nose cone end)
  - [ ] **m** Fold Rocket Rage parachute and shrouds using manufacturer's recommended method
  - [ ] **n** Wrap main chute in large Kevlar blanket
  - [ ] **o** Hook parachute shrouds to quick-link located on shock cord loop. Screw tightly.
  - [ ] **q** Slip chute and blanket, closed end toward charges, into upper airframe
  - [ ] **q** Fold the rest of the shock cord and insert into airframe on top of parachute.
  - [ ] **r** Attach shock cord to nose cone quick-link. Screw tightly.
  - [ ] **s** Insert nose cone into upper airframe, linking up index marks.
  - [ ] **t** partially screw in three 4-40 nylon screws (shear pins) into threaded airframe
    CAUTION - fully tightening screws could prevent proper deployment of main chute

- [ ] **11** **Assemble Middle Airframe to Avbay and Upper Airframe**
  - [ ] **a** Attach shock cord to avbay quick-link on Drogue side. Screw tightly
  - [ ] **b** Is Drogue chute loop in the shock cord closer to the avaby than the fin can end?
  - [ ] **c** Stuff shock cord through middle airframe
  - [ ] **d** slip middle airframe (21" long) over Drogue side of avbay and align index marks.
  - [ ] **e** secure middle airframe to avbay using six 6-32x3/8 pan head screws
  - [ ] **f** sprinkle baby powder or corn starch into middle airframe
  - [ ] **g** slip medium Kevlar blanket down shock cord toward avbay
  - [ ] **h** Hook a 1/4 quick-link to shock cord loop
  - [ ] **i** Fold top 1/3 of shock cord and insert into middle airframe
  - [ ] **j** Insert shock cord and blanket into upper airframe (nose cone end)
  - [ ] **k** Fold PML Drogue parachute and shrouds using manufacturer's recommended method
  - [ ] **l** Wrap drogue chute in medium Kevlar blanket
  - [ ] **m** Attach parachute shrouds to quick-link located on shock cord loop. Screw tightly.
  - [ ] **n** Slip chute and blanket, closed end toward avbay charges, into middle airframe
  - [ ] **o** Fold the rest of the shock cord and insert into airframe below parachute.
  - [ ] **p** Put two strips on vinyl tape across bottom of middle airframe to keep cord restrained
  - [ ] **q** Tape small bag containing 4-40 nylon screws for installation at range.
    NOTE: This above step is required because the entire rocket is too long to fit into truck.
  - [ ] **r** Tape the key lock switches in the safe position so they don't rotate during travel.

- [ ] **12** **Load Support Equipment into Vehicle**
  - [ ] **a** For every fastener in the rocket is there a tool that fits it in the range box?
  - [ ] **b** For every tool or material used in the previous steps, add to range box
  - [ ] **c** For every fastener or hardware item is there a spare to add to the range box?
  - [ ] **d** Do you have duplicate charges loads prepared and extra e-matches?
  - [ ] **e** Do you have the tools/grease/dowels to prepare the motor and igniter?
  - [ ] **f** Add spare batteries, and insure any needed battery chargers are in range box.
  - [ ] **g** Coolers, chairs, table, rocket rack,. sunscreen, toilet paper, EZ-up loaded?
  - [ ] **h** Is rocket hauler vehicle's tank full of gas?
  - [ ] **i** Has provisions been made for meals/snacks.
  - [ ] **j** Do you have enough cash to pay for items at the launch site?
  - [ ] **k** Do you have all the cameras, cell phones, radios and GPS's that you need (all charged up)?
  - [ ] **l** Is extra clothing loaded suitable for the weather forecast?
  - [ ] **m** Is the Tripoli notebook loaded as well as any NAR paperwork needed?

Range Pre-Flight

- [ ] **13** **Assemble Motor and Mounts**

  Note: If the motor hardware and loads are already obtained then do these after step 11
  - [ ] **a** Attach 3/8-18 forged eye-bolt to forward closure, using a jam nut on the bolt.
  - [ ] **b** Assemble Motor Hardware and re-loads per Aerotech Instructions
  - [ ] **c** Before the aft closure (nozzle end) is screwed together, slip the Aero-pack adaptor ring on.
  - [ ] **c** Assemble forward 98mm to 75mm adaptor to motor casing, 1/2 from motor end. Tighten.

    Note: some movement of the grains will be detected but this is normal for heat expansion.
  - [ ] **d** Slip motor assembly into fin can.
  - [ ] **e** Screw the Aero-pack retainer tightly over aft end of motor
  - [ ] **f** Tape the igniter to the side of the fin can so it won't get lost.
  - [ ] **g** Cut a small hole in plastic cap and slip over nozzle end
  - [ ] **g** hook a 5/16 quick-link to the forward closure eye-bolt.

- [ ] **14** **Assemble Fin Can to rest of rocket airframe**
  - [ ] **a** Mount the upper airframe assembly horizontally on its rack.
  - [ ] **b** Remove the vinyl tape from the open end of the bottom of the middle airframe

    Note: Be careful not to let the shock cord and drogue chute spill out.
  - [ ] **c** Attach the end of the drogue shock cord to the quick-link on the fin can. Screw Tightly.
  - [ ] **d** Slip the fin can assembly into the bottom of the middle airframe. Align index marks.
  - [ ] **e** partially screw in three 4-40 nylon screws (shear pins) into threaded airframe
  - [ ] **f** Remove tape from key-lock switches, insuring that they have not been accidently armed.

    CAUTION - If the power switches were armed during travel,
    disassemble and measure the voltage for 9.5 V or replace with fresh batteries

- [ ] **15** **Final assembly check**
  - [ ] **a** All 6-32 screws holding airframes to avbay secure?
  - [ ] **b** All heads of 4-40 nylon screws show clearance to airframe (ie. not tightened).?
  - [ ] **c** Motor retainer tight?
  - [ ] **d** Are all static port and vent holes clear of debris?
  - [ ] **e** If possible get a section of 1515 rail to check fit and alignment of rail lugs.
  - [ ] **f** Fill out launch card at RCO table

- [ ] **g** coordinate readiness with support team members
- [ ] **h** Check Cameras - Notify photographers

- [ ] **16** **Launch Check**
  - [ ] **a** Get permission from LCO/RCO to prep rocket on launch pad.
  - [ ] **b** Clean launch rail (and lubricate if necessary) check fit of individual launch lugs/screws
  - [ ] **c** Mount the rocket onto the launch rail.
  - [ ] **d** Activate GPS, if present.
  - [ ] **e** Power on the altimeter(s)
  - [ ] **f** Check for the proper beep count. One long beep from each altimeter
  - [ ] **g** Wait two to three minutes.
  - [ ] **h** Check for the proper beep count again. One long beep from each altimeter

    CAUTION - If either altimeter is sounding off an altitude, then a false launch signal may have been initiated by localized transmissions. Turn off altimeters and abort the flight.
  - [ ] **i** Beeps OK. Power off altimeter(s)
  - [ ] **j** Lock the rail and rocket in vertical position on the stand.
  - [ ] **k** Adjust launch feet if rail is not vertical.
  - [ ] **l** Restrain igniter with plastic cap supplied by manufacturer
  - [ ] **m** Check alligator clips for any indication of voltage by briefly putting clips together
  - [ ] **n** Enable altimeters. Wait for indication of altimeter readiness.
  - [ ] **o** Are there two series of 3 beeps? Good to go.
  - [ ] **p** Wait two or three minutes
  - [ ] **q** Are there two series of 3 beeps? Good to go.

    CAUTION - If either altimeter is sounding off an altitude, then a false launch signal may have been initiated by localized transmissions. Turn off altimeters and abort the flight.
  - [ ] **r** Are camera's and photographer's standing by?
  - [ ] **s** Arm drogue and main charges
  - [ ] **t** Insert igniter to uppermost end of motor. Use following method:
    - [ ] - Tape the igniter leads to a 1/8” dowel that is longer than the motor
    - [ ] - kink the head of the igniter to get it to touch on the side of the core of the top grain
    - [ ] - Insert igniter and dowel, find the top of the motor and then pull it back a little
    - [ ] - break off the dowel flush with the bottom of the nozzle
    - [ ] - Insert leads through cap and push cap onto motor, holding up dowel.
  - [ ] **u** Attach clips to igniter wires, wrapping pigtails around alligator clip ends.
  - [ ] **v** Check for continuity at launch battery supply.
  - [ ] **w** Clear pad area, evacuating behind RSO
  - [ ] **x** Check reception of GPS on handheld
  - [ ] **y** Tell the photographers how much time there will be between launch and deployment
  - [ ] **z** Tell the RSO you are ready when he his
  - [ ] **!!** Enjoy the launch - Keep an eye on the rocket to get an initial bearing for recovery

- [ ] **17** **Recovery**
  - [ ] **a** Bring help to carry rocket back
  - [ ] **b** Bring the rocket to the TAPs for inspection.