



MiniSShot

Rocket Vehicle Assembly,

Launch Preparation & Procedure Manual

Rev. 2010/03/23

Introduction

This document describes the procedures to assemble the *MiniSShot* rocket vehicle and to prepare for launch. A sketch of the assembled vehicle is shown in Figure 1.

This document is in the form of a checklist. This document is to be printed and as each step is performed, a checkmark is to be placed in the corresponding box.

Additional documents, as listed below, specify tasks that must be performed in conjunction with those specified in this document.

Additional Required Documents

A printed copy of each of the following documents, of the stated revision, must be on-hand when carrying out the instructions described herein.

Important: For those documents which have had instructions partially carried out in advance of launch date, use the original “checked off” copy.

1. *MiniSShot Rocket Motor Assembly & Propellant Loading Manual* (Rev.2010-03-10)
2. *MiniSShot Pyrotechnic Separation Device Assembly Manual* (Rev.2010-03-01)
3. *MiniSShot Video Camcorder Operation & Set-up Manual* (Rev.2010-03-10)
4. *MiniSShot Telemetry Instructions* (Rev.2010-01-29)
5. *MiniSShot Chute Controller Instructions* (Rev.2010-01-24)
6. *MiniSShot Main Computer Instructions* (Rev.2010-01-23)
7. *MiniSShot Featherweight “Parrot” Configuration & Checklist* (Rev.2010-01-10)
8. *MiniSShot Wiring Harness Guide* (Rev.2010-03-10)
9. *Big Red Bee “BeeLine” Configuration Checklist* (Rev.2010-01-10)

Reference Documents

1. *MiniSShot Main Computer Manual* (Rev.2009-12-22)
2. *MiniSShot Chute Controller Manual* (Rev.2009-12-22)

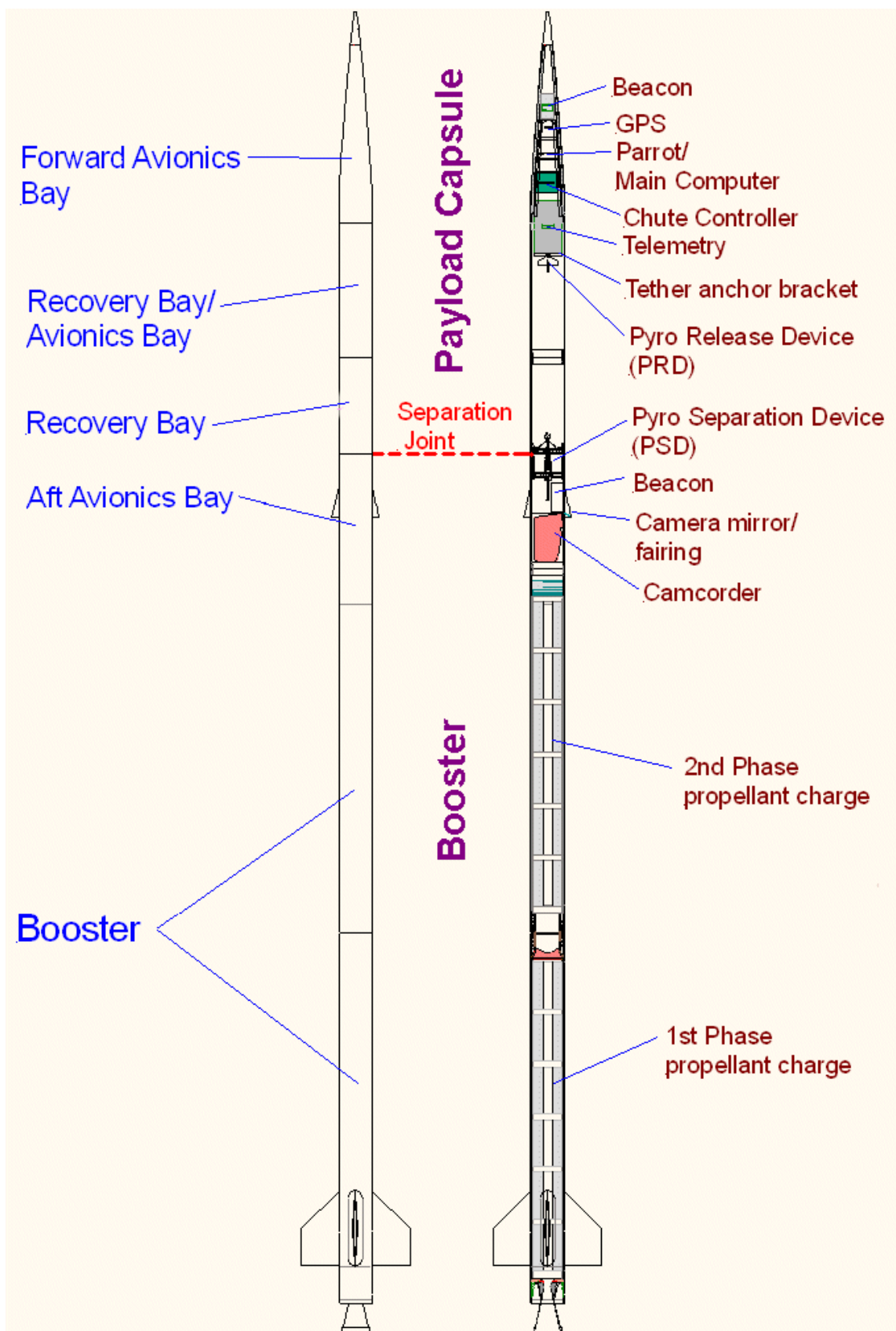


Figure 1 – MiniSShot rocket vehicle

Instructions: check off each step after accomplishment

**I. For expediency, the following tasks may be performed in advance of launch date:
(these tasks may be performed in any order, not necessarily as listed below)**

- A. Mount SS2S decals onto the airframe (two on booster, two on Payload Capsule).
- B. Configure and perform the physical set up of the Main Computer as described in “*MiniSShot Main Computer Instructions*”, steps 1 & 2 only.
- C. Configure and perform the physical set up of the Chute Controller as described in “*MiniSShot Chute Controller Instructions*”, steps 1 & 2. Also perform step 3 items 1 to 4 only.
- D. Configure the Telemetry as described in steps 1 to 4 of “*MiniSShot Telemetry Instructions*”.
- E. Secure the ribbon cable running through the Recovery/Avionics Bay to the interior wall using suitable tape. Break-away connector should extend outside the bay by approximately 3 inches.
- F. Trial fit nosecone to ensure avionics assembly fits without interference.
- G. Attach the nosecone thermal sensor wiring harness to the Thermal Board (on the MC), as described in Reference 1, to terminals T0 to T4. Numbering order is not predefined, so make note of which wires are connected to which terminals. Attach fifth “loose” thermal sensor to T5.
- H. Feed the ribbon cable (with female break-way connector) into the Forward Avionics Bay and prep for connecting to the appropriate avionics devices. Consult the “*MiniSShot Wiring Harness Guide* as to connections. At this point, only connect the pressure sensor leads (wires 1, 2 &3) to the Main Computer. Do not connect the igniter leads (wires 4 through 9).
- I. Ensure all on-board batteries are fully charged.
- J. Trial Assembly of the motor as described in the document “*MiniSShot Rocket Motor Assembly & Propellant Loading Manual*”.
- K. Assemble & load Pyrotechnic Separation Device (PSD) as described in the document “*MiniSShot Pyrotechnic Separation Device Assembly Manual*”
- L. Assemble & load Pyrotechnic Release Device (PRD).
- M. Solder the PSD harness wires (coming off the female connector) to the circuit board of the terminal block located in the Aft Avionics Bay. Consult the “*MiniSShot Wiring Harness Guide* as to connections.
- N. Set up and mount the camcorder as described in the document “*MiniSShot Video Camcorder Operation & Set-up Manual*” (perform steps I and II only).
- O. Install the electrical break-away male connector as follows:
 - 1. Feed the ribbon cable through the 3/16” hole in the PSD plunger.
 - 2. Once fully fed through, loop the strain-relief cable (attached to the connector) through the Kwik-link attached to the PSD drogue anchor.

3. Pull lightly on the connector until strain-relief cable is taut, the seal around the ribbon cable where it penetrates through the 3/16" hole using silicone sealant or RTV.

- P. Join together both sections of the Recovery Bay using eight #40x1/4" flat head screws. Seal the resulting joint with silicone or RTV as illustrated in Figure 2. Note that the other (pre-assembled) joint has already been sealed.

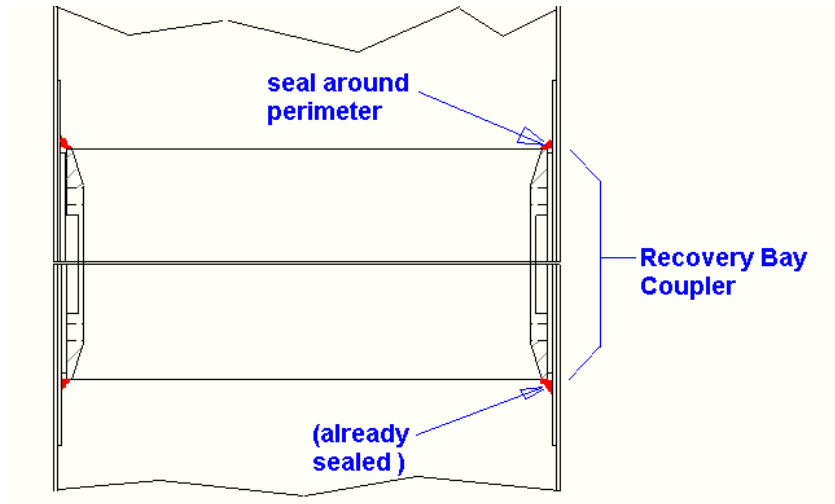


Figure 2 – Sealing of Recovery Bay compartment at coupler



Figure 3 – Bracket for attaching main chute anchor and PRD

II. Launch preparation – Note steps A through P must be completed before proceeding.



NOTE: STEPS Q & R MAY BE DONE IN PARALLEL FOR EXPEDIENCY.

Q. Assemble and load the motor as described in “*MiniSShot Rocket Motor Assembly & Propellant Loading Manual*”.

R. Pack the parachutes into the Recovery Bay using the following procedure:

1. Attach Main Chute anchor fitting to the support “half-moon” bracket (mounted on telemetry housing). Attach with #10 machine screw & nut. Use threadlock compound to secure nut. See Figure 3 for details.
2. Install Pyro Release Device (PRD) into the recess of the support bracket. Slide 1/8” pin into the hole in the side of the bracket then through the PRD lugs. Secure the pin in place with a piece of tape over the hole.
3. Run PRD igniter leads through support structures in forward avionics bay.
4. Attach Main Chute tether to Main Chute anchor fitting using Kwik-link.
5. Attach Payload Capsule drogue tether to PRD link.
6. Install 1)Payload drogue chute, 2)Main Chute Tethers, 3)Main Chute, 4)Payload Drogue Tethers & 5)Booster tethers, and 6)Booster Chute into Recovery Bay.

Note: Payload Drogue and Booster Chute need to be intertwined/connected for deployment as the Booster Chute pulls out the Payload Drogue.

7. Mate Forward Avionics support structure to Recovery Bay, taking care to thread PRD igniter leads and ribbon cable through support structure penetrations.
8. Secure “half-moon” bracket to Recovery Bay. Accomplish this by installing five #40x1/4” flat head screws through the skin reinforcement fitting and into the bracket.
9. Secure coupler with eight #40x1/4” flat head machine screws .
10. Attach Booster Chute tether to Booster Chute and attach tether to Pyro Separation Device (PSD) anchor using Kwik-link.
11. Join the male and female break-away electrical connectors.
12. Insert the PSD into the Recovery Bay and secure with eight #40x1/4” flat head screws.



NOTE: STEPS S & T MAY BE DONE IN PARALLEL.

S. Prepare Camcorder/Aft Avionics for flight using the following procedure:

1. Set up and mount the camcorder as described in the document “*MiniSShot Video Camcorder Operation & Set-up Manual*”, do steps I & II only.
Note: these two steps may have been done prior to launch date.
2. Slide the Booster into the horizontal positioned launch tower. Leave the forward end of the Booster protruding a few inches.
3. Feed the electrical leads from the motor pressure transducer and 2nd phase igniter through the rectangular slot in the camcorder support structure.
4. Stuff fiberglass insulation in the recess of the Forward Bulkhead.
5. Mate the camcorder support structure to the Booster using eight #40x1/4” flat head screws. Align the coupler such that the camera fairings will not interfere with launch buttons (if used) or launch tower guides.
6. Configure the camcorder for flight, as described in “*MiniSShot Video Camcorder Operation & Set-up Manual*” step III.
Note: make notation of time at point recording begins – camcorder has a 1 hour 55 minute recording limit.
7. Install the Aft Avionics compartment into position over the camcorder support structure.
**** Make certain “LENS” label on coupler is aligned with mirror ****
Join the male and female electrical connectors for the 2nd phase igniter and pressure transducer.
8. Secure to coupler using eight #40x1/4” flat head screws.
9. Remove protective tape on camcorder fairing. Dust off mirror and glass window using supplied brush.
10. Set the SAFE/ARM switch for 2nd phase igniter to SAFE.
11. Install the safety shunt with “*Remove Before Flight*” tag into the banana plug connector.
12. Attach the nine electrical wires of the ribbon cable coming off the male break-away connector to the terminal block located in the Aft Avionics Bay, as described in “*MiniSShot Wiring Harness Guide*”. Make sure to tighten screws and verify wires are held into terminal block securely.
Note that it will be necessary to position the Recovery Bay in close proximity to the Booster to accomplish this.
13. Connect the male and female connectors of the PSD ignition plug.

T. Prepare Forward Avionics for flight using the following procedure:

- 1. Set up the Chute Controller and connect the igniter leads as described in “*MiniSShot Chute Controller Instructions*” but do not arm at this time.
 - a) Perform Step 3 “Physical & Electrical Connections” (note that step 3 items 1-4 would have been done prior).
 - b) Step 4 “Launch Preparations” items 1-3 only.
- 2. Set up Featherweight Parrot altimeter and connect the igniter leads as described in “*MiniSShot Featherweight “Parrot” Configuration & Checklist*” step 2 “Pre-Flight Checklist” but do not arm at this time.
- 3. Set up the Main Computer as described in “*MiniSShot Main Computer Instructions*” step 3 (note steps 1 & 2 would have been done prior).
- 4. Set up Telemetry as described in Step 5 of “*MiniSShot Telemetry Instructions*”
Note: Steps 1-4 would have been done prior to launch date during ground testing.

U. Prepare Aft Avionics Bay for flight using the following procedure:

- 1. Perform the checks and power-up the Booster tracking beacon as described in “*Big Red Bee “BeeLine” Configuration Checklist*”.
- 2. Mate the Aft Avionics Bay to the PSD/Recovery Bay and secure using eight #40x1/4” flat head machine screws. Ensure launch rail buttons (if used) do not interfere with the camera fairings or fins.

V. Final launch preparation:

- 1. Perform the checks and power-up the Payload Capsule tracking beacon as described in “*Big Red Bee “BeeLine” Configuration Checklist*”.
- 2. ARM the Featherweight Parrot altimeter.
- 3. ARM the Chute Controller.
- 4. Verify the nosecone coupler o-ring is in place; lubricate o-ring with a light smear of silicone grease.
- 5. Join the connectors for the thermal sensors.
- 6. Bundle and secure loose wiring as needed.
- 7. Slide the nosecone into position and secure with eight #40x1/4” flat head machine screws.

- 8. Install 1st phase thermite igniter.
- 9. Elevate the launch platform to the required angle (near to vertical as possible).
- 10. Set the SAFE/ARM switch for 2nd phase igniter to ARM, then secure with a strip of suitable tape (optional)..
- 11. Gently REMOVE the 2nd Phase igniter safety shunt (attached to “REMOVE BEFORE FLIGHT” tag). Remove it gently (do not jerk or pull with string) to avoid false triggering of avionics.
- 12. Connect the 1st phase igniter to launch controller.

W. Verification of Flightworthiness:

Verify that all boxes in the following documents have been checked off.

(FOR EXPEDIENCY, THE FOLLOWING DOCUMENTS MAY BE VERIFIED AND CHECKED OFF AS SOON AS EACH ARE COMPLETED)

- MiniSShot Rocket Motor Assembly & Propellant Loading Manual*
- MiniSShot Pyrotechnic Separation Device Assembly Manual*
- MiniSShot Video Camcorder Operation & Set-up Manual*
- MiniSShot Telemetry Instructions*
- MiniSShot Chute Controller Instructions*
- MiniSShot Main Computer Instructions*
- MiniSShot Featherweight "Parrot" Configuration & Checklist*
- MiniSShot Rocket Vehicle Assembly, Launch Preparation & Procedure Manual*

CHECKING THIS BOX CONFIRMS THAT ALL STEPS IN THE ABOVE DOCUMENTS HAVE BEEN CHECKED OFF.

APPROVED -----

PAUL AVERY OR MATT CAMPBELL

X. THE ROCKET IS NOW READY FOR FINAL RANGE PROCEDURES & COUNTDOWN.

Important note: Prior to commencing final countdown, verify elapsed time since beginning camcorder recording is less than 1 hour 40 minutes.