**AirLock Master Test Plan**

**Please Note:** this is not a ‘master test plan’ as asked for in Part A. It contains no analysis of risks, and no prioritisation of test areas – specifically static reviews of requirements and specifications, design docs, or any planning related to user acceptance testing.

Having said that, the most critical risk in an airlock system is that a spacecraft suffers a catastrophic loss of pressure to the interior of the spacecraft. Even stranding someone outside is preferrable to killing everyone inside the spacecraft. So – Sorry Dave.

This ‘test plan’ document specifies what is desired in regard to unit, integration, system operation, scenario testing and functional testing of the AirLock system.

It is suggested that you implement and unit test classes in parallel. I.E. either write unit tests for a method and then implement the method to satisfy the unit tests (as in Test Driven Development), or write the method, and then implement the unit tests to ensure it meets the specifications.

In the following section, for each class, methods to be tested are listed in priority order. It is left to you to decide if, and how much to test each method, according to your assessment of what is possible and desirable within the constraints of submitting the assignment by the due date.

Remember it is just as important to test that classes work correctly when error conditions occur, as that they work correctly during normal operation.

* AirLock
* Constructor
* Ensure that a valid fully initialised AirLock is returned. (Both airlock state and operation mode are initialised correctly)
* openOuterDoor
* Ensure that if operation mode is AUTO and after the inner door is closed then an attempt is made to equalise pressures with the external environment
* openInnerDoor
* Ensure that if operation mode is AUTO and after the outer door is closed then an attempt is made to equalise pressures with the internal cabin

The aim of testing for AirLock is to ensure that under no circumstances do both doors open when exterior environment and interior cabin pressures are unequal.

In AUTO mode, both doors should never be simultaneously open.

Toggling between Auto and Manual mode should only be possible when both doors are shut.

System Level Testing (Functional Acceptance Tests)

For system operation testing, you must write Functional Acceptance Tests (FATs) that set up different starting conditions from which to test the airlock’s functionality in both MANUAL and AUTO mode in a variety of scenarios.

Scenario testing puts system operations together in a sequence to enact a use case such as ‘enter spacecraft’ or ‘exit spacecraft’.

Required test scenarios:

* Pass through airlock in auto mode from inside to outside when external environment pressure is less than internal cabin pressure
* Pass through airlock in auto mode from outside to inside when external environment pressure is greater than internal cabin pressure
* Pass through airlock from inside to outside in manual mode when external environment pressure is greater than internal cabin pressure
* Pass through airlock from outside to inside in manual mode when external environment pressure is less than internal cabin pressure

Steps involved in transiting the airlock in auto mode from outside through to the cabin for all initial pressure settings with both doors closed are as follows:

* Open the outer door
* Open the inner door
* Close the inner door

At the end of this process, the airlock should be SEALED, the cabin pressure should be unchanged, and the airlock pressure should be the same as the cabin pressure.

Steps involved in transiting the airlock in manual mode from outside through to the cabin for all initial pressure settings with both doors closed are as follows:

* Equalise lock pressure with external environment pressure
* Open the outer door
* Close the outer door
* Equalise lock pressure with internal cabin pressure
* Open the inner door
* Close the inner door

At the end of this process, the airlock should be SEALED, the cabin pressure should be unchanged, and the airlock pressure should be the same as the cabin pressure.