**System Testing**

*Note: All system tests refer to two files, these files contain mock transponder data for the test described for both our aircraft and the intruder. Comments in the transponder will start with a #. Altitude changes are linear and so are the aircraft paths. Attention will be given to keeping the speeds within realistic conditions. Latitude and Longitude will be over the United States. Some files may be longer or shorter depending on the testing. For instance if we are testing a near collision from 7 miles out to see the warning escalation at .5 second intervals this could be a long text file where as if we are testing a collision from 10 seconds out at .5 second intervals this will only have 20 lines per file. Western longitude is measured in negative degrees from prime meridian. Southern latitude would be measured in negative degrees but this will not be in the test data as the US is positive latitude and negative longitude. All times will start at 12:00:00Z.000 and increment accordingly. All altitudes are above sea level.*

**Legend**

|  |  |
| --- | --- |
| **Name** | **Value** |
| Our Plane ICAO | B1E24F |
| Intruder Plane ICAO | CE64B2 |
| Our Plane Flight Num | AE1200 |
| Intruder Flight Num | 00HN00 |

**Definitions**

|  |  |
| --- | --- |
| **Term** | **Definition** |
| Approach | Moving towards (either our plane directly or a future collision point) |
| Depart | Intruder is leaving our warning area without intersection |
| Ascend | Changing Altitude positively |
| Descend | Changing Altitude negatively |
| Miles | Nautical Miles |
| System | Collision detection system |
| Us | Our Plane |
| Intruder | Intruder Plane |
| Intersection | Same latitude and longitude but different altitude |
| Collision | Same latitude, longitude and altitude |

*Note: # column refers to test folder number as well.*

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| --- | --- | --- | --- |
| **#** | **Test** | **Expected Results** | **Files** |
| 1 | Intruder approaching from 7+ miles out from us. Will collide. Intruder is above us and descending to our altitude. Our altitude is not changing. | System will log transponder data, System will show radar information when within 6 miles, System will warn for traffic, System will escalate to yellow warning, System will escalate to red warning, System will give instructions to take evasive action. | 1US.txt  1INT.txt |
| 2 | Intruder is tethered weather balloon at 1000 feet and not moving. We will approach from about 3 miles out below the balloon and cross its path 50 feet above the balloon. The transponder will continue 5 seconds after the intersection. | System will log transponder data, System will warn for traffic, System will escalate to yellow warning, System will escalate to red warning, System will give instructions to take evasive action, System will give all clear message after intersection. | 2US.txt  2INT.txt |
| 3 | Intruder is a helicopter ascending with no Latitude/Longitude change. Helicopter starts at a lower altitude than us and ascends to nearly collide with us at an intersection altitude of 50 feet difference below us. The transponder will continue for 10 seconds after intersection. We will start about 1.22 miles out and about 45 seconds until intersection. | System will log transponder data, System will warn for traffic, System will escalate to yellow warning, System will escalate to red warning, System will give instructions to take evasive action, System will give all clear message after intersection. | 3US.txt  3INT.txt |
| 4 | Intruder exists for 15 seconds then stops transmitting data. This simulates our system not receiving data. Planes are not on a near collision course as their altitudes are very different. | System will log transponder data, System will raise alert that no data is being received. | 4US.txt  4INT.txt |
| 5 | Intruder exists for 15 seconds then stops moving but continues to transmit data from a fixed point. This simulates an error condition that cannot be true. Planes are not on a near collision course as their altitudes are very different. | System will log transponder data, System will raise alert of malfunction. | 5US.txt  5INT.txt |
| 6 | Intruder flies normally for 15 seconds then immediately begins flying backwards. This simulates an error condition that shouldn't be true. Planes are not on a near collision course as their altitudes are very different. | System will log transponder data, System will raise alert of malfunction. | 6US.txt  6INT.txt |
| 7 | Intruder flies normally for 15 seconds then begins erratically changing altitudes. This simulates an error condition that shouldn't be physically possible. Planes are not on a near collision course as their altitudes are very different. | System will log transponder data, System will raise alert of malfunction. | 7US.txt  7INT.txt |
| 8 | Intruder flies normally for 15 seconds then begins erratically changing horizontal position. This simulates an error condition that shouldn't be physically possible. Planes are not on a near collision course as their altitudes are very different. | System will log transponder data, System will raise alert of malfunction. | 8US.txt  8INT.txt |
| 9 | Intruder flies normally for 15 seconds then begins erratically changing speed. This simulates an error condition that shouldn't be physically possible. Planes are not on a near collision course as their altitudes are very different. | System will log transponder data, System will raise alert of malfunction. | 9US.txt  9INT.txt |
| 10 | Intruder flies very slow (like a drone or UAV). The intruder is below us and we are descending . The drone will pass under us by 25 feet resulting in a near collision. The transponder will continue for 10 seconds after intersection. | System will log transponder data, System will warn for traffic, System will escalate to yellow warning, System will escalate to red warning, System will give instructions to take evasive action, System will give all clear message after intersection. | 10US.txt  10INT.txt |
| 11 | Intruder flies very fast (like a jet). The intruder is above us and we are climbing . The jet will pass over us by 300 feet resulting in a near collision. The transponder will continue for 10 seconds after intersection. | System will log transponder data, System will warn for traffic, System will escalate to yellow warning, System will escalate to red warning, System will give instructions to take evasive action, System will give all clear message after intersection. | 11US.txt  11INT.txt |
| 12 | Intruder flies 1000 feet over us as we taxi on the ground. | System will not log transponder data, System will not warn for traffic, System will not go through any escalations, System will not give any all clear message. | 12US.txt  12INT.txt |
| 13 | We are taking off and will climb to 1000 ft and then the intruder will nearly miss us flying under us by 50 feet. | System will log transponder data after we reach the appropriate altitude or speed, System will warn for traffic after we reach the appropriate altitude or speed, System will escalate to yellow warning, System will escalate to red warning, System will give instructions to take evasive action, System will give all clear message after intersection. | 13US.txt  13INT.txt |
| 14 | We are landing parallel to the intruder who is also landing from 750 feet. | System will log transponder data System will not warn for traffic as we are landing, System will not escalate warnings, System will not give instructions to take evasive action, System will not give all clear message after intersection. | 14US.txt  14INT.txt |
| 15 | Intruder approaching from directly behind and moving faster than us. Near miss by 100 feet below. | System will log transponder data after we reach the appropriate altitude or speed, System will warn for traffic, System will escalate to yellow warning, System will escalate to red warning, System will give instructions to take evasive action, System will give all clear message after intersection. | 15US.txt  15INT.txt |
| 16 | Intruder departing from directly behind and moving slower than us. | System will log transponder data, System will de-escalate from red warning to yellow warning, System will de-escalate from yellow warning to traffic warning | 16US.txt  16INT.txt |