

## CaPE Notes (DJM)

### 8 July 1991

0830<sup>1</sup> - Attended meeting of some of the participants at Patrick Air Force Base. Items of interest:

- 1) T-1 line one month late, arrived just recently. Therefore, NCAR is behind schedule for transmitting CP-4 data to FOC. At least a couple of days will be required before the system is ready.
- 2) Communications consoles inoperative, probably ready soon.
- 3) CP-2, CP-3, and CP-4 are operational.
- 4) NCAR RATS box not installed yet, will be installed at Patrick Air Force, followed by transmission of data to Miami, followed by a return to FOC.

### 9 July 1991

Spent the day visiting various sites, other systems were not ready for T-28 operations. CP-4 experienced a blown blower motor late in the afternoon. Storms developed during the afternoon, as well as on 8 July. Only radar operations were accomplished on this day.

### 10 July 1991

1100 - At FOC. Echoes beginning to form. Spent time learning manipulation of consoles, especially those displays useful for aircraft operations.

1400 - Echoes moving in from the west across the state. Some weaker ones in the area, with rain occurring at the site.

1430 - Talked to Dan Custis about trying to launch the T-28 for a test flight between rainshowers.

1530 - Dan ran into problems getting clearances, Patrick wouldn't accept request. FAA tried to straighten out the problem, but the word failed to get passed down the line. Still raining at the site.

1645 - Rain expected to continue for 1.5 hours approximately. Can't take off prior to that because conditions are too wet. Called things off for the day. Test flight scheduled for about 1000 tomorrow.

### 11 July 1991- Flight 557 (research flight during afternoon)

0930 - Arrived at FOC. Take-off scheduled for 1000 for test top. Will check radios, telemetry, track, and T-28 data system.

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<sup>1</sup> All times Eastern Daylight Time, unless otherwise noted.

1003 - T-28 airborne. Telemetry poor.

1007 - Radio okay.

1015 - No track although transponder appears to work in the aircraft.

1016 - IDENT shows 5703, but T-28 has 5037.

1022 - Track appears to be okay, but position is questionable. Track from telemetry is okay, but lagging 15 minutes behind.

1027 - T-28 will orbit Lakeland.

1033 - RATS track is about 3 minutes behind.

1040 - Check all radio frequencies (128.15, 133.8, and 134.275). All systems useable, operating about 4x4.

1050 - Position 286/45.5<sup>2</sup>. Tracks are interfering with the radar data transmissions in some unknown fashion.

1052 - Position 292/42.4, large delay on my display. Tracks failed.

1055 - Radios are fouled up, no communication with aircraft.

1105 - Radios back again, problem unknown.

1109 - T-28 leaving frequency, will shoot surveillance approach and return to base.

1345 - Back at FOC for possible research flight. Line of echoes from 20 nm west, oriented east-west, another west-northwest-east-southeast line centered 20 nm south of Melbourne (MLB).

1500 - Awaiting possible activity for coordination with CP-2. Plan to fly anyway later if storms fail to develop close enough to CP-2 and if other storms are still in the area.

1525 - Alerted T-28 for take-off at 1630, with possible slide to 1700.

1535 - Attempting to move take-off up if possible.

1609 - T-28 airborne. Track appears to be okay.

1626 - Fairly extensive cone of silence associated with the tracking system over Patrick Air Force Base.

1635 - Heading<sup>3</sup> 130° for penetration of echo at 143/30 km from CP-2.

1643 - Out of cloud.

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<sup>2</sup> All positions given with respect to Melbourne in nautical miles, unless otherwise noted.

<sup>3</sup> All headings are magnetic, unless otherwise noted.

1645 - Heading 340° for new penetration.  
1646 - Heading changed to 330°.  
1649 - In small echo.  
1650 - Out of cloud for penetration 2.  
1652 - Heading 130° for new penetration.  
1653 - Out of cloud, very little activity.  
1700 - Moving to new storm.  
1703 - Heading 165° from an IP at 360/20..  
1709 - Out on south-southeast side of cloud, turning back for new penetration and descending to flight level 120.  
1712 - Penetration puts the T-28 in the cone of silence over Patrick, tracks are not available in that region.  
1724 - New penetration heading of 150° for a distance of about 15 nm.  
1731 - Out of cloud.  
1732 - New penetration heading of 340°.  
1735 - Out on northwest side of the cloud.  
1741 - Executing a 90/270 turn to 160° for new penetration.  
1746 - In cloud.  
1750 - Out of cloud.  
1753 - Descending to flight level 080, will penetrate on a heading of 340° for last penetration.  
1757 - T-28 return to base.

12 July 1991 - Flight 558

0830 - Plan for the day, T-28 to coordinate with Lear and CP-2, if possible.  
1030 - At airport. Front strobe on Cannon camera inoperative.  
1100 - At FOC. CP-4 radar flaky. Informed crew to be on-site by 1300 for possible flight.  
1120 - Radar back, weak echoes northwest, beyond 25 nm.

1325 - Front strobe failure is in the power supply, fix unknown. Scheduled take-off as soon as possible, probably by 1400. CP-2 people are more interested in later activity where 2D-P would be more useful.

1340 - Base Ops wouldn't accept Dan's clearance again, but this probably won't affect the take-off time very much.

1355 - T-28 start up.

1407 - T-28 airborne, track okay.

1426 - Take-off was to the west, then southeast and now north-northeast. Lots of traffic, T-28 being vectored by FAA.

1428 - T-28 penetrating cloud just on the west side of a storm located 5 nm northeast of MLB.

1437 - Penetration heading to the north.

1440 - Passing 2 nm west of storm located at 165/30 km from CP-2.

1443 - End of penetration 1.

1446 - Heading 180° for second penetration at flight level 164.

1453 - End penetration 2.

1500 - Storm located at 285/22 nm.

1503 - Heading 210° for new cloud.

1509 - Out of cloud. Penetration was at flight level 180 near 205° radial from CP-2.

1513 - Heading 030° for new penetration, flight level 160.

1519 - Out of cloud.

1522 - Heading 210° for new penetration, flight level 150.

1527 - Out of cloud.

1530 - Heading 030° for new penetration, flight level 130.

1535 - End of penetration.

1541 - Heading 200° for a new penetration at flight level 110.

1547 - Out of cloud. Need update of landing conditions at MLB.

1553 - In penetration at flight level 090.

1559 - Out of cloud on the north side.

**1602 - In penetration at flight level 070.**

**1611 - Out of cloud, return to base.**

**13 July 1991**

**Plan called for possible experiment 11 with hard standby at 1400. No T-28 flight was made on this day. There were also numerous problems with the Cannon camera, but it appeared to be operational at the end of the day.**

**14 July 1991 - Flight 559**

**0830 - Plans called for a hard standby at 1100. Looking for possible activity in the northern Doppler lobe, with emphasis on experiment 11.**

**1045 - At FOC.**

**1100 - Good sea breeze front development today, looks like a good possibility for convection.**

**1200 - Convection is a bit suppressed along the sea breeze front. Things should develop within 1 to 2 hours, according to the forecasters.**

**1600 - Small clouds have been in the region all afternoon, growing and decaying. Projected activity has not developed yet. Apparently convection has been suppressed by subsidence.**

**1620 - Scheduled T-28 launch as soon as possible. Essentially launching on a forecast, although an echo exists at 290/25 nm MLB.**

**1700 - T-28 airborne.**

**1730 - Visual penetration, no echoes at this time.**

**1732 - T-28 passed under the cloud of interest.**

**1735 - In cloud on heading of 120°.**

**1737 - Out of cloud for penetration 1.**

**1741 - Climbing to flight level 180.**

**1748 - In cloud for penetration 2 at flight level 180. Lightning reported.**

**1749 - Out of cloud.**

**1754 - In cloud for penetration 3 at flight level 160. 1500 ft/min updrafts reported during penetration.**

**1755 - Out of cloud.**

**1801 - Heading 200° for penetration 4 at flight level 140. Precipitation and light to moderate turbulence reported.**

**1803 - Out of cloud.**

**1807 - In cloud for penetration 5 at flight level 130. Moderate precipitation, with turbulence and lightning reported.**

**1810 - Out of cloud, penetration ended at flight level 120.**

**1817 - Penetration 6 at flight level 100. 500 ft/min downdrafts with light precipitation reported.**

**1822 - End of penetration; logged turn will be made in cloud for new penetration, with heading to the north for penetration 7.**

**1825 - Weak updrafts reported.**

**1826 - Out of cloud.**

**1834 - In cloud for penetration 8, flight level 060.**

**1835 - Out of cloud.**

**1841 - In penetration 9 at flight level 060.**

**1845 - Out of cloud.**

**1847 - In cloud, light turbulence and moderate precipitation reported.**

**1850 - Out of cloud. Will penetrate another cloud on return to base at location of 355/25.**

**1853 - Moderate to heavy precipitation with lightning reported.**

**1855 - Out of cloud, return to base.**

#### **15 July 1991**

**Day off. Lots of weather developed in three different surges between 1300-1900.**

#### **16 July 1991 - Flight 560**

**0930 - Gave Dan Custis a ride to the airport for a meeting with the FAA representative about flight operations.**

**1500 - Alerted T-28 for take-off as soon as possible, probably will occur in less than one hour.**

**1525 - T-28 airborne.**

**1535 - Problem with transponder code for T-28 (5037). Apparently not available from FAA.**

**1540 - CP-4 radar problems, storms too strong to penetrate without radar.**

**1603 - Will try north-south legs in front of line, still no radar.**

1606 - Heading 170° in clear on east side of line.  
1612 - Reversing course for north bound heading.  
1621 - Reversing course again. The T-28 can't stay VFR. Heading 190°.  
1627 - Changing heading to 160°.  
1630 - Reversing course to the north.  
1646 - Heading 190°, in light precipitation.  
1649 - Radar down for the day. Light icing occurred on aircraft during last penetration. In cloud early, heading changed to 150° to get out, then back to 180°.  
1651 - Heading 150° in cloud again.  
1657 - Reversing course, will hold short of cloud, within 200 ft if possible.  
1702 - In precipitation, turning to 350° heading.  
1703 - Out of cloud again, back on heading of 340°.  
1709 - South bound heading again.  
1716 - Heading 120° for last run. Return to base. Switched frequencies during this flight from 133.8 to 123.3 for better reception.

#### 17 July 1991

No flight this day. Voltage regulator installed on CP-4 to resolve yesterday's problems; however, radar failed again and T-28 operations were called down around noon. The FOC people opted for a down day in order to include program fixes that became necessary for the display programs.

#### 18 July 1991 - Flight 561

0830 - Plans call for early flights for the King Airs and the sailplane for a coordinated mission. T-28 planned for later take-off.  
1030 - At FOC. King Airs aloft. Absolutely need a listening capability at least, in order to even attempt a coordinated T-28 and sailplane mission. Radio communications are really questionable at FOC for coordinating several aircraft.  
1100 - Line of cumulus clouds in northern lobe, along west side of Indian River.  
1145 - Towering cumulus visible to the north. Might be the weak echo that appears at 50 km north of MLB.  
1150 - Cloud is growing very fast. Sailplane is airborne now.

1320 - Aircraft armada has shifted to 210/8. Out of lobes to southeast of southern lobe.

1340 - Weak echo in southern lobe, sailplane investigating.

1345 - Sailplane sort of off on its own to the north while King Airs work at about 250/8.

1405 - Sailplane off tow near position of 255/9.

1420 - Sailplane moving to another cloud about 5 nm north of present position.

1430 - T-28 alerted.

1455 - Storm located at 340/25.

1500 - T-28 airborne.

1525 - Heading of 230° for penetration 1 at flight level 170.

1529 - Heading 030° for penetration 2. The clouds are very weak.

1536 - New cloud on a heading of 280°.

1539 - Out of cloud.

1541 - Penetration 4 on a heading of 110°.

1542 - Out of cloud.

1545 - In cloud for penetration 5.

1549 - In cloud for penetration 6 on a heading of 110°. Radar displays inoperative.

1557 - In cloud for penetration 7, northern most cell of weak cloud complex.

1559 - Out of cloud, trying to descend to flight level 065.

1610 - Clearance to descend.

1616 - Penetration 8 on a heading of 320° at flight level 065.

1618 - Out of cloud. Light rain reported.

1619 - In cloud for penetration 9 on a heading of 120°.

1621 - Out of cloud.

1624 - In penetration 10.



1625 - Out of cloud. Moderate precipitation reported.

1630 - In penetration 11.

1632 - Out of cloud, return to base.

19 July 1991 - Flight 562

0830 - Listen-only radio post may be available today. Communications is still the biggest problem on this project. CP-4 prior to this date may have been as much as 8 dB low, probably okay today.

1110 - At FOC. King Airs and sailplane operation in progress.

1130 - Two storms in northern lobe, reflectivity greater than 50 dBz at 15,000 ft. Storms located at 355/28 and 010/23.

1142 - Lear plans to launch. Extra communications post is available where we would be able to share the frequency with the sailplane if desired.

1155 - King Airs way south of storms, too much electricity. Probably could presently work the sailplane, with T-28 underneath, if we were airborne.

1157 - Sailplane moving to new storm located at 350/24. Reflectivity greater than 50 dBz at 15,000 ft.

1200 - It may be possible to consider a T-28 launch on a suitable cloud in conjunction with the rest of the aircraft. If the storms go through their normal fast life cycle, King Airs will not be a factor because of the lightning. Thus, we will only need to coordinate with the sailplane most likely.

1208 - T-39 to fly. No space is available for that controller and plans call for him to use my post. There are not enough communications stations to include the T-28 in a multi-aircraft mission.

1215 - My spot is taken over by the T-39 controller.

1220 - T-28 alerted for take-off as soon as possible.

1350 - Lots of static interference on frequency 123.3 whenever anyone transmits on 133.8. T-28 airborne.

1355 - Storm developed at 320/24. IP at 340/21 with east-west penetrations planned.

1405 - ATC took T-28 pretty far east before turning to a 360° heading to get to the IP during climb out.

1417 - Penetration 1 on a heading of 280° at flight level 165.

1419 - Moderate precipitation reported.

1420 - Out of cloud.

1424 - In cloud for penetration 2.  
142530 - Lightning reported by T-28.  
1426 - Out of cloud.  
1429 - In cloud for penetration 3, T-39 passed over head.  
142940 - Lightning in cloud.  
1433 - Out of cloud.  
1438 - In penetration 4, T-39 1 nm west headed southwest.  
1441 - End of penetration. T-28 still in cloud.  
1445 - In cloud for penetration 5 on a heading of 230°. New cloud located at 305/34.  
1447 - Turning right to heading of 270°.  
1448 - Turning right to 290°.  
1449 - Correction to 310° heading.  
1450 - Out of cloud.  
1456 - In penetration 6 on a heading of 090°.  
1457 - Out of cloud.  
1459 - In penetration 8 on a heading of 280°.  
1501 - Out of cloud.  
1510 - New target 285/34, pilot on visual penetration.  
151030 - In cloud for penetration 9.  
1512 - Out of cloud.  
1513 - In cloud for penetration 10.  
151320 - Out of cloud.  
151430 - In cloud for penetration 11.  
1515 - Out of cloud.  
1518 - In penetration 12.  
1520 - Out of cloud.  
1522 - In penetration 13.

1523 - Out of cloud. 500 ft/min downdrafts reported, followed by 1,000 ft/min updrafts.

152640 - In cloud for penetration 14.

1530 - Out of cloud, 2,000 ft/min updraft near the end of the penetration. Trouble maintaining the block.

1533 - Pilot attempting to get larger block.

153650 - In penetration 15 at flight level 160.

1539 - Out of cloud.

1542 - In cloud for penetration 16.

154330 - Out of cloud.

1544 - In cloud for penetration 17.

1545 - Out of cloud.

1547 - In cloud for penetration 18.

1549 - Out of cloud, return to base.

20 July 1991 - Flight 563

0830 - At airport, T-28 ready.

0900 - At FOC, thunderstorm in progress nearby.

0940 - Alerted T-28 for take-off, thunderstorm in progress at airport.

0950 - King Air returning to base, too electrical. Sailplane airborne.

1007 - Sailplane heading south, can't climb in the northern lobe.

1013 - No foil or telemetry will be available on this flight.

1024 - T-28 airborne.

1037 - Penetrating cell that was raining earlier at Patrick.

1039 - IP at 315/26.

1050 - Camera also down.

1054 - In penetration 1 at flight level 180 on a heading of 060°.

1055 - Out of cloud.

1059 - Penetration 2 on a heading of 240°.

1101 - Out of cloud. 1,000 ft/min updrafts reported.  
1105 - In cloud on 120° heading for penetration 3.  
1106 - Light to moderate precipitation and some lightning reported.  
1108 - 1,500-2,000 ft/min updraft.  
110830 - Out of cloud.  
111240 - In penetration 4.  
111340 - 1,000 ft/min up/heavy precipitation/severe turbulence reported.  
1115 - Out of cloud.  
1122 - Heading 120° for penetration 5.  
1127 - Out of cloud.  
1131 - In new cloud for penetration 6.  
1135 - Out of cloud.  
1136 - Long track plot lags.  
1137 - In cloud for penetration 7, will miss on the west side of the echo.  
1141 - Out of cloud.  
1143 - In penetration 8.  
1146 - Missing cloud to the east, mainly due to slow update of radar data.  
1147 - Out of cloud, return to base. Weather is approaching Melbourne.  
1155 -T-28 has field in sight, RW- occurring at FOC.

21 July 1991

0900 - At hangar, Cannon camera still has problems. Plan is to fly without it if necessary.  
0920 - At MOCCA, little cloud development.  
0945 - Sailplane scheduled for 1030 take-off.  
1010 - T-28 alerted for 1115 take-off. No foil available today.  
1110 - Storms decaying. No activity over land yet.  
1120 - Aborted T-28 take-off.

1130 - Planned to go back on stand-by at 1250.

1230 - Outlook is not good, may be coming under the influence of subsidence region in advance of easterly wave.

1400 - Few turkey towers visible to the northwest. Practically no chance for T-28 activity today. Apparently dryness in the atmosphere is having an adverse effect on the development of convection, anyway there is a big difference between today and the last three days where convection was active early and lasted throughout the day.

1430 - T-28 operations called off.

22 July 1991: Day Off.

1330 - Note on my condo door notifying me that there was a crack found in one propellor blade. JEL returning to RAP for a short-bladed prop. JEL plans to return via rented truck. The aircraft will be hard down for several days.

23 July 1991

Summary: Jim Dye has been helping Gary Johnson check out the FSSP. It was found to be badly out of alignment, but should be okay now. Clouds formed late in the afternoon and were visible from Patrick Air Force Base just before dark. They were spectacular clouds with rather high bases for Florida. They dissipated shortly after dark.

24 July 1991

Summary: Viewed an operation at FOC consisting of the Lear, T-39, and ER-2. The King Airs and sailplane had been up on an operation earlier. There are still serious potential communication problems if all the aircraft are flying at the same time.

25 July 1991

Summary: There was a pilot's meeting to discuss intercomparisons for field mills, i.e. types of patterns and types of clouds. Viewed an operation with storms active in the southern lobe, as well as storms near CP-2. Storm development today was later than normal. They tended to stay in the MLB area til near dark.

26 July 1991

Summary: Viewed an operation at FOC. Good storms north and west of the north lobe, moving east. Around 1400 would have been a good time to launch the T-28 if the aircraft had been available. Heavy precipitation occurred a little later at the airport from nearby storm development. The storms today were very active, moving from the west.

## 27 July 1991

**Summary:** T-28 is down today for swap of propellers, which was actually completed by about 1730. It was decided not to fly because of the late hour and the fact that we were still a good hour from take-off because of additional maintenance work going on with the camera and the foil impactor. This means that the T-28 would not have been to altitude until near 1900 and would have had to return to base, leaving the project area by about 1930 to ensure landing before dark. Actually, the storm that formed inland and moved through the coastal region around 2000 made things darker than normal at that time. We need to assess things on a daily basis and be wary of late launches, so as to get the aircraft back on the ground during the daylight.

## 28 July 1991 - Flight 564

**1000** - Arrived at FOC. Discussed plans with Roger, which are to go on stand-by at 1300. Plan is to try to coordinate with the ER-2 and/or T-39, preferably in conjunction with CP-2. Need to confer with Bringi about penetrating the cloud during the change over to ice. This is a difficult operational problem as we need to be in just the right area at the right time; this is virtually unforecastable.

**1250** - Stand-by at 1300 looks okay, but may be slightly early. Clouds are forming, but tops can't be more than about 10,000. Higher clouds are visible to the west.

**1305** - Generator problems at CP-4. Will have to operate on commercial power today, which means a lightning strike could present operational problems at the radar.

**1415** - Cell forming between CP-4 and FOC, just east of the south lobe.

**1430** - ER-2 airborne, ETA 1530.

**1450** - Scheduled take-off for T-28 at 1545.

**1535** - T-28 airborne.

**1549** - Frequencies still present problems at FOC, they tend to interfere with each other.

**1609** - T-28 in penetration 1 with T-39 passing overhead.

**1611** - End penetration 1. Radio frequency very busy and noisy. Icing occurred during the penetration. Very slow scan cycle time for T-28 operations because of dual Doppler scanning procedures in southern lobe, while we are flying elsewhere.

**1616** - T-28 in penetration 2, T-39 about 90 seconds ahead at higher altitude.

**1617** - End penetration 2.

1622 - Penetration 3, storm is dissipating.

1623 - End penetration 3.

1625 - Moving to new cloud.

1628 - In cloud for penetration 4.

1629 - Out of cloud.

1634 - In penetration 5, heading for a tower on southwest side. Clouds are very weak.

163730 - In cloud for penetration 6. New cloud located at 320/20.

163830 - Out of cloud. Light turbulence, updrafts and icing reported. Storm is near 317/24.

164349 - In cloud for penetration 7.

1645 - End penetration 7, 800-1200 ft/min updrafts reported.

1651 - In cloud for penetration 8.

1652 - End penetration 8, 1000 ft/min updrafts encountered.

1659 - In cloud for penetration 9.

1656 - End penetration 9, very little activity.

170048 - In cloud for penetration 10.

1702 - Out of cloud, 500 ft/min updrafts and downdrafts reported.

1707 - In cloud for penetration 11 at flight level 210.

1709 - Out of cloud, very little activity.

1714 - In cloud for penetration 12.

1715 - Out of cloud, little activity. Return to base.

**Summary:** There were about 67 minutes of penetration activity on these clouds; however, they were very weak with fast life cycles. The last one was penetrated pretty much through its entire life cycle. The T-28 was struck by lightning near one of the propellor tips. Data okay. There seems to be a radar scanning procedure problem at FOC where the boundary layer people arbitrarily take priority for scanning purposes. Today the aircraft were working in the north lobe while the radar was spending most of its scanning time in the southern lobe. This situation needs to be clarified.

**29 July 1991 - Flight 565**

**0830 - The plan for today is to have the T-28 coordinate with the sailplane, dual Doppler and CP-2, if possible.**

**1255 - Arrived at FOC. Clouds are developing a little faster than yesterday, but still no workable clouds at this time. The King Airs are up, but the sailplane is still on stand-by. King Airs are operating in the southern lobe.**

**1315 - Wyoming operates okay on FM, but the NCAR King Air does not.**

**1400 - Scheduled T-28 for a take-off at 1430.**

**1421 - Slight delay in T-28 take-off due to a problem getting the Cannon camera back together.**

**1430 - Best storm located at 345/30.**

**1443 - Sailplane off tow near a position of 346/37. Echo is located 2 nm southwest of that position..**

**1445 - Clouds appear to be dissipating.**

**1448 - Computer on T-28 won't boot, delay unknown.**

**1455 - Still no joy. T-28 crew will call when ready, for a decision whether to fly or not.**

**1504 - Problem was a bad tape, going back on stand-by. Storms are weakening, echoes about 20 dBz. Storms stayed in an intense mode with about 50 dBz echoes aloft for about 30 minutes from 1330 to 1430.**

**1550 - Storm located at 347/18, tops about 20,000.**

**1605 - Two storms in the same area described above, life cycle very fast, about 10 minutes.**

**1645 - Scheduled T-28 launch as soon as possible.**

**1703 - T-28 airborne.**

**1724 - Storm located at 321/28.**

**1729 - On penetration heading, encountered 1200 ft/min updrafts at flight level 180.**

**1730 - End penetration 1.**

**1735 - In cloud for penetration 2.**

**1736 - CP-2 down.**

**1738 - End penetration 2, light turbulence encountered.**



**1743 - Start penetration 3.**

**1745 - End penetration 3, couple of regions of 1000 ft/min updrafts reported during the penetration.**

**1749 - On heading of 045° for penetration 4.**

**1750 - Out of cloud.**

**175525 - In cloud for penetration 5. Displays are experiencing some delays.**

**1756 - T-28 reports heavy precipitation with 1000 ft/min updrafts.**

**1757 - Out of cloud.**

**180140 - In cloud for penetration 6. Several lightning flashes reported.**

**1804 - Out of cloud. Tracking problems are being experienced.**

**1812 - In cloud for penetration 7.**

**181440 - Out of cloud.**

**1819 - In cloud for penetration 8.**

**1823 - Out of cloud.**

**182630 - In cloud for penetration 9.**

**1828 - Out of cloud.**

**183320 - In cloud for penetration 10.**

**1836 - Out of cloud.**

**1837 - In cloud for penetration 11.**

**1839 - Out of cloud.**

**1842 - In cloud for penetration 12.**

**184330 - Out of cloud. Return to base.**

**Summary: Pretty good case, especially penetrations 3-8, which were in a developing storm which became a mature thunderstorm. Later penetrations were in the same mass of cloud but missed the most active part of the cloud because of intermittent track and radar display problems. Still the penetrations were pretty good. The data looked reasonable, probably the best case of the season so far.**

**30 July 1991**

**0830 - Plans call for the T-28 to coordinate with the sailplane.**

1200 - Arrived at FOC. Clouds began forming at about 0900 and gradually developed as they moved inland. Good towering cumulus, possibly a Cb on the north side of the northern lobe. Kings Airs and sailplane are coordinating on the cell. This wave of storms is quite weak. The T-28 will have to wait for the next development. Called T-28 to delay stand-by until 1300.

1230 - CP-2 down and track problems are being experienced. Fix unknown.

1315 - Generator down at CP-4, probably for the day. Commercial power is also out. Awaiting return of power before committing to a possible flight. Small rainshower passed the radar site within the last hour, thunder heard in the past 10 minutes.

1515 - Attempting to fix generator, which may be up in about one-half hour. Still on stand-by.

1540 - T-39 plans to launch in about 45 minutes, without CP-4. CP-4 not likely to be up for rest of day. Calling T-28 operations down.

#### 31 July 1991 - Flight 566

0915 - PLS in town. Picked him up at the hotel for a trip to various project sites.

1015 - Took PLS to airport terminal to get his badge.

1040 - Arrived at FOC. King Airs and sailplane being launched.

1115 - Returned PLS to hangar. Verified that the crew is ready for a 1200 stand-by. This looks too early to me.

1200 - Arrived back at FOC. Clouds near CP-2 and near MLB. Weak, but growing, visual tops between 10-15,000 ft.

1225 - Notified T-28 for launch. Nothing workable now, but nowcast is for continued development.

1238 - Track is down.

1242 - Track is back up again.

1301 - T-28 is airborne.

1307 - Track is out on my display.

1320 - Track is back.

1325 - Experiencing some problem with ATC concerning aircraft clearances.

1326 - More tracking problems.

1330 - Track appears to be okay.

1333 - In cloud for penetration 1 on heading of 265°.

1335 - Out of cloud.

1337 - In cloud for penetration 2.

1339 - Out of cloud.

133936 - In a second nearby cloud, logged as penetration 3.

1341 - Out of cloud.

1345 - In cloud for penetration 4.

1346 - Missing the echo 1 nm to the south.

134723 - End penetration 4. Turning in-cloud for next penetration.

1350 - In cloud for penetration 5 on a heading of 130°.

1351 - Out of cloud. Good lift of about 1000-1500 ft/min reported.

1401 - In cloud for penetration 6.

1402 - Good updraft.

140345 - Out of cloud. Good penetration, longest, most sustained updraft of the season so far.

140830 - In cloud for penetration 7.

141130 - Out of cloud. Some updrafts but not as strong as previous penetration. Heavy precipitation reported.

1417 - In cloud for penetration 8.

141730 - Turning to heading of 170°.

141830 - Out of cloud on the south side.

1422 - In cloud for penetration 9.

1423 - Good updraft, moderate to severe turbulence, moderate to heavy precipitation.

142730 - Out of cloud.

142740 - In cloud for penetration 10.

1428 - Out of cloud, passed on the east side of the echo.

1430 - Dog leg maneuver for field mill test.

1431 - Return to base, weather approaching Melbourne.

Summary: Track problems should be less tomorrow. Sailplane broke off from operations early, reasons unknown.

1 August 1991

Day off for potential shuttle launch. Shuttle launch was cancelled around 1230 due to weather problems. A beautiful wall cloud with a nice outflow boundary passed over the beach near Patrick around 1500.

2 August 1991 - Flight 567

0830 - Plans again call for coordination with the sailplane.

1320 - Arrived at FOC. Clouds are much slower developing than yesterday. Small cumulus showing up on radar. King Airs flying boundary layer experiment. They plan to return to base soon and hope for a second mission.

1400 - Displays and programs at FOC have crashed twice in the last 5 minutes. Solution unknown.

1430 - Took Peter Menzel (National Geographic) to the hangar to talk to the T-28 people and see the aircraft.

1510 - Back at FOC. Clouds look rather flimsy visually. A few small clouds appearing on radar south and east of Melbourne.

1540 - Alerted T-28 for a take-off at 1630.

1623 - T-28 airborne.

1624 - Displays out again.

1638 - Displays up momentarily, but out again.

1643 - Tracks are back, T-28 heading for cloud located at 310/50.

1701 - Penetration 1 being accomplished visually.

1704 - Moderate precipitation and turbulence.

1705 - Heading 160° to get back in the cloud.

170615 - Out of cloud.

1709 - Too much radio traffic.

1710 - In cloud for penetration 2.

1713 - Out of cloud. Up to 1000 ft/min updraft near the end of the penetration.

1717 - In cloud for penetration 3.

1718 - 3000 ft/min updrafts reported.

171930 - Out of cloud.

1723 - In cloud for penetration 4.

1726 - Out of cloud, but heading into some additional growth on the northeast side of the cloud.

1727 - Out of cloud.

1731 - In cloud for penetration 5.

1733 - Out of cloud.

173754 - In cloud for penetration 6.

1740 - Out of cloud. Some updrafts, as well as precipitation and turbulence reported.

1746 - In cloud for penetration 7.

1748 - Out of cloud.

174949 - In cloud for penetration 8.

1751 - Out of cloud.

1756 - In cloud for penetration 9.

1800 - Out of cloud.

1802 - In cloud for penetration 10.

180330 - Out of cloud.

1807 - In cloud for penetration 11.

1809 - Several clouds penetrated.

1810 - In cloud again for penetration 12.

1811 - Out of cloud. Heading for new growth.

1813 - In cloud for penetration 13.

1815 - Out of cloud. Return to base. Displays experiencing 8 minute lags near the end of the flight.

### 3 August 1991 - Flight 568

0830 - Large discussion on the inadequacy of radar updates and air-to-ground radio communications. Plan is to stress precipitation studies over boundary layer activity while the King Airs are still around. Radio problem resolution unknown.

1330 - Arrived at FOC. Clouds are around, but little vertical development.

1610 - Alerted T-28 for take-off. Clouds expected to form within the hour along a sea breeze front.

1643 - T-28 airborne.

1651 - COM2 aboard the T-28 has an echo making communications difficult, but may be better than COM1.

1657 - Transmitting on COM1, works better.

1710 - Storms not expected, continue climb to 22,000 for porpoise-maneuvering.

1724 - In cloud for penetration 1 at flight level 210. Heading south.

172421 - Out of cloud.

1729 - In cloud for penetration 2.

1730 - Out of cloud.

1732 - In cloud for penetration 3.

173216 - Out of cloud.

1738 - In cloud for penetration 4.

1739 - Out of cloud. Power fluctuations on the T-28.

1744 - In cloud for penetration 5 at flight level 190.

174440 - Out of cloud.

175148 - In cloud for penetration 6 at flight level 170.

175217 - Out of cloud.

175749 - In cloud for penetration 7.

175830 - Out of cloud.

1759 - Tracks out.

180250 - In cloud for penetration 8.

1806 - Out of cloud.

180808 - In cloud for penetration 9.

180857 - Out of cloud. Return to base.

#### 4 August 1991

1030 - JEL reports valve guides are crooked on the cylinder that gave us so much problem during 1989. T-28 will be down for the day. Reported this to Roger. JEL also has to try and refasten the propellor boots which are beginning to loosen slightly. He says if it becomes necessary to remove them we can still fly at sub-freezing temperatures.

1045 - Talked with Jeff French about getting a formation flight with the NCAR King Air to get data for a comparison of winds from the King Air and the T-28.

1830 - Returning to condo. Weather is not developing and missions have been cancelled. The T-28 will be operational tomorrow with a new cylinder on the aircraft.

Summary: Clouds developed after dark to the southwest. No storms were missed during the daylight hours. This has been the driest day of the project so far.

#### 5 August 1991

1030 - Arrived at hangar. The T-28 is not ready yet. JEL estimates it should be up by noon.

1300 - Arrived back at hangar. T-28 is still about 2 hours away from being ready.

1330 - Arrived at FOC. Large cloud located at 290/40. Movement from the west/10 kts, or maybe a little slower. Reflectivity max near 50 dBz low in cloud.

1350 - King Air aloft. Clouds beginning to develop in the northern lobe. Tops about 13,000 ft.

1400 - Sailplane aloft.

1420 - Radio communication traffic extremely high.

1435 - P-3 coming into the area for operations.

1445 - T-28 now appears to be 1 hour away from operations. Aircraft needs a run up to check for oil leaks. Squall line is now located in the northern lobe, this would be a tough radar operation for proper scanning.

1456 - Sailplane off tow at 13.4 kft.

1502 - At 15.4 kft, losing lift.

1516 - Sailplane back up at 17,000.

1518 - Sailplane at 18,000.

1527 - Sailplane at 21,000.

153030 - Sailplane at 24,000 ft. This would have been a good case for T-28 and sailplane coordination.

1534 - Sailplane peaks at 25,000, north of strong echo and in mid-cloud.

1540 - Run up planned for 1600 if all goes well, take-off could be about 1630 at the earliest. Activity extensive, but weaker.

1600 - Run up at 1630, earliest take-off possible at 1645. Delays we experienced were due to having to change the spark plugs due to corrosion.

1650 - Rolling out for engine run up. The clouds are pretty much past their peak.

1702 - Mag check no good. T-28 down for the day.

#### 6 August 1991 - Flight 569

0900 - Arrived at hangar, mag drop is still present in the aircraft. JEL to do a compression check on replaced cylinder while the plugs are out. The leads are okay and only one problem was found with a spark plug, but this was not expected to have caused the problem.

1400 - King Airs were flying a boundary layer experiment, but NCAR King Air has a INS problem. Wyoming will work alone for approximately 1.25 hours, then intercompare with T-28. T-28 take-off scheduled for about 1445. Patrick radar inoperative, therefore no tracks at FOC.

1420 - The tracks appear to be back.

1430 - JEL ordering a new cylinder. Replacement still leaks. Plan is to fly the aircraft and hope it repairs itself. Tracks went out again around 1425.

1456 - Alerted T-28. Wyoming is nearing the end of their mission in about one-half hour.

1525 - T-28 airborne.

1535 - All tracks are back again.

1540 - Tracks out again.

1548 - T-28 and Wyoming King Air are linked. Photo plane from National Geographic is in the group too.

1553 - Tracks are back again.



155545 - Leg 1 of intercomparison flight at flight level 105.

1559 - Tracks are out again.

1605 - New leg.

1610 - Tracks intermittent.

1617 - COM2 appears to be working better today.

1618 - Heading southwest with aircraft for photo opportunity.

1642 - Return to base. T-28 seems to be working properly.

7 August 1991 - Flight 570

0830 - Plan is to try and coordinate with the sailplane, hopefully between 1100-1400. These are the only two aircraft available today.

1120 - Arrived at FOC. Clouds are developing more than expected. Sailplane on stand-by.

1200 - Clouds developing on the eastern side of the southern lobe. Tops near 10,000 ft. Cell located at 248/11. New development near the New Mexico Tech radar, storm located near 355/30.

1240 - Sailplane airborne.

1305 - T-28 alerted. Storm is located near 250/18, moving from the southeast at 5 -10 kts.

1334 - T-28 airborne.

1336 - Sailplane off tow.

1342 - Clearance problems with ATC.

1347 - Sailplane at 20,000 ft.

1351 - Sailplane at 26,000 ft.

1401 - T-28 in cloud at 16,000 ft. Heading 360°.

1402 - T-28 out of cloud. Very little activity.

1404 - Moving to a new cloud located at 270/22.

1406 - In cloud for penetration 2.

1407 - Out of cloud. New cloud located at 280/25.

1408 - In cloud for penetration 3.

141020 - Out of cloud.

141325 - In cloud for penetration 4.

1414 - Out of cloud.

1418 - Sailplane in cloud.

142215 - In cloud for penetration 5 at 15.5 kft (T-28).

142320 - Out of cloud. Sailplane located above T-28 at 18.5 kft. Storm appears to be weakening.

143120 - In cloud for penetration 6, 1000 ft/min updrafts reported.

143230 - Out of cloud. Two clouds were actually penetrated, No. 1 was the stronger.

143648 - In cloud for penetration 7.

143750 - Out of cloud, several 1000 ft/min updrafts reported.

1444 - In cloud for penetration 8 on a heading of 330°.

1445 - Out of cloud.

1447 - In cloud for penetration 9.

1449 - Out of cloud, mostly a smooth ride.

145250 - In cloud for penetration 10.

1455 - Out of cloud. Actually two small clouds were penetrated.

1457 - In cloud for penetration 11.

145950 - Out of cloud.

1503 - In cloud for penetration 12.

1504 - Out of cloud. May have missed on the northwest side of both cells.

151010 - In cloud for penetration 13.

1512 - Out of cloud.

1515 - In cloud for penetration 14 on a heading of 080°.

151530 - Out of cloud.

1516 - Changing to heading of 060° for second cloud.

1517 - Out of cloud. Descending to 14,000 ft.

152111 - In cloud for penetration 15.

1523 - Out of cloud.

1526 - Penetrating small echo on the south side for penetration 16.

152943 - In cloud for penetration 17.

1531 - Out of cloud.

1532 - In cloud for penetration 18.

1534 - Out of cloud.

1538 - In cloud for penetration 19.

153950 - Out of cloud. Return to base.

8 August 1991 - Flight 571

0915 - Clouds starting to develop, probably along a sea breeze front.

1200 - Arrived at FOC. Clouds still around, but growth is slower than yesterday. NCAR King Air back on ground with INS problems again. Nothing of interest for the T-28.

1230 - Alerted the T-28. Filing for 18,000 ft. Storm located at 340/15.

1253 - T-28 airborne. Echoes not very strong now.

1320 - Penetration 1 at about 17.5 kft.

1321 - Out of cloud. Moving to a cell near Melbourne.

1325 - In cloud for penetration 2 at flight level 170.

1327 - Out of cloud.

133025 - In cloud for penetration 3.

133039 - Out of cloud. Actual cloud is a small towering cumulus.

133640 - In cloud for penetration 4.

133651 - Out of cloud.

134020 - In cloud for penetration 5.

1341 - Out of cloud.

134333 - In cloud for penetration 6.

134535 - Out of cloud.

135250 - In cloud for penetration 7.

135358 - Out of cloud.

135924 - In cloud for penetration 8.

140040 - Out of cloud.

140912 - In cloud for penetration 9.

1411 - Out of cloud. Trying for an intercomparison with the sailplane.

141832 - Linked with sailplane for an intercomparison pass.

1430 - Intercomparing with NCAR King Air.

1444 - Return to base.

Summary: This might prove to be a good coordinated case, as was Flight 570. However, this day was not quite as active as yesterday.

#### 9 August 1991 - Flight 572

1200 - Arrived at FOC. The clouds are developing quite slowly today. Started about one hour later than yesterday.

1245 - Mostly cloudy outside but growth is slow.

1305 - Alerted T-28. Sailplane also ready to go. Storms electrifying quickly.

1342 - T-28 airborne.

1405 - T-28 at 16,000 ft.

1408 - In cloud for penetration 1.

1412 - Out of cloud.

141535 - In cloud for penetration 2. King Airs also penetrating. P-3 coming in from 1 nm southwest.

141630 - Out of cloud.

1421 - In cloud for penetration 3.

142205 - Out of cloud.

1427 - In cloud for penetration 4. Lightning reported.

142930 - Out of cloud.

1434 - In cloud for penetration 5. Good updrafts reported, new development.

1436 - Out of cloud. Liquid water  $1.75 \text{ g m}^{-3}$  reported from telemetry.

144050 - In cloud for penetration 6.

1442 - Out of cloud.  $15 \text{ kV m}^{-1}$  reported from telemetry.

144620 - In cloud for penetration 6.

144930 - Out of cloud.

1454 - In cloud for penetration 7. Radio frequency 128.15 overrides our frequency.

1456 - Out of cloud.

1458 - In cloud for penetration 8. Penetration aborted due to ATC traffic.

150940 - In cloud for penetration 9.

151130 - Out of cloud. Very little activity reported.

151323 - In cloud for penetration 10.

151347 - Out of cloud.

152205 - In cloud for penetration 11.

1523 - Out of cloud. Nothing much reported. Tracks have been very slow in plotting.

1525 - Poor performance by CP-4. Sailplane intercomparison underway.

1534 - Tracks down.

1540 - Intercomparison underway with P-3. East then west then west-southwest for 10 nm.

1547 - Return to base. Looks like a pretty good case.

#### 10 August 1991

1200 - All second trip echoes on display scopes, except for a couple of weak showers. King Airs and sailplane in the area.

1210 - P-3 expected in the area in 20 minutes.

1230 - Clouds still not very active. Tops estimated to be about 9,000ft. Forecasters are calling for rapid activity in about 30 minutes.

1300 - Clouds increasing in vertical development. One top near 15,000 to north. No echo yet.

1320 - Clouds appear frizzy. Tops are lower than previously. Appears that strong storms out west are affecting things in some unknown way.

1425 - Towers to 18.5 kft reported by aircraft. Still not very vigorous growth. Radar has been down since 1418.

1430 - Tops are collapsing.

1500 - Clouds tending to dissipate. Only weak vertical development to the north. King Airs returning to base.

1520 - Stand-by until 1600. Clouds should develop by then if they are going to.

1600 - Stand-by until 1700.

1700 - Shutting down operations.

Summary: In retrospect, the decision to cancel was a mistake. A beautiful storm formed in the north lobe around 1800 local. Heavy rain and small hail was observed. Storm lasted until sundown. Long stand-by days sometimes color one's thinking.

#### 11 August 1991 - Flight 573

0930 - Back at condo. Viewed shuttle landing from Titusville.

1210 - Arrived at FOC. No activity yet.

1235 - Sailplane to launch, short flight for work on small clouds is planned.

1310 - First echo located near 270/24 nm Melbourne.

1335 - Clouds are more vigorous.

1350 - Clouds continue to increase.

1410 - Sailplane reports clouds are not so active at this time.

1418 - Sailplane off tow.

1500 - Some development located just northwest of MLB near the east edge of the southern lobe, nearly over CP-4. Storms 2, 3, 6, and 9 are working in that area. P-3 having trouble joining the stack. There doesn't appear to be room for the T-28. Sailplane and P-3 passed within 1 nm of each other with barely 1,000 ft vertical separation.

1530 - Alerted T-28 for take-off. I think there is too much pressure for launching at this time.

1551 - T-28 airborne. Operations Director wants to abort the mission because of decreasing activity. Too late for that decision now.

1600 - P-3 climbing to 21,000. T-28 will be in the 14-16,000 ft block, penetrating at 15,000 ft.

161144 - In cloud for penetration 1 at 14,000 ft, heading south.  
1612 - Out of cloud.  
161247 - In cloud for penetration 2 on newly developing tower.  
161310 - Out of cloud.  
161425 - In and out of short penetration for No. 3.  
161850 - In cloud for penetration 4 on a heading of 310°.  
1619 - Out of cloud. Very small cumulus.  
1622 - Penetrating the top of another cloud for penetration 5.  
1615 - Small tower being penetrated.  
162750 - In a small cloud again.  
162818 - Out of cloud.  
163250 - Very short penetration.  
163720 - In cloud again for another short penetration.  
163740 - Out of cloud. Heading to a position of 340/32 for another cloud.  
1653 - In cloud for another penetration, 1000 ft/min updrafts reported.  
165140 - Out of cloud.  
165705 - In cloud again.  
165750 - Out of cloud.  
1704 - In cloud for another short penetration.  
1724 - Heading for a cloud at a position of 310/40, will penetrate on a heading of 090°.  
172510 - Penetration heading will be 060°.  
1726 - Out of cloud.  
172726 - In cloud for another penetration.  
1728 - Out of cloud.  
172910 - In cloud again. Moderate precipitation reported.  
1730 - Out of cloud.  
173040 - In cloud for what I think is penetration 14.

173140 - Out of cloud. Good updrafts reported with moderate to heavy precipitation.

173440 - In cloud for penetration 15.

1736 - Out of cloud.

173735 - In cloud for penetration 16.

1738 - Out of cloud. Return to base.

Summary: The launch decision was wrong. My arguments for not launching at an earlier time were ignored and overruled. Thus, we ended up launching in mid-storm on the first wave of activity and therefore missed the best part of that activity, as well as that which occurred later.

#### 12 August 1991

Day off. Thunderstorms occurred in the late evening perhaps even too late for any aircraft operations. However, there was other activity south of Melbourne south of the southern lobe that did occur a little earlier and may have been workable.

#### 13 August 1991 - Flight 574

1030 - Plans call for coordination with the Lear in the CP-2 area, preferably within the northern lobe.

1300 - Arrived at FOC. Development is dismal for this time of the day. A weak echo is located at 275/45.

1350 - Nowcasters think that activity will be late again like yesterday, when activity occurred around 1900. The difference yesterday was that there were rainshowers around by early afternoon. The sea breeze is not setting up very well today.

1445 - Clouds are growing, but very slowly.

1510 - CP-2 down for the next 1-2 hours.

1530 - Have decent towers are occurring on the sea breeze front to the west. Still must wait for later activity. Echo is located at 320/50 with tops to 30,000 ft.

1640 - CP-2 up again.

1655 - T-28 alerted.

1721 - T-28 airborne.

1746 - Attempting to get to the northwest side of a storm located at 345/65, plan to penetrate south-southeast along the line of clouds.



**1756 - In cloud for penetration 1.**

**175920 - Out of cloud.**

**180224 - In cloud for penetration 2.**

**1806 - T-28 reports 1500 ft/min updrafts followed by 2000 ft/min updrafts with icing. These are some of the strongest updrafts of the season.**

**1808 - Out of cloud.**

**181415 - In cloud for penetration 3. CP-4 down temporarily.**

**181646 - Out of cloud.**

**182030 - In cloud for penetration 4. Radio frequency 128.15 overrides transmissions on our frequency (123.3). These are transmissions originating from FOC.**

**1825 - Out of cloud.**

**1828 - In cloud for penetration 5.**

**1830 - P-static, lightning, light turbulence, and 1000 ft/min updrafts reported.**

**183248 - Out of cloud.**

**183352 - In cloud for penetration 6.**

**1835 - Out of cloud.**

**183710 - In cloud for penetration 7.**

**1838 - Out of cloud.**

**1839 - In cloud for penetration 8. Severe turbulence reported.**

**183954 - Out of cloud.**

**184120 - In cloud for penetration 9.**

**1843 - Out of cloud.**

**184320 - In cloud for penetration 10. Heavy precipitation and severe turbulence reported.**

**184540 - Out of cloud.**

**1851 - In cloud for penetration 11. Moderate turbulence, icing, 1000 ft/min downdrafts and 2000 ft/min updrafts.**

**1855 - Out of cloud.**

**1856 - In cloud for penetration 12. Lightning, moderate turbulence, and precipitation reported.**

**1900 - Out of cloud.**

**190330 - In cloud for penetration 13.**

**1906 - Out of cloud.**

**190746 - In cloud for penetration 14.**

**1909 - Out of cloud.**

**191110 - In cloud for penetration 15.**

**191245 - Out of cloud momentarily. Changing heading to 230° to get back in.**

**191334 - In cloud for penetration 16. Moderate turbulence, along with icing and heavy precipitation reported.**

**191627 - Out of cloud. Return to base. Aircraft experienced engine problems on return to base, probably due to ice breaking loose in the carburetor. The engine almost quit at 8,000 ft (very warm temperatures).**

#### **14 August 1991**

**1030 - The T-28 will be the only aircraft available today. The plan is to support CP-2 in precipitation studies, which calls for a step down procedure from 18,000 ft at 2,000 ft intervals. Soft stand-by at 1330 with 1500 hard stand-by.**

**1230 - JEL informs me that about 15 hours are left prior to a required major airframe and engine inspection. This involves gear, tires, etc. Difficult to accomplish this in Florida because it would take the aircraft off the line for too long a period near the end of the project. What this means is that we can get about three flights prior to departing for Rapid City where the maintenance can be performed.**

**1430 - Arrived at FOC. Weak echoes in the area, but nothing organized.**

**1650 - Operations called off.**

#### **15 August 1991 - Flight 575**

**1500 - Arrived at FOC. Cloud tops are 25-30,000 ft visually. Forecasters expect boundary collisions to initiate storms near northern lobe on the west side.**

**1615 - Alerted T-28.**

**1641 - T-28 airborne.**

**1647 - A line of clouds extends from 300/20 to 345/50.**

**170810 - In cloud for penetration 1, heading south for a long penetration.**

**171928 - Out of cloud.**

**1721 - In cloud for penetration 2.**

**172429 - Out of cloud.**

**1731 - In cloud for penetration 3.**

**1737 - Out of cloud.**

**173740 - In cloud for penetration 4.**

**174220 - Out of cloud.**

**174718 - In cloud for penetration 5.**

**175130 - Out of cloud.**

**1759 - In cloud for penetration 6 at flight level 160.**

**180106 - Out of cloud.**

**1805 - In cloud for penetration 7 at flight level 140.**

**1811 - Out of cloud.**

**1816 - In cloud for penetration 8 at flight level 120.**

**1820 - Out of cloud. Return to base. Moderate rain occurring at Melbourne.**

### **16 August 1991**

**1300 - Arrived at hangar. Small cumulus activity, which started around 1230.**

**1350 - Arrived at FOC. Foil impactor motor burned out and one strobe from the Cannon camera is not working. Reverse flow temperature device also still out. Atmospheric conditions seem somewhat suppressed, this is probably due to the presence of Tropical Storm Bob located southeast of here.**

**1410 - Project seems to be going into a hurricane watch mode, meaning around the clock radar watches. How might this effect T-28 operations?**

**1415 - AGD called. PLS has called and is in agreement with the concept of making two more flights, and then departing for Rapid City to accommodate the T-28 inspection.**

**1555 - The Lear will launch to work some small clouds about 30 miles out over the ocean.**

1705 - Calling operations off. Clouds are out of range over the ocean. Tops are only about 20,000 ft anyway and no more than a couple miles in diameter.

#### 17 August 1991

0730 - Called the FOC. Tropical Storm Bob has gone north, nearest activity too far offshore. No possibility of an early flight.

1045 - Low clouds begin forming around 0900, but with little vertical development since. The sounding is very unstable, needs 31°C to release convective potential. Soft stand-by to begin at 1200.

1305 - Arrived at FOC. Lear and ER-2 are flying, working a storm over the water at 070/38. A small storm is also located at 345/41, just west of CP-2. Tops are around 35 and 25,000 ft respectively.

1400 - Cloud near CP-2 has dissipated. Clouds over the ocean are moving slowly east, the main part of the storm is now at 42 nm range. Cumulus are trying to form, but Bob seems to be building a ridge over the Florida Peninsula. This tends to suppress the convection over land. Viewing of the cloud movie on the display system shows that the clouds over the water are really moving south-southeast.

1600 - Shutting down operations for the day.

#### 18 August 1991 - Flight 576

1300 - Arrived at FOC. The T-28 crew is ready to fly. The Lear is delayed until about 1430. We will try to coordinate with them if possible, if there is a conflict then we support CP-2. Storms are in the northern lobe now, but it is too late to launch on these. They are moving from the west at about 20 kts. An activity lull is expected, with the next development occurring in the southern lobe.

1330 - The best development is in the southern lobe and south of the lobe at 80 and 110 km from CP-2, respectively. The one occurring in the lobe is past its peak.

1400 - AGD alerted T-28 for possible take-off between 1445-1500. Echoes are located at 320/60 and 315/65. Movement is from the west-northwest/about 20 kts. Tops greater than 30,000 ft.

1420 - Thunder over head with rain at the site. T-28 is headed for a take-off at 1500 if the rain stops in time.

1425 - CP-2 4 down with T-1 line problems.

1452 - Radar is back up. A discussion had occurred about the possibility of flying the T-28 without the use of radar. The point became moot when the radar came back up; however, my decision up to that point that the airplane would not fly without the radar. The storms of interest were near or exceeded our 55 dBz limit. I do not appreciate these attempts to change on

the fly; we set up our limits for safety of the pilot and the aircraft and we shouldn't change them every time an opportunity presents itself to do so.

1510 - T-28 airborne.

1515 - The storms appear to be weakening.

1525 - Echo located at 008/48 (over the water). The plan is to penetrate east to west for penetration 1.

1530 - Operations wants to switch to storm located at 340/38.

1537 - T-28 has turned toward the new storm.

155020 - In cloud for penetration 1 on a heading of 290° at an altitude of 20,000 ft.

1553 - Reversing course to 100° for a new penetration.

155450 - In cloud for penetration 2.

155658 - Out of cloud.

160123 - In cloud for penetration 3. Lear is passing southeast about 2 nm southwest of our track plot. The T-28 is heading northwest on its penetration.

160421 - Broke out of cloud temporarily.

1609 - Reversing course and descending to flight level 160 for a new penetration.

1615 - T-28 is being held at 19,000, reason unknown.

1626 - In cloud for penetration 5. I seem to have missed a penetration.

1629 - Out of cloud. Return to base.