U.S. DEPT. COMM./NOAA/OAO - DATA SECTION WORK FORM NO.1 OAOWF1 FILE

FLT ID: 960622H	FM: BKF	TO: BKF
FLT NO: 96-029	BLK IN: 0300	ATA: 0255
ETD: 2000	BLK OUT: ~~2000~~ 1959	ATD: 2010
ETE: 0300	BLK TIME: 7.0	FLT TIME:
SPONSOR ORG: NOAA	PROGRAM: STERAO-A	PURPOSE:

OAO PERSONNEL

AC	KENNEDY ✓	SYS ENG	ROLES
CP	KENUL ✓	DATA SYS	MCMILLAN ✓
NAV	KOZAK ✓	RADAR	
FE	TORREY ✓	BT/ODW	
~~RADIO~~	SANS SOUCI ✓	CLD PHYS	
FD	WHITE/PARRISH ✓	DOPPLER	

PARTICIPATING SCIENTIST/VISITORS/OAO

LAST,FIRST NAME	ACTIVITY ON A/C	AFFILIATION
HUBLER, G / RIO HOLLOWAY, J	STERAO-A	NOAA/AL/CIRES
GOLDAN, P / JOBSON, T	"	NOAA/AL
SHERIDAN, P / WILLIAMS, J	"	NOAA/AL
FRIED, A	"	NCAR
RYERSON, T	"	NOAA/AL/CIRES
MATEJKA, T	"	NOAA/NSSL
		NOAA/NSSL

PROPOSED/ACTUAL MISSION/REMARKS (RECCO,FIXES,STORM,PCNET,NHOP #)

25:95 1014.1

41N 103 50W

U.S. DEPT. COMM./NOAA/OAO - DATA SECTION WORK FORM NO.2 OAOWF2 FIL

FLT ID: 960822H TIME OFF: TIME ON:

	A/C T/O	WX STN	A/C LAND	WX STN
PRESSURE		1014.1		1010.5

	NO	DATA DISPOSITION/DATE/QUALITY
1/SEC FLT LVL TAPES		
FAST FLT LVL TAPES		
RADAR TAPES		
DOPPLER TAPES		
ODW CASSETTES		
HARD COPIES		
AXBT		
AXCP		
ODW		

PHOTOGRAPHY

	FWD	LS	RS	VERT	
ON					
OFF					
RATE					

REMARKS

STERAO 96 TRANSIT

FLIGHT #3 H960622

TYPE OF DATA	SENSOR OR OPTION
INE	1
Accelerometer	1
Temperature probe	1
Altitude change option (for vertical winds)	PA
Static pressure	Rosemount fuselage
Dynamic pressure	Rosemount fuselage
Time source	Micro 99
Constants file	CO2963.CON

Notes:

There were ten time/data gaps: 2151:35 2151:40 2151:43 2151:50 0000:11 0000:20 0000:23 0000:30 0209:05 0209:20

The aircraft INE positions were renavigated with respect to GPS.

SPECIAL NOTE!!! Locations 80, 81 and 82 of record five on the standard tape contain vertical ground, vertical air and vertical speeds, respectively, computed using Dave Jorgensen's vertical wind algorithm. It is recommended that these values be used for vertical wind analysis.

Flight Meteorologist: Sean White: (813) 828-3310 ext. 3072

960622H

START: 1955:52 200501
END: 0300:50 030000

BAD BLOCKS

2151	:35
	:40
	:43
	:56
0000	:11
	:20
	:23
	:30
0209	:05
	:20

INE 1

AU ~~2~~ 1

INE 1 w/ GPS

210000	-0.2	+0.2
220000	-0.4	+0.2
230000	-0.5	+0.8
000000	-0.4	+0.9
010000	-0.7	+1.7
020000	-0.5	+2.3
030000	-0.7	+2.3

OAA FORM 59–4
2–72)

Time	LA	LO	TA	TD	WD	WS	Remarks
2010	—	—					T/O
2020	—	—	6.9	-3.3	226	10	start calib 12K
2037	—	—	11.1	-0.7	200	15.7	
2126							ascend to 21K
2158			-15.6	-27.0	228	30.0	level 21K finally!
	radar/ storm portion						
0115							begin N/S legs below F26

Flightplan Thunderstorm Study (Scenario 3)
Colorado
boundary-layer to free troposphere exchange

Doors closed: 13:50
Takeoff: 14:00
Point A, Buckley National Guard Field 39 42 N, 104 45W
13k

Calibration at constant altitude, Observer calls
Head direction of **Pt. B (41 00N, 104 25W) at 15 kft MSL**

Pt. A to Pt. B 150 km, ~ 19 min, (Climb < 10 min)

Stay at constant altitude for calibration, observer calls 12k
14:00-14:25 2020 – 2037

Before the Storm
After Calibration descend to 1500 ft AGL along the way to Pt. C

Horizontal Survey within the PBL
Pt. B to Pt. C (40 10N, 105 00W), to Pt. D (40 10N, 103 30W), to Pt. E (40 30N, 104 10W)
14:25-15:10 2055Z 2113Z 2123Z

Racetrack Profile up to 21 kft near Pt. E
==> Take first set of HC can samples at 1500 ft AGL, 13 kft, 17 kft, 21 kft MSL
head east for 1 min 50 sec and climb at 1500 ft/min, reverse direction, head west for 1 min 50 sec, and continue climb etc up to 21 kft MSL)
15:10-15:20

Head direction of Pt. F (40 10N, 104 25W)
Pt. E to Pt. F 60 km, 9 min
15:20-15:30

Super Cell Scenario

IF during any part of the flight Operation Center identifies an isolated storm, fly U-Pattern (S, W, N sides) **around the storm at max altitude, 21 kft MSL, 17 kft MSL, 13 kft MSL, and 1500 ft AGL.**

The sides of the boxes have to be long enough for the radar characterization of the wind field and the distance from the storm is determined by the requirements of the doppler radar. The exact location of the boxes at a given altitude will depend on the movement of the storm cell.

Should the time that is required to fly this pattern be too long for the anticipated flight duration, limit the number of constant altitude boxes.

This pattern should satisfy both the radar and chemistry objectives of STERAO.

Squall Line Scenario

Concentrate on edge of squall line closest to CHILL.

L-pattern on the southern (south-eastern) **and the western side of the squall line.**

I) Radar leg : **parallel to the line of storm cells at 2000 ft AGL** (default) **from Bsw to Bse.**

II) Radar leg : **return from Bse to Bsw at 500 ft AGL** (default).
Max length of these legs 15 min (~90 km).

III) Radar leg : **perpendicular to the line of storms at the western edge of the squall line, Bsw to Bnw at 500 ft AGL** (default). **Length of this leg is determined by radar requirement.**

IV) Chemistry : **Return to Bse; either directly under the storm in a direct line from Bnw to Bse or parallel to the radar legs, but in closer proximity to the active storm cells at 500 ft AGL.**

Repeat this pattern II)-IV), if radar observations call for it. Adjust altitude if radio communication with CHILL require it.

V) Racetrack profile ahead of the squall line (in clear air) up to max altitude.

VI) If there is an anvil within the altitude range of the P3, ~~descend~~ ascend to that altitude and attempt to approach the anvil by flying short legs (< 5 min) parallel to the line in progressively closer proximity to the storm (pilots disgression).

VII) Fly to the back side of the squall line around the storm at max altitude. Attempt again to approach the anvil region.

VIII) Racetrack profile behind the squall line.

IX) Radar and chemistry leg behind the squall line from Bne to Bnw.

If the radar indicates an anvil that is within the altitude range of the P3, attempt to transect part of the anvil if it is feasible and safe. Start these transect away from the cloud and attempt to move closer on subsequent transects.

Hydrocarbon Profile between Pt. F and Pt. G

At 15:35 head direction of Pt. G (41 00N, 104 25W)

Hydrocarbon profile between Pt. F and Pt. G at 21 kft, 17 kft, 13 kft MSL, and 1500 ft AGL

Start HC-leg at : 05, :20, :35, :50 so that the HC sample will be centered along this leg. Change altitude approximately 3 min after HC sample ends (**Observer calls**)
15:35-16:35

If at any point during this leg the **Observation Center** at the CHILL Radar site should indentify a target storm, switch to the **Active Storm Phase.**

<u>During the Active Storm Phase</u>

Characterize Airflow with Radar and Characterize In-Flow Region of Cloud

Cloud identification and flight coordinates will be given by CHILL Radar.

Radar Legs:
Straight lines parallel to and S to SW of the storm approximately 12 km away from the perimeter of the storm, orientation parallel to storm track at 7kft MSL (within the PBL, this should also be the inflow region of the storm)
until dissipation of storm.

Alternatives:	I) Straight leg parallel to the storm track.
===>	II) Fly L-pattern (south and west side of the storm). **See Squall Line Scenario**
===>	II) Repeat radar flight pattern at different altitude. (7kft, 16 kft, and > 22 kft MSL).

16:35-18:35

<u>After Dissipation of the Storm</u>:

Characterization of PBL after Storm Dissipation:
Cross below location of the latest radar echo for 15 min (~100 km)
18:35-18:50

Characterization of Vertical Profile after Storm Dissipation
Race track Profile at location of the latest radar echo of the storm, descend to 500 ft AGL and then climb to max altitude at 1500 ft/min

Alternatives:

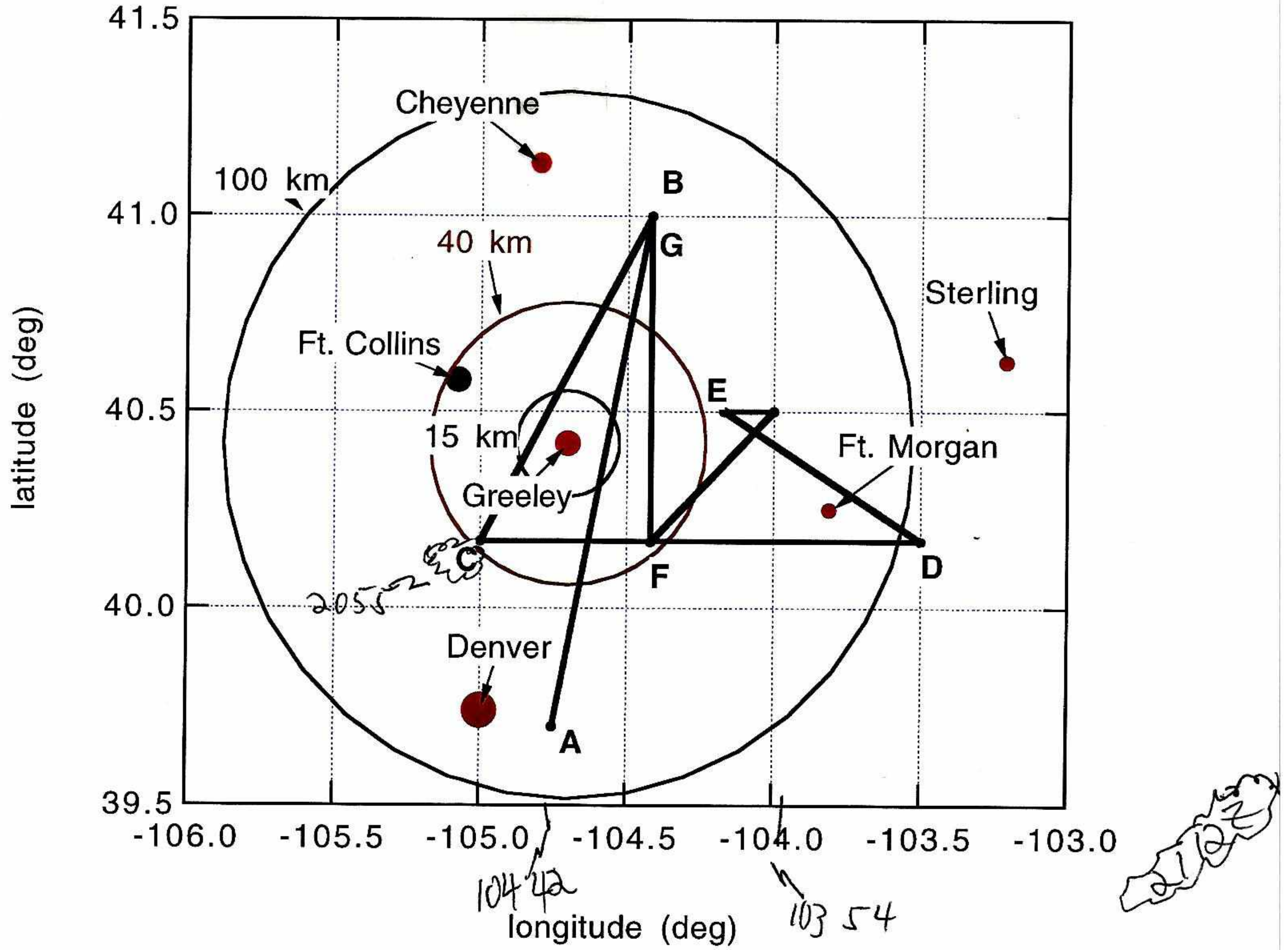
I) 16:35-17:50: If there is no appropriate storm identified in the study area,
start HC profile between Pt. F (40 10N, 104 25W), and Pt. AH (40 10N, 103 25 W)
at 1500 ft AGL, 13 kft MSL, 17 kft MSL, 21 kft MSL, 25 kft MSL.

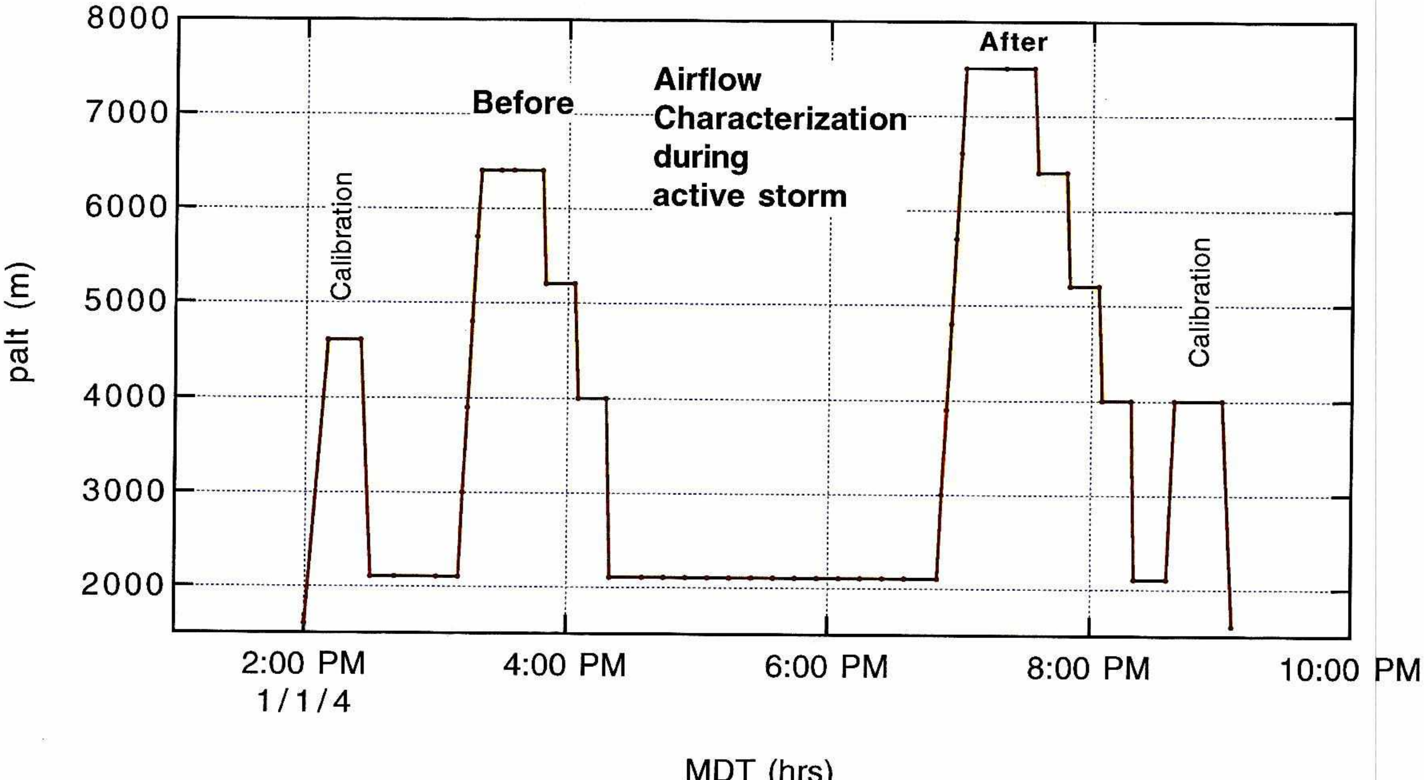
II) 17:50-19:05: start HC profile between Pt. AH (40 10N, 103 25W) and AI (41 00N, 103 25W)
at 25 kft MSL, 21 kft MSL, 17 kft MSL, 13 kft MSL, 1500 ft AGL

Climb to 12 kft MSL for calibration, 30 min

Return to Buckley

The detailed characterization of the 1 deg lat by 1 deg long box will hopefully help to pick the most appropriate orientation for the HC profiles for subsequent flights. It also allows to fall back into the thunderstorm mode at any time if appropriate storms should develop later on.


41.5
41.0
40.5
40.0
39.5
latitude (deg)
Cheyenne
100 km
40 km
B
G
Sterling
Ft. Collins
E
15 km
Ft. Morgan
Greeley
C
F
D
2055
Denver
A
-106.0
-105.5
-105.0
-104.5
-104.0
-103.5
-103.0
10442
103 54
2112
longitude (deg)


8000
7000
6000
5000
4000
3000
2000
palt (m)
After
Before
Airflow
Characterization
during
active storm
Calibration
Calibration
2:00 PM
1/1/4
4:00 PM
6:00 PM
8:00 PM
10:00 PM
MDT (hrs)

==> Take second set of HC can samples at 1500 ft AGL, 13 kft, 17 kft, 21 kft MSL

18:50-19:20

HC profile after the storm

North-South leg across the center of the last radar echo, the length of the HC-leg is approximately 100 km (not quite 1 deg latitude)

0152 0135Z 0115Z

Hydrocarbon profile at 25 kft (or max altitude), 21 kft, 17 kft, 13 kft MSL, and 1500 ft AGL

Start HC-leg at :05, :20, :35, :50 so that the HC sample will be centered along this leg. Change altitude approximately 3 min after HC sample ends **(Observer calls)**

19:20-20:35

Climb to 12 kft MSL for calibration

(Start NOy calibration, and stay at altitude for calibration 20:35-20:50, Observer calls)

Head direction of Buckley (39 42N, 104 45W) **Pt. A**

~ 20 min

Return to Buckley at ~21:00

Pt. A (39 42N, 104 45W)

Pt. B (41 00N, 104 25W)

Pt. C (40 10N, 105 00W)

Pt. D (40 10N, 103 30W)

Pt. E (40 30N, 104 10W)

Pt. F (40 10N, 104 25W)

Pt. G (41 00N, 104 25W)

other points will be determined during the flight......

050
120

MISSION LOG			PAGE ___ OF ___																		

4242

FIX TYPES
(G) - GPS (I) - INS (R) - RADIO (V) - VISUAL (C) - CELESTIAL (D) - DR

TIME	FIX TYPE	POSITION	INS 1 POSITION	K ERR	INS 2 POSITION	K ERR	MH	VAR +E==>	TH	DR +R==>	TRK	GS	WD	WS	ALT	TAS	NEXT PT	DIST	TIME	ETA	REMARKS
1952	VIS	3942.4N 10445.0W	✓ ✓		✓ ✓																Chocks/Eng Start
2000																					Taxi Rwy 14 2995
2009																					T/off
2017	GPS	3953.9N 10500.3W	3954.0N 10500.2W	-.1 +.1	3953.3N 10500.1W	+.6 +.2			003	1R	004	252	233	10	12K	214					Level off 2302
2112	At	PT D turning towards E.																			
2122	PT E GPS	4031.2N 10418.7W	4031.8N 10418.6W	-.6 +.1	4025.6N 10410.1W	+5.6 -.4			turning			225	169	23	↗	224					
2345	GPS	4057.5N 10404.1W	4058.1N 10403.2W	-.6 +.9	4041.5N 10411.7W	+16.0 -7.6			TURNING			276	272	27	↗	250					
0116	GPS	4012.3N 10427.9W	4013.0N 10426.3W	-.7 +1.6	3952.2N 10442.2W	+20.1 -14.2			000	Ø	000	263	155	22	60K	242					At PT F
0235	Land at Buckley																				
0300	VIS	3942.4N 10445.0W	3942.9N 10442.7W	-.5 +2.3	3920.1N 10506.2W	+22.3 -21.0															Chocks

5121 5211