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

FLT ID: 960713H	FM: BKF	TO: BKF
FLT NO: 96-0	BLK IN: 0228	ATA: 0225
ETD: 2100	BLK OUT: 2100 ~~0058~~	ATD: 2114
ETE: 0300	BLK TIME: 5.5	FLT TIME:
SPONSOR ORG: NOAA	PROGRAM: STERAO	PURPOSE: Air Chem

OAO PERSONNEL

AC KENNEDY, P ✓	SYS ENG ROLES, J ✓
CP TAGGART, B ✓	DATA SYS McMILLAN, S ✓
NAV STRONG, T ✓	RADAR
FE TORREY, R	DT/ODW
RADIO	CLD PHYS
FD WHITE, S	DOPPLER

PARTICIPATING SCIENTIST/VISITORS/OAO

LAST, FIRST NAME	ACTIVITY ON A/C	AFFILIATION
$ HUBLER, G	Air Chem	AL
BUHR, M	"	AL
MATEJKA/BARTELS	radar	NSSL
SHERIDAN/FRIED	Air Chem	CMDL/NCAR
JOBSON, T	"	AL
HOLLOWAY, J	"	↓
GOLDAN, P	"	
WILLIAMS, J	"	

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

360/4 G-13 updated

320/6 30.04 ~ 1017.2

TT3 1 NOP

" "

59

STERAO 96

FLIGHT #13 H960713

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:

No data was collected due to a RAMS system error from before takeoff (2114:00) until 2133:01.

There were ten time/data gaps: 2227:51 2228:00 2333:51 2334:00 2359:53 0000:01 0000:10 0208:11 0208:20 0208:22

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

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TITLE (MAX 21 CHARACTERS) -- EX  HURRICANE PAINE
STERAO FLIGHT 13
YYMMDDL  FLT I.D.
960713H
HHMMSS START TIME    -99999 DEFAULT TO START OF DATA FOR PRINTOUT ONLY
213301
HHMMSS END TIME      999999 DEFAULT TO END OF DATA FOR PRINTOUT ONLY
022600
HHMMSS TAKE OFF TIME
211400
* NUMBER OF TAPES (I2) ...FOR STANDARD TAPE OUTPUT ONLY
13
* -------LOGICAL UNIT OF INPUT DATA (I1)  5, 8 OR 9 FOR TAPE DRIVE
9
* -------LOGICAL UNIT OF OUTPUT TAPE DRIVE (I1) [FOR STANDARD TAPE ONLY]
9
* -------LOGICAL UNIT OF PRINTER (I1)
6
* -------DATE OF PROGRAM (MMDDY)
06094
* --------STATIC PRESSURE PROBE (I1)
* 1 = PSW (WINGTIP)
* 2 = PSF (CO-PILOT/FUSELAGE)
* 3 = FUTURE USE
2
* -------DYNAMIC PRESSURE PROBE (I1)
* 0 = PQW(WINGTIP)
* 1 = PQF1 (FUSELAGE 1281)
* 2 = PQF2 (FUSELAGE 1221)
* 3 =FUTURE US
1
* ---------INE SELECTION  (I1)
* 1 = INE 1
* 2 = INE 2
1
* ---------ACCELEROMETER (I1) - USUALLY THE SAME AS YOUR INE SELECTION
1
* --------- TOTAL TEMPERATURE PROBE (I1) [1 OR 2]
1
* --------- DEWPONT TEMPERATURE PROBE (I1) [1 OR 2]
1
* ---------ALTIMETER OPTION (I1) - FOR VERTICAL WIND COMPUTATION
* 0 = PRESSURE ALTITUDE (OVER LAND)
* 1 = RADAR ALTITUDE APN-159 (OVER WATER)
* 2 = RADAR ALTITUDE APN-232 (OVER WATER)
0
* ---------PRINTOUT RATE  SECONDS (I2)
30
* ---------WINDSPEED/DIRECTION RUNNING AVERAGE TIME, SECONDS (I2)
10                                  ! FOR STANDARD TAPE OUTPUT ONLY
* ---------TIME OPTION (I1)
* 1 = MICRO 29
* 2 = TIME BASED GENERATOR #1
* 3 = TIME BASED GENEATOR #2
1
* ---------NAME OF CONSTANTS FILE EX CO3863.CON
CO2963.CON
*****************************************************************
```

960713H

START: ~~2113:01~~ 2133:01
END: 0226:00

BAD BLOCKS

2227:51
28:00
2333:51
2354:00 2359:53
0000:01
:10
0208:11
:20
:22

NO RE-NAV

NO DATA FROM
T/O 2014 UNTIL
2133:01

(OAA FORM 59-4
2-72)

Time	TA	TD	WD	WS	Remarks
2114	24.3	13.8	25	8	T/O

Flightplan Thunderstorm Study (with western variation)
Colorado
boundary-layer to free troposphere exchange

Doors closed: 13:50
Takeoff: ~~14:00~~ 2114
Point A, Buckley National Guard Field 39 42 N, 104 45W

Calibration at constant altitude, Observer calls 12k (2131
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
14:00-14:25

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

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

IF during any part of the flight Operation Center identifies an isolated storm, fly boxes 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

Concentrate on Western edge of squall line.

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 from Lsw to Lse.

II) Radar leg : return from Bse to Bsw at 500 ft AGL.
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. 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 up to max altitude.

VI) If there is an anvil within the altitude range of the P3, descend 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.**

During the Active Storm Phase

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).
===>	II) Repeat radar flight pattern at different altitude. (7kft, 16 kft, and > 22 kft MSL).

16:35-18:35

After Dissipation of the Storm:

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
==> 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)

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.....

NE quad
E-W ahead
moving SE

multicells
E-W less

40 21 103 56
40 11 104 40

40 37 103 31
40 11.5 104 40

743-9185

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.

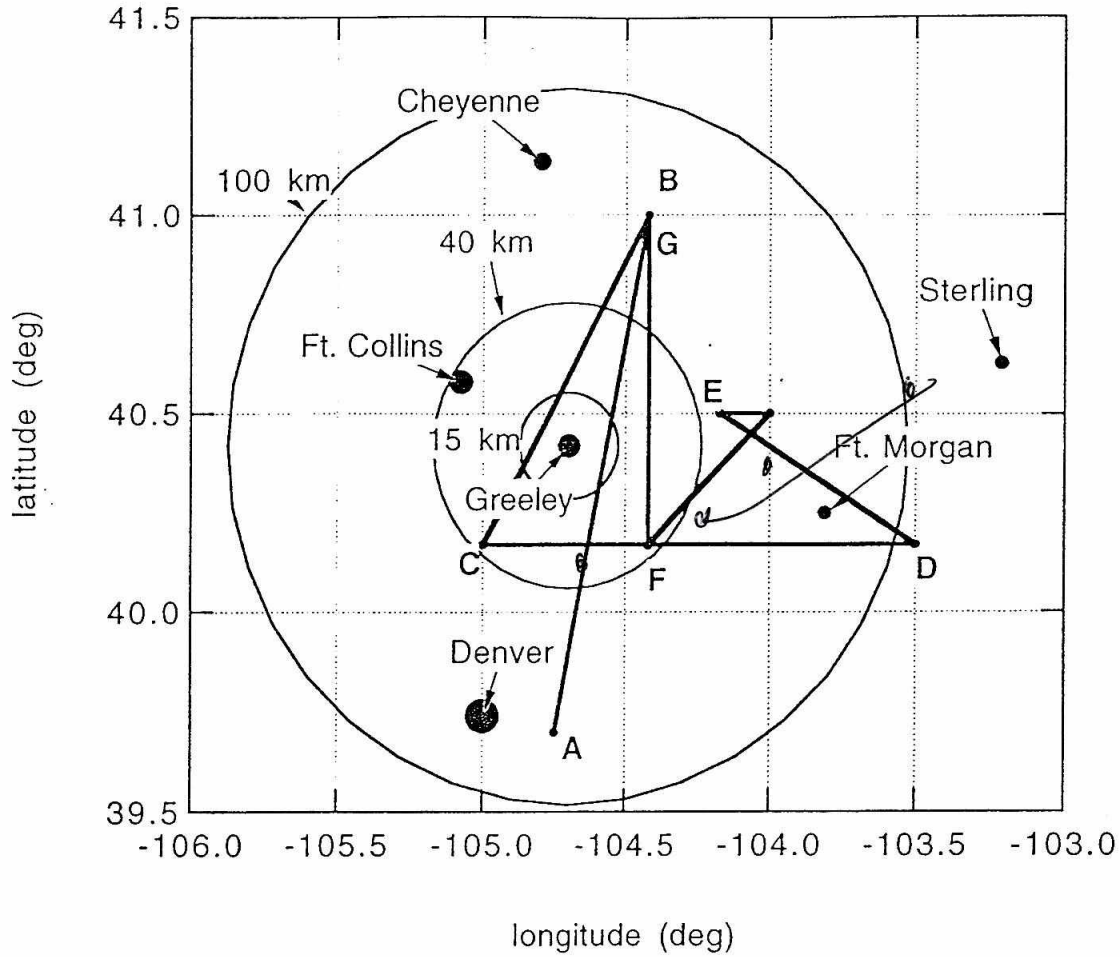
Alternative Orographic profile and Profile near Kremmling:

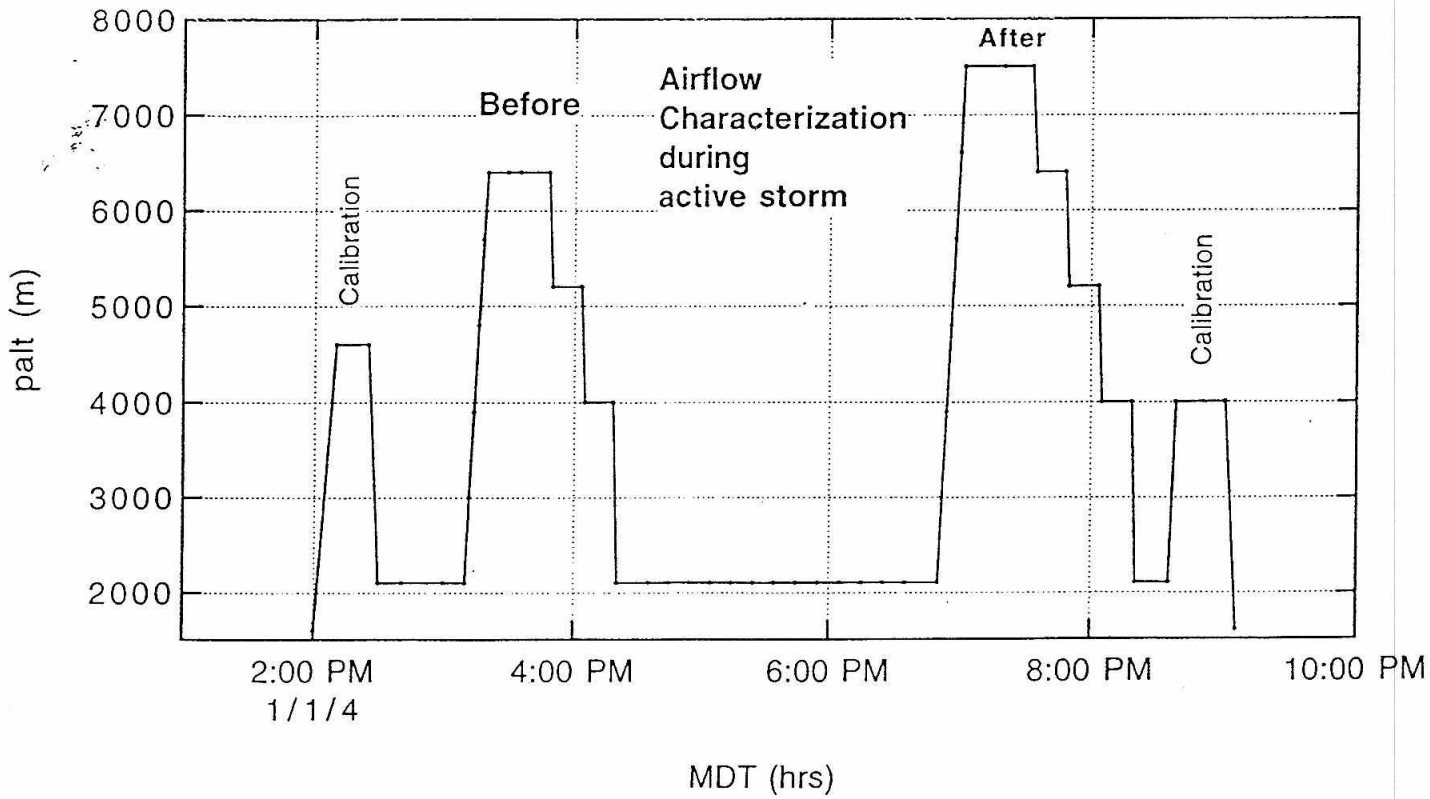
I) HC-Profile to the West of Ft. Collins.

Cross to Pt. BH (40 10N, 105 10 W) and adjust time for HC-Profile by flying N at 500 ft AGL and return to BH at start of HC profile
If there is no appropriate storm identified in the study area, start HC profile between Pt. BH (40 10N, 105 10W), and Pt. BI (41 00N, 105 10 W)
at 8 kft MSL, 13 kft MSL, 17 kft MSL, 21 kft MSL, 25 kft MSL.
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**)
16:35-18:05:

II) HC-Profile near Kremmling
Head direction of Pt. BJ (41 00N, 106 30W) at 25 kft MSL
(Pt. BI to Pt. BJ 110 km, ~ 15 min) 18:05-18:20
HC Profile between Pt. BJ (41 00N, 106 30 W) and Pt. BK (40 00 N, 106 30 W)
at 21 kft MSL, 17 kft MSL, 15 kft MSL, 11 kft MSL (> 500 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**)
18:20-19:20

Climb to 15 kft MSL and return to Buckley, Calibration along the way.
(Pt. BJ to Buckley 210 km, ~ 30 min)
19:50


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


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

DATE : 13 July 96

TO : Chief, AOC Flight Operations

FROM : Pilot/Flight Director, Aircraft N42RF ON 0228 BLOCKTIME OFF 2100 5.5

SUBJECT: Hazardous Duty

PURPOSE OF FLIGHT: STERAO

Hazardous Duty Pay is required for flight made on 13 July 96 (DATE)

Request based on POISONOUS GASES ONBOARD

Personnel on board authorized Hazard Pay:

TORREY, R

ROLES, J

MCMILLAN, S

PILOT/FLIGHT DIRECTOR: LCDR SEAN R. WHITE

APPROVED: _____ DISAPPROVED: _____

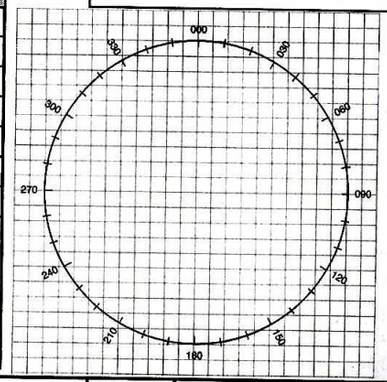
CHIEF, AOC FLIGHT OPERATIONS: _____

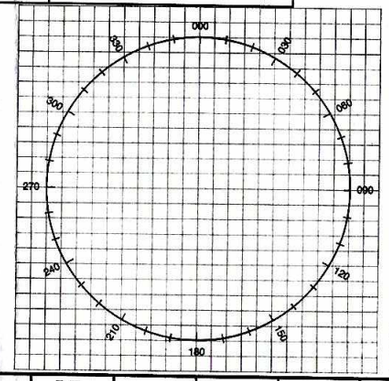
CLEARANCES

FREQ	ALT	HDG	OTHER

MISSION LOG

PAGE ___ OF ___





POSITION REPORT

1. POSITION
2. TIME
3. ALTITUDE
4. NEXT POSITION
5. ETA
6. NEXT POSITION

EMERGENCY MESSAGE

TRANSMIT THE FOLLOWING MESSAGE TO ANY AGENCY ON THE AIR-GROUND FREQUENCY IN USE. IF UNABLE TO ESTABLISH COMMS, ATTEMPT CONTACT ON ANY OF THE FOLLOWING EMERGENCY FREQUENCIES:

UHF/VOICE	VHF/VOICE	MF/VOICE	HF/CW	MF/CW
243.0	121.5	2182 KHZ	8364 KHZ	500 KHZ

MAYDAY, MAYDAY, MAYDAY
THIS IS NOAA _____, NOAA _____, NOAA _____

- POSITION _____ N / S
  _____ E / W AT _____ Z
- HEADING _____ TRUE/MAG
- AT _____ KTS TRUE/INDICATED
- FLIGHT LEVEL OR ALTITUDE _____
- WE ARE A P-3 AIRCRAFT WITH _____ SOULS ON BOARD
- NATURE OF EMERGENCY
- ASSISTANCE DESIRED
- PILOT INTENTIONS
- WE HAVE _____ ENDURANCE REMAINING

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
2055	V	39-42.3 104-45.0	39-42.4 ✓	-.1 0	39-42.4 ✓	-.1 0															Fm/ Checks
2324	G	40-07.8 104-42.1	40-06.3 104-40.6	+1.5 +1.5	40-07.2 104-42.2	+.6 -.1			091	2R	093	287	292	41	17.0	252					
0121	G	39-31.7 104-00.0	39-30.1 103-59.4	+1.6 +.6	39-32.3 103-59.3	-.6 +.7															
0225	V	39-42.3 104-45.0	39-38.9 104-45.0	+3.4 0	39-42.5 104-45.4	-.2 -.4															
												170/16									