NOAA P-3 N43RF
SALLJEX 2003
FLT # 7

Flight ID: I030124

Sensor or system	Number or Name
INE	2
Accelerometer	2
Temperature Probe	1
Dew Point Probe	2
Altitude (for vertical wind)	Pressure Altitude
Static Pressure	Rosemount Fuselage
Dynamic Pressure	Rosemount Fuselage
Time Source	Micro 99
Constants File	CO3031.CON

Take off: 1054Z
Land: 1824Z

Notes:

There were six (6) time gaps during the flight due to data system malfunctions. The time gaps were: 125721 - 130940, 133001 - 133430, 143941 - 145100, 145131 - 152500, 152521 - 152640, and 152721 - 152740.

SPECIAL NOTE: For approximately 20 seconds at the beginning and end of each time gap, artificially induced errors occur in the vertical winds. Special caution should be used in these areas of the data.

The RA-159 altimeter was substituted with the RA-232 from 105101 - 105930 (take off) and 182130 - 182700 (landing) due to spiking.

All other instruments worked optimally during the flight; however, there were multiple times when the dew point temperature exceeded ambient temperature resulting in an RH>100%. These times were during rain events (as noted by the Johnson-Williams Liquid Water sensor) and were likely due to a wet-bulb effect on the total temperature sensor and/or an artificial warming of the dew point sensor as it tried to burn off excess moisture. No corrections were made during these events.

The APN-159 was used for surface pressure calculations.

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.

	Takeoff	**Landing**
Aircraft Static Pressure	972.9 mb	970.3 mb
Corrected Tower Pressure	1016.9 mb	1017.9 mb

Flight Director: Paul Flaherty
Phone #: (813) 828-3310 ext. 3094

U.S. Dept. of Commerce / NOAA / Aircraft Operations Center

Flt ID: 030124I	From: SLVR	To: SLVR
Flt No: 03-028	Blk In: 1832	ATA: 1824
ETD: 1100	Blk Out: 1042	ATD: 1054
ETE: 7+30	Blk Time: 7.8	Flt Time: 7.5
Sponsor Org: NOAA/NSSL	Program: SALLJEX	Purpose: FLT 7 IOP

AOC Personnel

AC:	TEBEEST, R	Sys Eng:	LYNCH, T ✓
CP:	SILAH, M / STRONG, T ✓	Data Sys:	TONG, R ✓
Nav:	BRAKOB, D ✓ / NEWMAN, C ✓	Radar:	HALL, P ✓
FE:	TORREY, R ✓	GPS/BT:	
FD:	SHEPHERD, T ✓	Cld Phys:	
Avionics:	SANS SOUCI, D ✓		CREW CH: MITCHELL, R ✓

Participating Scientists / Visitors / AOC

Name (Last, First)	Activity on Aircraft	Affiliation
DOUGLAS, M ✓	PI	NOAA/NSSL
ZIPSER, E ✓	Co-PI	U of Utah
GARREAUD, R ✓	OBS	U of Chile
DIAS, P.S. ✓	↓	U of Sao Paulo
VIDAL, L ✓		U of Bns Ars
PAEGLE, J ✓		U of Utah
ALDUNATE, J ✓		AASANA
RODRIGUEZ, E. ✓	↓	AASANA

Proposed/Actual Mission Remarks (Recco, Fixes, Storm, PENET, NHOP #)

RAMS T.U. ~1300 – 1311
RAMS ↓ 1330
RAMS ↓ 1440 – 1526

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AOC WF2

Flt ID: 030124I	Time Off: 1054	Time On: 1824

	A/C (Take Off)	Wx Station (Take Off)	A/C (Land)	Wx Station (Land)
Pressure	972.9	30.03	970.3	30.06

	Number	Data Disposition / Date / Quality
Flt Lvl Tapes	7	
Radar Tapes	1	
Cloud Physics Tapes	6	
Video Tapes	4	
AXBT		
AXCP		
AXCTD		
Dropsondes		

Video

	Forward	Left Side	Right Side	Down	Remarks
Time On					
Time Off					
Rate					

Remarks

Flight ID: 030124I

U.S. Dept. of Commerce/NOAA/Aircraft Operations Center Form 413-50

Time	S Lat	Long	Trk	Hdg	Wind Dir	Wind Spd	T_a	T_d	Press. Alt.	Geo. Alt.	Sfc Press.	Press. Sfc	Dyn. Press	Remarks
111100	1655	6335	002	009	157	54.0	18.7	9.4	870	690	990.1	917.8	70.8	DESCend to 1000'
111250	1646	6335												1000 RA
112110	1612	6335												10000 PA
112915	1537	6335	3	8	135	28.8	19.7	14.4	470	317	993.5	958.1	78.1	1000' RA
113915	1457	6334												12000 PA
114835	1417	6335	0	4	153	21.4	20.0	17.9	425	293	996.4	963.2	80.2	1000' RA
115330	1400	6335												TURN TO TRK 260
115730	1400	6354												10000 PA
120530	1400	6428	268	262	133	34.6	19.6	16.7	430	306	998.2	962.1	73.9	1000' RA
121330	1400	6502			292	5.5	9.0	6.8						10000' PA
122030	1400	6532	270	264	125	43.5	16.6	16.8	779	679	998.8	923.1	81.6	2300' RA
122730	1400	6603			306	2.5	10.1	9.5						10000' PA
123420	1400	6633	269	266	113	24.1	18.7	18.1	542↑	526↑	998.7	929.9↓	83.0	Climb from 1000'
124125	1400	6505			196	2.9	10.4	8.6						10000 PA
124815	1400	6735	269	266	118	34.0	16.8	17.9	812	696	996.6	919.2	84.2	2300 RA
125310	1400	6758												TURN TO TRK 360
1255	1350	6801			114	11.3	9.0	9.8						10000' PA
131720	1305	6801	17	28	117	40.0	16.4	16.8	920	788	994.8	907.5	75.2	2600 RA
131945	1239	6800			095	8.3	9.4	10.3						10000 PA
132630	1213	6800												2500 RA
133900	1145	6800	002	004	094	10.0	9.8	10.4						10000 PA
134540	1118	6800	000	356	251	20.9	19.0	18.0	907	769	993.0	909.0	78.5	2600 RA
135040	1101	6757												TURN to TRK 112
135640	1111	6733	111	109	031	15.2	9.5	11.3						10000 PA
140300	1120	6710	109	111	280	13.8	18.4	18.4	932	850	998.3	906.8	79.4	2800 RA
141210	1134	6635	112	111	016	10.6	10.7	7.5						10000 PA
141900	1143	6611	108	109	117	6.9	19.4	19.0	899	767	995.9	909.8	73.2	2600 RA
142715	1156	6540	113	112	060	9.6	9.6	6.6						10000 PA
142920	1159	6532												TURN TO TRK 190
143530	1221	6534	188	183	121	26.1	18.1	17.8	773	682	999.4	923.7	69.1	2400 RA
153310	1359	6552	182	185	116	28.0	19.8	18.7	427	308	997.7	963.3	73.8	1000' RA
154145	1431	6552	180	181	305	1.0	10.0	10.3						
155000	1502	6551	175	173	114	7.0	19.7	16.3	455	328	997.2	960.1	72.9	1000' RA
155540	1524	6551		092	22.5	13.7	13.0							7000 PA
160050	1543	6551	175	176	077	1.2	20.0	18.6	458	299	993.4	959.6	68.2	1000 RA
160915	1559	6532	092	095	128	10.7	9.2	8.7						10000 PA

6335

Flight ID: 030124I

U.S. Dept. of Commerce/NOAA/Aircraft Operations Center — Form 413-60

Time	Lat	Long	Trk	Hdg	Wind Dir	Wind Spd	T_a	T_d	Press. Alt.	Geo. Alt.	Sfc Press.	Press. Sfc	Dyn. Press	Remarks
161730	1600	6504	92	094	146	7.6	21.1	16.4	437	302	995.7	962.0	74.8	1000' RA
162535	1600	6433			136	12.8	9.4	7.5						10000 PA
163416	1600	6463	89	95	149	18.0	22.3	16.1	451	302	994.0	960.0	69.8	1000 RA
163945	1600	6343			109	31.4	14.0	11.7						7000 PA
164520	1600	6324	090	097	161	20.4	21.9	17.8	477	317	991.3	957.6	66.1	1000'RA
165315	1600	6256			104	13.2	9.7	9.8						10000 PA
165930	1559	6233	91	99	164	34.1	15.5	14.5	1228	838	963.6	874.3	73.8	~2500 RA
170240	1600	6222			079	18.2	14.1	12.2						7000 PA
170500	1600	6213	086	091	143	30.0	15.3	14.3	1512	1169	964.7	844.4	67.3	~3800 RA
171030	1600	6100	092	092	025	4.3	10.9	8.6						10000 PA
171650	1600	6127	87	94	175	20.7	17.6	17.3	1057	725	970.4	892.1	69.4	~2500 RA
172040	1600	6112	098	097	091	5.6	14.2	12.5						7000 PA
172430	1600	6057												TURN TO TRK 219
172835	1612	6106	221	220	072	4.6	15.2	11.4						7000 PA
173145	1621	6114	221	218	174	20.2	16.9	16.2	1209	816	963.5	876.2	82.8	~2700 RA
173720	1639	6122	219	219	090	7.9	10.9	6.2						
180750	1807	6247			171	24.0	17.3	14.4	1189	936	978.2	878.2	80.7	4000 PA
181915	1750	6314			169	34.8	19.1	8.0	1204	829	965.2	877.4	49.9	4000 PA

NOAA FORM 56-49
(2-95)

MISSION PREFLIGHT LOG

DESTINATION	MISSION	NAVIGATOR	AIRCRAFT COMMANDER	FLIGHT DIRECTOR	SCHEDULED / ACTUAL TAKEOFF Z	DATE OF TAKEOFF
SLVR #7	SALTEX #7	LT BRAKOB	LCDR TEBEEST	SHEPHERD	1100Z / 1053	27JAN03

WP	LAT / LON	RTE	MH	VAR +E==>	TH	DR +R==>	TRK	GS	WD	WS	ALT	TAS	LEG / TOT DIST	LEG / TOT TIME	PROP ETA	ETA	ATA	REMARKS
SLVR	S 17-38.7 W 63-08.1		278	9W	269								26 / 26	+9		1100	1102	→ 1
1	17-39.5 63-35.6		010	9W	001								54 / 80	+13		1113	1115	→ 2
2	16-45.0 63-35.0		009	10W	359								164 / 244	+40		1155	1153	→ 3
3	14-00.0 63-37.0		278	8W	270								139 / 383	+35		1228	1225	→ 4
4	14-00.0 66-00.00		276	6W	270								117 / 500	+29		1254	1254	→ 5
5	14-00.0 68-00.0		007	7W	360								120 / 620	+28	CL	1401	1350	→ 6
6	12-00.0 68-00.0		099	9W	090								147 / 767	+40		1430	1430	→ 7
7	12-00.0 65-30.0		198	8W	190								121 / 888	+30		1500		→ 8
8	14-00.0 65-52.0		188	8W	180								120 / 1008	+30		1530	1606	→ 9
9	16-00.0 65-52.0		099	9W	090								130 / 1138	+32		1638	1638	→ 10
10	16-00.0 63-37.0		102	12W	090								156 / 1294	+39		1717	1717	→ 11
11	16-00.0 60-55.0		114	11W	162								157 / 1451	+39		1756		
12	18-30.0 60-05.0		295	10W	285								143 / 1594	+35		1752	1752	→ 13
13	17-52.0 60-30.0		237	9W	228								57 / 1651	+14		1807	1807	→ 14
14	18-30.0 63-15.0		348	9W	339								54 / 1705	+14		1821	1821	→ 15
15	17-39.3 63-35.6		010	9W	001								54 / 1759	+14		1835		
16	16-45.0 65-25.0		163	9W	154								59 / 1818	+16		1829	1836	→ SLVR
SLVR	17-38.7 63-08.1																	

INS PERFORMANCE

	INS 1	INS 2
BEGIN ALIGN TIME	0844	0844
ALIGN STATUS (0-5)	0	0
END NAV TIME	1825	1825
START NAV TIME	1025	1025
DELTA T	8+00	8400

TERMINAL ERRORS

	INS 1	INS 2
DELTA LAT	-1.1	-1.6
DELTA LON	+.3	+.2
RGS		
RADIAL ERROR	1	1

REMARKS

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
AIRCRAFT OPERATIONS CENTER

150/35 280/31

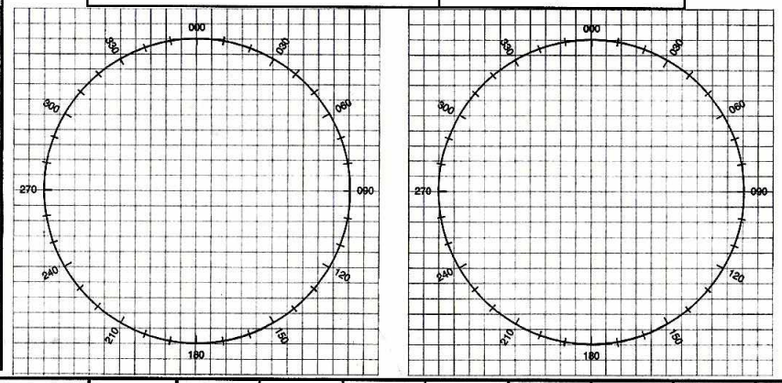
30.03 5006

CLEARANCES

FREQ	ALT	HDG	OTHER
123.7	5K		273
			260
			270
			280

MISSION LOG

PAGE 1 OF 1



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

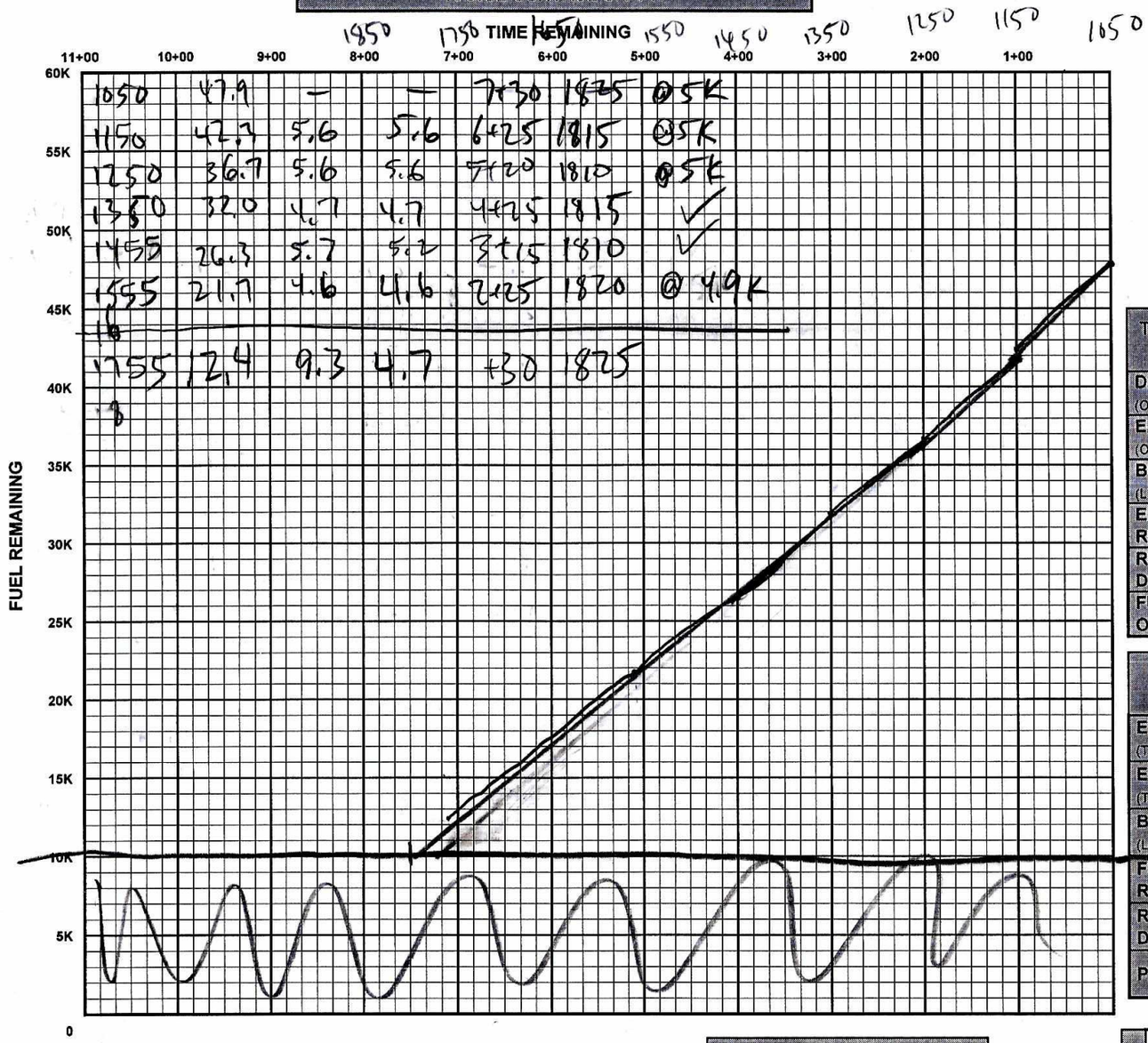
MAYDAY, MAYDAY, MAYDAY
THIS IS NOAA _____, NOAA _____, NOAA 43

- 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 20 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
1036	ENG	S	S		S																INS 1 PRE
1042	BLOCK	W	W		W																
1042	TAXI																				
1053	T/O																				
1056	XV	17-37.9 63-14.3	17-37.9 63-14.3	0 0	17-38.0 63-14.3	-.1 0				10R	277	232	175	46	4K	221					273/3 VIZ ✓
1130	△G	15-29.7 63-34.7	15-29.8 63-34.8	-.1 -.1	15-30.0 63-34.7	-.3 0				8L	359	260	140	51	3K	224					
1215	△G	14-00.2 65-11.3	14-00.1 65-11.4	+.1 -.1	14-00.3 65-11.4	-.1 -.1				1L	271	235	300	5	7K	236					
1302	△G	13-22.4 68-00.2	13-23.2 68-00.4	-.8 -.2	13-23.5 68-00.2	-1.1 0				11L	000	256	164	46	5K	244					103/122 INS 2
1346	△G	11-15.0 67-59.8	11-14.8 68-00.0	+.2 -.2	11-15.3 67-59.9	-.3 -.1				3R	000	274	267	14	3K	230					
1435	△G	12-24.2 65-34.7	12-24.5 65-34.6	-.3 +.1	12-25.3 65-34.8	-1.1 -.1				5R	188	212	128	24	3K	233					
1520	△G	13-08.3 65-42.5	13-08.6 65-42.6	-.3 -.1	13-09.3 65-42.4	-1.0 +.1				1L	191	264	345	13	10K	251					4 CIRCLES FOR RADAR
1607	△G	15-58.6 65-40.5	15-59.1 65-40.5	.5 0	15-59.9 65-41.9	-1.3 -.4				3L	091	230	135	16	8K	238					
1714	△	16 00 62 16.5	16 00.6 62 16.6	-.6 -.1	16 01.1 62 16.5	-1.1 Φ	104	9W	095	7L	88	202	143	29	5K	223					18.4K (10K)
1800	△G	17-45.6 62-24.5	17-45.6 62-24.0	-.6 +.5	17-46.0 62-24.1	-1.0 +.4				5R	225	210	180	27	4K	232					
1824	LAND	17-38.7 63-08.1	17-39.8 63-07.8	-1.1 +.3	17-40.3 63-07.9	-1.6 +.2															

5679

RANGE CONTROL GRAPH



1050	47.9	—	—	7+30	1825	@5K
1150	42.3	5.6	5.6	6+25	1815	@5K
1250	36.7	5.6	5.6	5+20	1810	@5K
1350	32.0	4.7	4.7	4+25	1815	✓
1455	26.3	5.7	5.2	3+15	1810	✓
1555	21.7	4.6	4.6	2+25	1820	@4.9K
16						
1755	12.4	9.3	4.7	+30	1825	
18						

1850 1750 1650 1550 1450 1350 1250 1150 1050

ETP = .5(TOTAL DISTANCE x OUTBOUND WIND FACTOR)

ENROUTE FUEL	
ENROUTE TIME	
ENROUTE FUEL (6K, 5K 4.5K RULE)	
RESERVE AT DESTINATION	
REQUIRED RAMP	
ACTUAL RAMP FUEL	

TACTICAL (OFFSTA TO DESTINATION)	4 ENG	3 ENG
DISTANCE (OFFSTA TO DEST)		
ENROUTE TIME (OFFSTA TO DEST)		
BURN RATE (LBS/HR)	4500	5500
ENROUTE FUEL REQUIRED		
RESERVE AT DESTINATION		
FUEL AT OFFSTA		

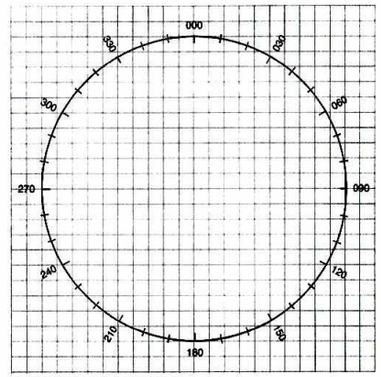
POINT OF SAFE RETURN	4 ENG	3 ENG
ETP DISTANCE (TO DEPARTURE)		
ENROUTE TIME (TO DEPARTURE)		
BURN RATE (LBS/HR)	4500	5500
FUEL REQUIRED		
RESERVE AT DEPARTURE		
PSR FUEL		

WIND FACTOR		
WINDSPEED	HEADWIND	TAILWIND
10	1.03	.97
20	1.06	.94
30	1.10	.92
40	1.14	.89
50	1.18	.87
60	1.22	.85

CEX - TRUE BEARING METHOD			
COMPASS TYPE	INS1	INS2	WET
MCH (READING)			
- MTH (SEXTANT)			
CE			
- VAR			
DEV			

CEX - ERB METHOD			
COMPASS TYPE	INS1	INS2	WET
MERB (DIAL 000)			
+ ZN			
= MTH			
MCH (READING)			
CE			
- VAR			
= DEV			

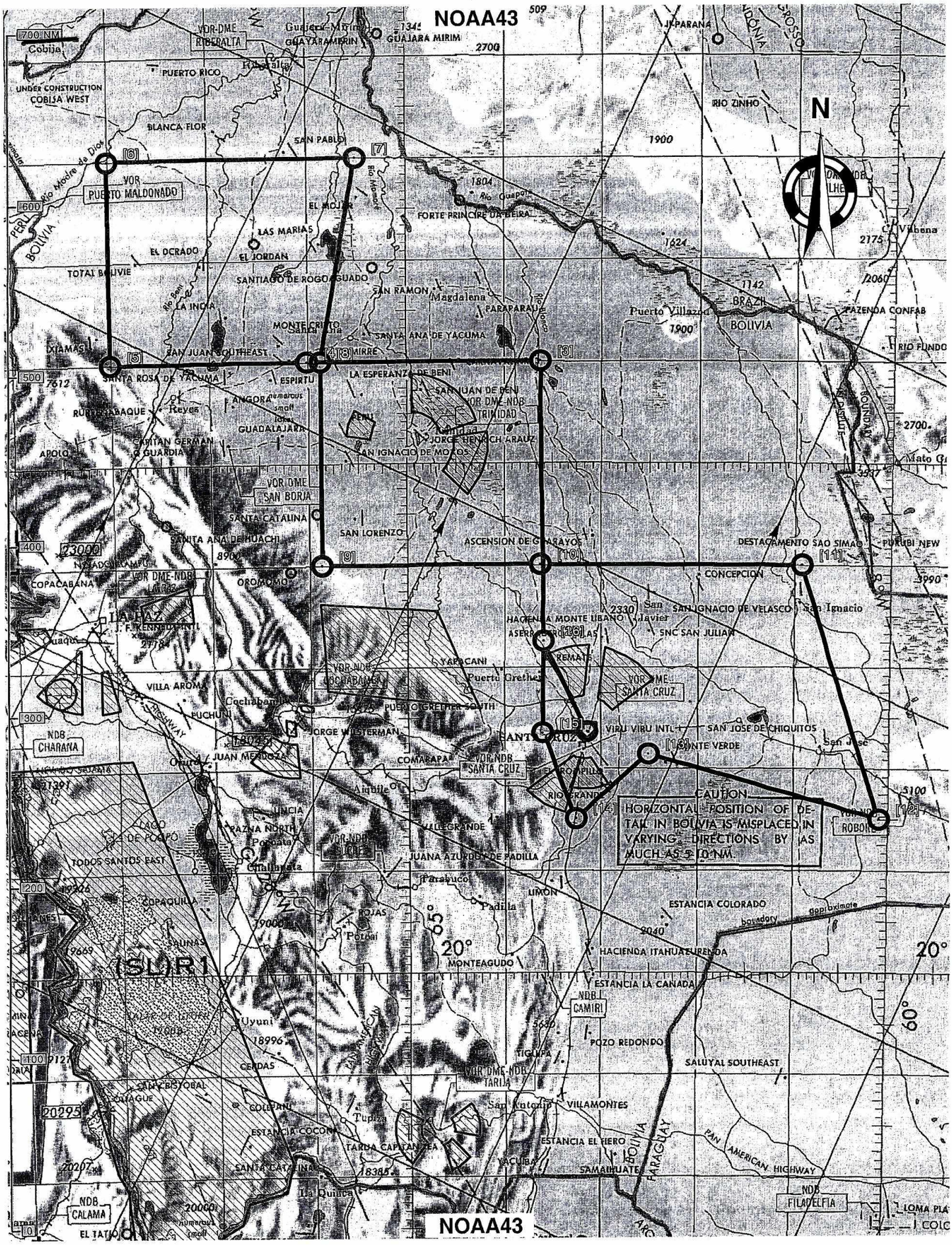
CEX SIGHT	
GMT	
GHA	
CORR	
GHA	
LONG +W -E	
EXACT LHA	
LAT	
BODY	
DEC	
HC / D	
CORR	
HC	
Z	
ZN	

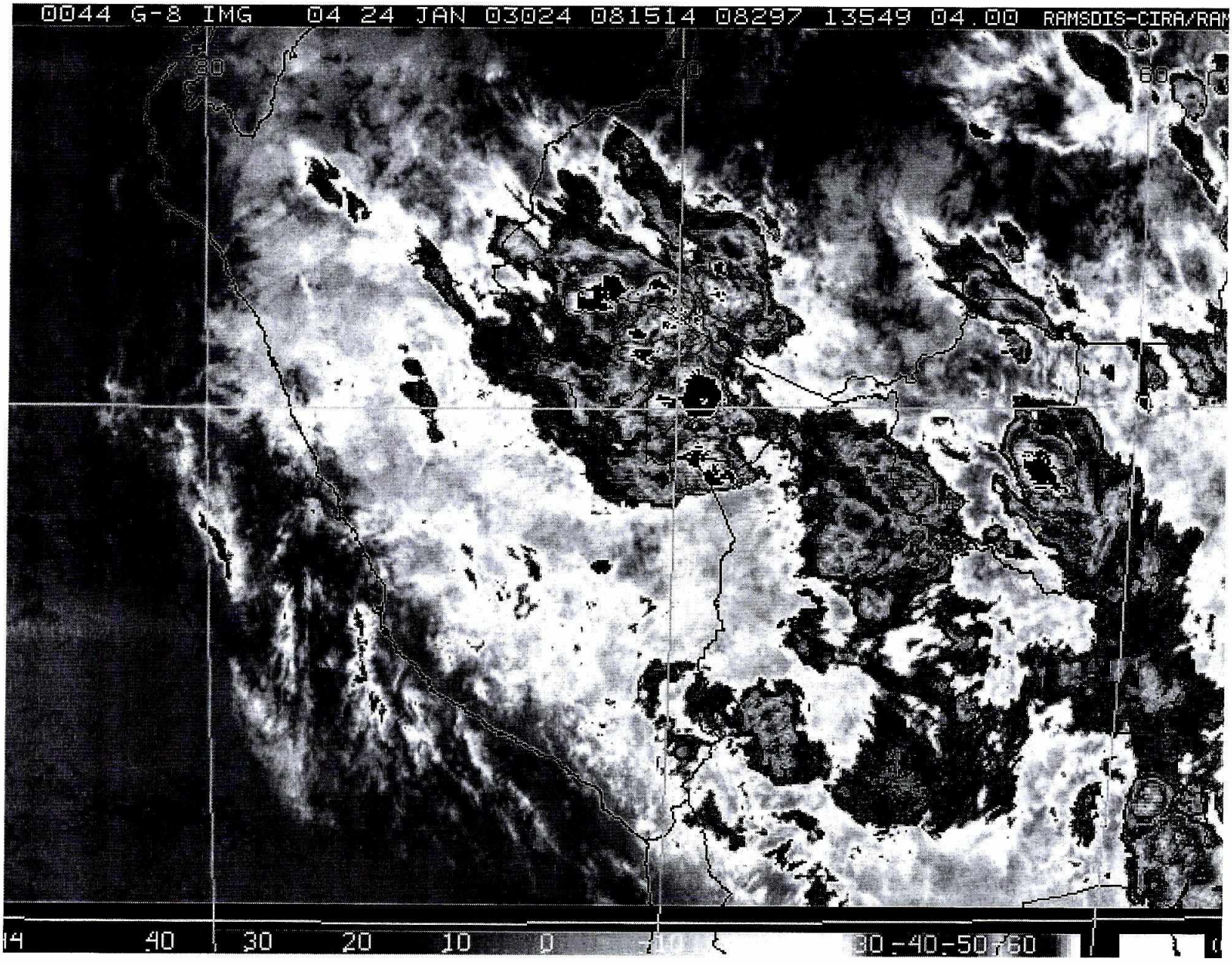


"F" FACTOR	PRESS ALT	200	250	300	350
	10,000	1.0	1.0	.99	.99
	20,000	.99	.98	.97	.97
	30,000	.97	.96	.95	.94
	40,000	.96	.94	.92	.90

TRUE AIRSPEED CROSS-CHECK							
TIME	IAS	PRESS ALT	"F" FACTOR	EAS	OAT	TAS	ITAS
1104	205	5K	X	X	+16	222	224

Turn Pt	Type DTD	Fix/Point Description	Latitude Longitude	Elev MV	MH MC	TH TC	Leg Time Clock Time	Leg Dist Total Dist
1	ST	SLVR/A	S 17 38.69	1224F	156	147	00+00+00	0.0
*M		VIRU VIRU INTL	W063 08.12	9.2W	156	147	00:00:00	0.0
	level off		S 17 39.21	unk	278	269	00+03+47	22.0
*M			W063 31.18	9.1W	278	269	00:03:47	22.0
2		VIR/E273025	S 17 39.31	unk	278	269	00+01+02	4.2
*M 1		VIRU VIRU	W063 35.61	9.0W	278	269	00:04:49	26.3
3		VIR/E342058	S 16 45.00	unk	010	001	00+13+15	54.1
*M 2		VIRU VIRU	W063 35.00	9.2W	010	001	00:18:04	80.4
4			S 14 00.00	unk	009	359	00+40+14	164.3
*M 3			W063 37.00	9.9W	009	359	00:58:18	244.7
5			S 14 00.00	unk	280	270	00+34+08	139.0
*M 4			W066 00.00	8.0W	280	270	01:32:21	383.7
6			S 14 00.00	unk	278	270	00+28+34	116.7
*M 5			W068 00.00	6.3W	278	270	02:00:55	500.4
7			S 12 00.00	unk	006	360	00+29+15	119.5
*M 6			W068 00.00	6.3W	006	360	02:30:10	619.8
8			S 12 00.00	unk	097	090	00+36+00	147.0
*M 7			W065 30.00	8.8W	097	090	03:06:10	766.8
9			S 14 00.00	unk	199	190	00+29+44	121.4
*M 8			W065 52.00	8.1W	199	190	03:35:54	888.2
10			S 16 00.00	unk	188	180	00+29+16	119.5
*M 9			W065 52.00	7.5W	188	180	04:05:10	1007.7
11			S 16 00.00	unk	098	090	00+31+51	130.0
*M 10			W063 37.00	9.4W	098	090	04:37:01	1137.8
12			S 16 00.00	unk	100	090	00+38+13	156.0
*M 11			W060 55.00	11.6W	100	090	05:15:14	1293.8
13		VIR/E114183	S 18 30.00	unk	174	162	00+38:25	156.9
*M 12		VIRU VIRU	W060 05.00	11.6W	174	162	05:53:39	1450.7
14		VIR/E118040	S 17 52.00	unk	297	285	00+35+08	143.1
*M 13		VIRU VIRU	W062 30.00	9.8W	297	285	06:28:42	1593.8
15		VIR/E198052	S 18 30.00	unk	238	228	00+14+00	57.2
*M 14		VIRU VIRU	W063 15.00	9.0W	238	228	06:42:42	1651.0
16		VIR/E273025	S 17 39.31	unk	348	339	00+13+16	54.2
*M 15		VIRU VIRU	W063 35.61	9.0W	348	339	06:55:58	1705.2
17		VIR/E342058	S 16 45.00	unk	010	001	00+13+15	54.1
*M 16		VIRU VIRU	W063 35.00	9.2W	010	001	07:09:13	1759.2
18		SLVR/A	S 17 38.69	1224F	164	154	00+14+32	59.3
*M		VIRU VIRU INTL	W063 08.12	9.2W	164	154	07:23:45	1818.6


NOAA43
700 NM
Cobija
VOR-DME
RIBERALTA
Guajara-Mirim
GUAJARA MIRIM
PUERTO RICO
UNDER CONSTRUCTION
COBIJA WEST
BLANCA FLOR
SAN PABLO
[6]
[7]
VOR
PUERTO MALDONADO
Río Madre de Dios
Río Manuripi
Río Guaporé
FORTE PRINCIPE DA BEIRA
EL MOJON
LAS MARIAS
EL OCRADO
EL JORDAN
TOTAL BOLIVIE
SANTIAGO DE ROGOAGUADO
SAN RAMON
Magdalena
PARAPARAU
LA INDIA
MONTE CRISTO
SANTA ANA DE YACUMA
Puerto Villazon
BOLIVIA
BRAZIL
FAZENDA CONFAB
RIO FUNDO
IXIAMAS
SAN JUAN SOUTHEAST
[5]
[4]
[8]
SANTA ROSA DE YACUMA
ESPIRITU
LA ESPERANZA DE BENI
SAN JUAN DE BENI
VOR DME-NDB
TRINIDAD
JORGE HENRICH ARAUZ
RURRENABAQUE
Reyes
ANGORA
numerous small lakes
GUADALAJARA
SAN IGNACIO DE MOXOS
APOLO
VOR DME
SAN BORJA
SANTA CATALINA
SAN LORENZO
ASCENSION DE GUARAYOS
DESTACAMENTO SAO SIMAO
PORTUBI NEW
[9]
[10]
[11]
CONCEPCION
COPACABANA
VOR DME-NDB
LA PAZ
OROMOMO
HACIENDA MONTE LIBANO
SAN IGNACIO DE VELASCO
San Ignacio
SNC SAN JULIAN
YAPACANI
REMATE
VOR DME
SANTA CRUZ
VILLA AROMA
Cochabamba
PUERTO GRETHER SOUTH
PUCHUNI
NDB
CHARANA
JORGE WILSTERMAN
VIRU VIRU INTL
SAN JOSE DE CHIQUITOS
[15]
[13]
[14]
[12]
JUAN MENDOZA
COMARAPA
VOR-NDB
SANTA CRUZ
CAUTION
HORIZONTAL POSITION OF DETAIL IN BOLIVIA IS MISPLACED IN VARYING DIRECTIONS BY AS MUCH AS 5 NM
ROBORE
LAGO
DE POOPO
PAZNA NORTH
Pongata
VOR-NDB
TODOS SANTOS EAST
Challapata
JUANA AZURDUY DE PADILLA
Parapucos
LIMON
Padilla
COPAQUILLA
ROJAS
Porcai
ESTANCIA COLORADO
HACIENDA ITAHUATURENDA
20°
MONTEAGUDO
(SUR1)
ESTANCIA LA CANADA
NDB
CAMIRI
Uyuni
POZO REDONDO
CERDAS
TICUPA
SALUYAL SOUTHEAST
VOR DME-NDB
TARIJA
SAN BISTOBAL
COLPANI
San Antonio
VILLAMONTES
Tupiza
ESTANCIA COCONA
ESTANCIA EL FIERO
TARIJA CAPITAL AEA
SAMAIHUATE
PAN AMERICAN HIGHWAY
SANTA CATARINA
Ita Quinca
NDB
CALAMA
NDB
FILADELFIA
EL TATIO
NOAA43


0044 G-8 IMG 04 24 JAN 03024 081514 08297 13549 04.00 RAMSDIS-CIRA/RAM
80
60
40 30 20 10 0 -10 -30 -40 -50 -60