DCA97MA017
Addendum V to Meteorological Factual Report

Mesoscale Analysis of the COMAIR-3272 Crash of 9 January 1997 [revised]
by Ben C. Bernstein, National Center for Atmospheric Research

[redacted]
Gregory D. Salottolo
National Resource Specialist
Meteorology
April 7, 1998

Mesoscale analysis of the COMAIR-3272 crash of 9 January 1997

Ben C. Bernstein
Research Applications Program
National Center for Atmospheric Research
Boulder, CO 80307-3000
March 30, 1998

1. Introduction

This discussion is to be considered in the context of the synoptic-scale weather data previously presented to the NTSB by NCAR. Here, the focus is placed on the mesoscale weather elements which are pertinent to the accretion of ice on Comair-3272 and on explaining the significant differences in icing reported by the pilots of four other aircraft which flew in close proximity to Comair-3272 within a 10 minute time window.

2. Analysis of radar data - overview

Regional radar images indicate widespread areas of snow across Michigan at 2000 and 2100 UTC, essentially to the north of the Ohio/Michigan border (see Figs. 1a,b). Along the edges of this area of snow, there were patches of lower reflectivity, which show up as "holes" in the echo pattern. These patches were evident near Detroit during the period in which the crash occurred. Close examination of the 0.5 degree scan from the Detroit NEXRAD (DTX) at 2049 UTC (Fig. 2a) shows widespread reflectivity of > 15 dBZ across much of the radar scope, with weaker echoes to the southeast and south of DTX. Patches of lower reflectivity are evident in these areas, with values of about 0 to 10 dBZ. One of these patches was in place from approximately 50 to 100 km to the south-southwest of DTX. A look at the 1.5 and 2.4 degree scans (Figs. 2b,c) indicates that reflectivity values decreased with height in this area. Comair-3272 was flying through this patch of lower reflectivity during the last 6 ½ minutes before the upset occurred. At 2050 UTC, Comair-3272 was at an altitude of ~7000 ft (~2133 m) MSL and location of ~ 72 km from the DTX radar at ~ 200 degrees azimuth. Since the DTX radar is at an elevation of 360 m MSL, Comair-3272 was ~1733 m above the radar at a distance of 72 km, corresponding to an elevation angle of approximately 1.4 degrees. Reflectivity values at the location of the Comair were between -5 and +10 dBZ on the 1.5 degree elevation scan and are relatively low compared to the 10-30 dBZ values within a swath of snow to the northwest and north.

Data from the DTX radar have been digitally interpolated to a 150 km by 150 km grid that encompasses the Comair's path of flight during the last ~8 minutes before the crash. Horizontal slices (CAPPIs) of radar data were created at 0.8 and 2.3 km MSL from DTX radar volumes which began at 2037, 2043 and 2049 UTC. These altitudes roughly approximate the height of the center of the 0.5 and

1.5 degree elevation DTX radar beams at the horizontal location of Comair-3272 at 2050 UTC (~72 km SSW of DTX). Superposition of the FAA radar-based tracks of Comair-3272 and several other aircraft on approach to Detroit on the 0.8 km CAPPI from 2049 UTC (Fig. 3a) indicate that these planes were flying on the southeastern edge of the large swath of precipitation where most of the reflectivity values were approximately 10 dBZ at 0.8km (~1.3 km below flight level). All of the aircraft passed through a patch of lower reflectivity during or just before the first of two turns on approach to Detroit. This patch will be discussed in further detail and related to the tracks of the aircraft in a later section of this report.

3. Comparison of surface observations with radar and sounding data

Data from several National Weather Service reporting stations in the vicinity of the crash have also been plotted on the gridded radar reflectivity map for 0.8 km MSL (Fig. 3a). All of the stations (DTW - Detroit MI, YIP - Ypsilanti/Detroit-Willow MI, ARB - Ann Arbor MI, JXN - Jackson MI, TOL - Toledo OH) were reporting snow at ~2050 UTC, but details in the observations reveal more information. DTW was reporting light snow and mist, visibility of 3/4 miles, broken clouds at 600 and 1200 feet and an overcast deck at 1700 feet. Reflectivity values over DTW were approximately 20 dBZ at this time, but as areas of lower reflectivity to the southwest moved over DTW, the visibility at the surface improved to 3 miles and the snow briefly stopped between 2149 and 2201 UTC (1649-1701 LST - see observer comments in Table 1a). Ice pellets were reported at DTW about 2 ½ hours after the crash, from 2332 to 2347 UTC (1832-1847 LST). ARB was located on the northern edge of the patch, where reflectivity values were approximately 10 dBZ. As the northern edge of the patch of low reflectivity reached ARB, the visibility temporarily rose from 1 mile (1953 UTC) to 4 miles (2053 UTC), then fell back to 2.5 miles (2121 UTC), then to 1.5 miles (2150 UTC), following the passage of the patch (see Table 1b). This brief increase in visibility indicates that the intensity of the snow is likely to have decreased substantially within the northern edge of the patch. JXN was located to the northwest of the aircraft tracks, within areas of 15-20 dBZ reflectivity, reported continuous light snow, visibility values of 1 mile or less and overcast ceilings varying from 800 to 1700 feet.

The decrease in or cessation of snowfall in the areas of low reflectivity indicates that the snow-making process was less efficient there, thus allowing a greater opportunity for liquid cloud to exist. Several observations of pellets were made by surface stations (Detroit MI, Findlay OH) and individuals (a pilot at home in Mason City, MI reported pellets and described them as "not opaque, but not clear, either"; a fireman on his way to the crash scene reported pellets) around the Detroit area in the hours surrounding the crash. These observations indicate that either large drops and/or significant water contents were likely to exist within the cloud, possibly mixed with snow crystals in some locations. Any pellets which did occur were formed in an environment free of the melting process, since only sub-freezing temperatures

were found in sounding data from both Detroit and Wilmington, Ohio for 0000 UTC on 10 January (see Tables 2a,b).

4. Comparison of aircraft tracks with radar data

FAA radar-based track data available for five different aircraft flying in the area near the time of the crash are plotted on the 0.8 km radar cross-section (Fig. 3a). The planes were as follows: Comair 3272 (Embraer 120, red line), NW 272 (DC 9, purple line), America West 50 (Airbus 320, green line), NW 483 (Boeing 757, blue line) and NW 208 (Airbus 320, brown line). Times for the locations of the aircraft are indicated with symbols on the plot. At 2050 UTC (circles in Fig. 3a), Comair-3272 was making a turn toward the southeast within the patch of low reflectivity, while America West 50 was just ahead of it and NW 272 was just behind it. NW 483 and NW 208 had passed through this area about 5 and 10 minutes earlier, respectively. In post-crash interviews, the pilots of these aircraft reported icing conditions varying from no icing (NW 483) to "the worst icing that (the pilot) had encountered all season" (NW 272). Although these planes flew through similar locations within about 10 minutes of each other, close inspection of the tracks and altitudes of the aircraft relative to the patch of low reflectivity reveals the source of this discrepancy.

A radar cross-section at 2.3 km MSL (Fig. 3b) reveals a slightly larger patch of < 10 dBZ reflectivity (compared to the size of the patch at 0.8 km) at the location of the first turn in the approach pattern. Comair-3272 had descended from 11,000 ft (3352 m - all heights MSL) at 2045 UTC and slowed from ~350 knots to ~240 knots before entering the first turn at 2050 UTC (see Table 3a). According to *preliminary* information from Embraer engineers, the airplane was "clean" until it descended to 7000 feet (~2133 m) MSL, and started to pick up drag at ~204945 UTC, possibly indicating the onset of ice accretion on the aircraft. Comair-3272 reached this altitude when it entered the patch of lower reflectivity at ~204904 UTC, held at 7000 ft until 205113 UTC, then gradually descended as it flew toward the southeast through the low reflectivity patch, reaching an altitude of 4000 ft (1219 m) by 205403 UTC. It was during this period that drag counts were reported to have increased, with the most rapid increase in drag counts indicated between 5500 and 4500 ft (1675 and 1370 m), according to Embraer engineers. Reflectivity values in the path of flight during this period of time were between ~4 and 9 dBZ. Once Comair-3272 descended to altitudes of 7000 ft or less, it flew through an area with reflectivity values of less than 10 dBZ for ~6 ½ minutes (~5 minutes of which the aircraft was picking up drag, according to the preliminary engineering data - *possibly* in icing conditions) before attempting to make a left turn on approach to Detroit at 205426 UTC and 4000 ft (1219 m). During this portion of the flight, the plane was traveling at between approximately 160 and 180 knots in an environment where temperatures were between -6 and -11 C, according to the Detroit balloon borne sounding released at 2300 UTC. Total temperatures calculated for this period were between -3 and -7C.

NW 272 (a DC 9) also descended into the patch of low reflectivity at 7000 ft and made a right turn within it, essentially following the path of Comair-3272, but was about two minutes behind it (see 2050 UTC locations on Fig. 3b; Table 3b). NW 272 flew at similar altitudes at speeds of 150 to 170 knots, and, thus, had similar total temperatures to Comair-3272. The pilot reported that this was "the worst ice (the pilot) had seen all season" with some splashback and described the ice as "extremely heavy to severe" based upon "18 years of operations in the Detroit and Lake Erie areas." The pilot also reported that ice was accreting at a rate of approximately ½ inch of ice per minute, that the plane was flying in solid overcast conditions and that the radar showed little or no returns. When asked to hold altitude, the pilot asked to climb out and did so by making a U-turn at the southeastern end of the low reflectivity patch. Overall, NW 272 appeared to be within the patch of less than 10 dBZ reflectivity at altitudes at or below 7000 ft for more than 8 minutes.

America West (AWE) flight 50 (an Airbus 320) passed over the top of Comair-3272 at ~2045 UTC and was a minute or so ahead of it at 2050 UTC (see Fig. 3b, Table 3c). This aircraft did not descend to 7000 ft until after making the initial turn at 8000 ft, reaching an altitude of 7000 ft at the eastern edge of the low reflectivity patch. This aircraft spent approximately two minutes in areas of less than 10 dBZ at altitudes of 7000 ft or less. The pilot did report moderate rime icing with possible freezing drizzle and light snow. The pilot reported an ice accumulation of approximately 1/4 inch and an icing exposure time of 5 to 8 minutes, much of which appears to have occurred at altitudes above 7000 ft and/or in areas of higher reflectivity to the east of the patch. Visible moisture was mentioned, and the pilot also indicated that light and occasionally moderate turbulence was present. Overall, Comair-3272, NW-272 and AWE-50 were all flying in a similar environment, but AWE-50 was exposed to the area of low reflectivity at altitudes of 7000 ft or less for a shorter amount of time.

NW-483 (a Boeing 757) descended into the center of the patch at ~204630 UTC and crossed through to the eastern edge rather quickly (Fig. 4, Table 3d). This aircraft was traveling speeds of roughly 210 to 280 knots through the patch and had total temperatures of between -3 and 0 C. The pilot only reported light snow and no icing on approach to DTW. This aircraft only briefly passed through the patch of reflectivity < 10 dBZ at altitudes of 7000 ft or less, causing a relatively short exposure (~2 minutes) to the environment that existed there. NW-208 (an Airbus 320) essentially crossed over the patch at altitudes of more than 7200 ft between 2038 and 2040 UTC, descending below 7000 ft into reflectivity of ~10 dBZ on the far east side of the patch, missing most of it (Fig. 5, Table 3e). The pilot of that aircraft reported rime icing, with 1/2 inch or less accumulation and light snow during descent.

Overall, the differences in exposure time and aircraft speed are likely to account for the wide variety of icing reported by these pilots in interviews following the crash. This is especially true if, indeed, the top of the icing layer was near 7000 ft MSL.

5. Cloud top height and possible shear layers

Examination of data from the DTX radar show that when looking toward the south-southwest (~200 degrees), patchy reflectivity is only evident out to ~55-60 km on the 2.4 degree elevation scan (Fig. 2c), indicating that the height of the highest radar-detectable particles was near 8900 ft MSL, and the pocketed nature of the reflectivity in this region points towards some variability in the height of the tops. Note that this height is not necessarily the same as cloud top, which may be higher. A close look at the radial velocity field on the 2.4 degree scan (Fig. 6) reveals the existence of multiple weak shear layers within the cloud depth, evidenced by slight changes in the azimuthal location of the 0 ms^{-1} radial velocity line with increasing distance from the radar (and thus, height). DTX sounding data (see Table 2a) also indicate the existence of some shear between 5900 and 8770 ft (1800-2675 m), in the upper portion of the layer with relative humidity values in excess of 95%. The next relative humidity value available in the sounding was 83%, with a temperature of -16C at 10,700 ft (3250 m). Relative humidity values dropped sharply above this altitude, indicating a lack of cloud there. Infrared data from the GOES-9 satellite indicate cloud top temperature values of approximately -17C over and to the south of Detroit, which roughly matches the cloud top heights inferred from the sounding data at 10,700 ft and -16C. The essentially liquid-saturated values of relative humidity that existed in the DTX sounding between 1700 ft (also the height of cloud base reported by DTW at 2100 UTC) to 8800 ft may serve as an indication that this layer was made up of predominantly liquid cloud, while a layer mostly comprised of snow may have existed above this. The 8800 ft height closely matches the approximate height of the radar reflectivity tops to the south-southwest of the Detroit airport. Pilots in the area reported cloud top heights ranging from 5000 to 11,000 ft (except for higher tops of 16,000 ft to the north), and moderate or greater intensity icing, both rime and mixed in type, between 4,000 and 11,000 feet MSL. Some pilots also reported the existence of multiple cloud layers around Detroit.

Overall, the assessment of cloud top height is difficult for this case. It is quite clear, however, that cloud tops were lower to the south of Detroit and that Comair-3272 was flying in a location of transition between deeper, snow clouds to the north and shallower, lightly precipitating or non-precipitating clouds to the south.

6. Radiometer data from Toronto, Ontario

Data from a microwave radiometer located downstream of the crash site at Toronto (43.964 N, 79.574 W) indicated integrated liquid water contents of 0.05 to 0.8 kg/m^2 as the area of relatively warm cloud tops and low radar reflectivity that was over the crash site reached the radiometer between the hours of 2300, 9 January and 0200, 10 January (see Figs 1a-b, 7a-c, 8). Tracking of the radar features was not easily done, but the back edge of the reflectivity region was used to roughly approximate the downstream

location of the portion of the storm in which the aircraft crashed. Using this method, the back edge of the radar reflectivity appeared to pass the radiometer near 0000 UTC, 10 January, when liquid water contents were near a short-lived minimum. Water content values were as high as 0.8 near 2300 UTC, then gradually dropped to near zero at ~0000 UTC, rose sharply to 0.5 at the 0030 UTC, dropped again to 0.1 by a 0100 UTC, then rose gradually to 0.8 at ~0200 UTC. It is difficult to say which, if any, of these liquid water contents was representative of the water content present at the time and location of the crash, but this range of values is certainly plausible for that environment. Using representative reflectivity values from the Detroit radar and a range of liquid water content values from the Toronto radiometer, one can roughly approximate the range of drop diameters, using a monodisperse distribution of liquid droplets. Assuming an all-liquid cloud with depth of ~2000 m (~6500 ft), integrated liquid water contents of 0.05 to 0.8 kg/m^2 and that the liquid water content was distributed evenly through the depth of the cloud, the average liquid water content would have been between 0.025 and 0.4 g per cubic meter. Using this range of values and representative reflectivity values of 5 dBZ, the expected drop sizes are approximately 200 to 400 microns (see Fig. 9). It is important to note that higher and lower values of LWC and corresponding lower/higher droplet sizes are likely to have existed within portions of the cloud depth, since the liquid water is unlikely to have been evenly distributed through the depth of the cloud.

7. Summary and conclusions

The evidence for the existence of icing conditions along the Comair-3272 flight track is strong and there are several clues present which suggest that freezing drizzle may have also existed there. The possibility that freezing drizzle existed within this cloud is supported by 1) reports of ice pellets and/or graupel in surface observations, 2) a report of possible freezing drizzle by the pilot of America West 50, 3) the report of extremely heavy to severe icing with some splash back and fast accumulation rates (1/2 inch per minute) by the pilot of NW 272, and 4) the roughly calculated drop sizes based upon reflectivity data from the DTX radar and the Toronto radiometer.

8. Acknowledgments

Thanks to J. Walter Strapp of the Atmospheric Environment Service of Canada for supplying the Toronto radiometer data, and to Greg Thompson for his help with the analysis of the GOES-9 satellite data.

Table 1a

UNEDITED SURFACE WEATHER OBSERVATIONS (METAR/SPEC)

LATITUDE	LONGITUDE	STATION ELEVATION FT (MSL)	TIME CONVERSION	DAY	MONTH	YEAR	SID	STATION (TYPE, NAME, STATE)
42°14'N	83°20'N	633	+5	09	01	1997	DTW	ASOS DETROIT, MI

TYPE M/S	TIME (LST)	WIND				VISIBILITY		PRESENT WEATHER	SKY CONDITION	TEMP °C	DEW POINT °C	ALTI-METER INS.	REMARKS AND SUPPLEMENTAL CODED DATA
		DIR TRUE	SPD KTS	GUST KTS	VARIABILITY TRUE	SURFACE STATUTE MILES	RUNWAY VISUAL RANGE (FEET)						
1	2	3	4	5	6	7	8	9	10	11	12	13	14
M	0054	090	7			10			SCT120	-04	-09	A3009	SLP198 T10441089 11044 21056 56036 (MKE)
M	0154	090	8			10			OVC100	-04	-08	A3007	SLP190 T10391083 (MKE)
M	0254	070	8			10			BKN020 OVC080	-04	-08	A3003	SLP177 T10391078 (MKE)
M	0354	090	9			10			BKN020 OVC090	-03	-08	A2995	PRESFR SLP151 T10331078 58044 (MKE)
M	0454	060	8			10			FEW014 BKN020 OVC080	-04	-07	A2992	PRESFR SLP139 T10391072 (MKE)
S	0512	080	8			10			BKN012 OVC020	-04	-07	A2992	(MKE)
M	0554	070	15	18		10			OVC010	-04	-07	A2987	PRESFR SLP122 T10391067 (MKE)
S	0630	070	12	17		1 1/2M		-SN BR	BKN008 OVC013	-04	-07	A2983	SFC VIS 2 SNB02 PRESFR P0000 (MKE)
M	0654	070	13	18		1 1/4M		-SN BR	OVC006	-04	-06	A2982	TWR VIS 1 1/2 SNB02 PRESFR SLP107 P0000 600 00 T10441061 11033 21044 58043 (MKE)
S	0717	060	14	20		1 1/2M		-SN BR	OVC010	-04	-06	A2975	PRESFR P0000 (MKE)
M	0754	070	15	19		1 1/2M		-SN BR	BKN010 OVC029	-04	-06	A2972	PRESFR SLP073 P0000 T10441056 (EJB)
S	0819	040	12	18		2		-SN BR	OVC012	-04	-06	A2969	PRESFR P0000 (EJB)
S	0838	050	12			3		-SN BR	OVC010	-04	-06	A2966	TWR VIS 4 UPB31E34SNE31B34 PRESFR P0000 (EJ B)
M	0854	070	11			3		-SN BR	OVC010	-04	-06	A2967	TWR VIS 4 UPB31E34SNE31B34 PRESRR SLP057 P0 000 T10441061 (EJB)
S	0933	070	12	21		2		-SN BR	OVC012	-03	-04	A2964	PRESFR P0000 (EJB)
M	0954	060	18	24		2		-SN BR	OVC014	-03	-04	A2958	PRESFR SLP024 P0000 60000 T10281044 56076 (EJB)
S	0959	060	16	24		2		-FZRASN	OVC014	-03	-04	A2956	FZRAB57 PRESFR P0000 (EJB)
M	1054	070	13	21		2		-FZRASN	OVC012	-03	-05	A2952	FZRAB1457 PRESFR SLP005 P0000 T10331050 (EJ B)
S	1100	090	11	19		3/4		-FZRASN	OVC012	-03	-05	A2953	SFC VIS 1 P0000 (EJB)
S	1110	080	14	23		1/2		-FZRASN	FEW005 BKN012 OVC017	-03	-04	A2951	TWR VIS 3/4 P0000 (EJB)
S	1118	070	11	19		3/4		-SN	FEW005 BKN012 OVC017	-03	-04	A2951	FZRAE12 P0000 (EJB)
S	1144	070	13			3/4		-SN BR	BKN005 BKN012 OVC017	-03	-05	A2946	FZRAE12 PRESFR P0000 (EJB)
M	1154	070	18	25		3/4		-SN BR	BKN005 OVC014	-04	-05	A2944	FZRAE12 PRESFR SLP977 P0000 T10391050 (EJB)
S	1231	070	9			3/4		-SN BR	FEW005 OVC011	-04	-05	A2938	PK WND 07026/1659 PRESFR P0000 (EJB)
M	1254	070	11	17		3/4		-SN BR	SCT005 BKN011 OVC014	-04	-05	A2935	PK WND 07026/1659 PRESFR SLP946 4/002 P0000 60000 T10391050 11028 21044 58085 (EJB)
S	1344	070	11			1/2		SN	BKN004 BKN009 OVC013	-04	-05	A2928	PRESFR P0000 (EJB)
M	1354	060	9			1/2		SN	BKN006 OVC013	-04	-05	A2927	PRESFR SLP919 P0000 T10391050 (EJB)
S	1405	060	12			1/2		SN	BKN004 OVC008	-04	-04	A2926	PRESFR P0000 (EJB)
S	1433	040	7			1/2		-SN	FEW004 BKN008 OVC015	-03	-04	A2923	SFC VIS 3/4 PRESFR P0000 (EJB)
M	1454	040	7			1/2		SN	BKN006 OVC011	-03	-04	A2922	PRESFR SLP900 P0000 T10331044 (EJB)
S	1524	070	7			1/2		-SN	SCT006 BKN016 OVC023	-03	-04	A2921	SFC VIS 1 P0000 (EJB)
S	1526	070	6			1		-SN	SCT006 BKN014 OVC021	-03	-04	A2921	TWR VIS 1 1/2 P0000 (EJB)
S	1529	070	6			1 1/4M		-SN	SCT006 BKN016 OVC021	-03	-04	A2920	TWR VIS 1 1/2 P0000CNCL (EJB)
S	1540	070	5			1 1/2M		-SN BR	BKN006 BKN011 OVC021	-03	-04	A2919	SFC VIS 2 1/2 P0000 (TBA)
S	1541	060	6			1 1/2M		-SN BR	SCT006 BKN011 OVC019	-03	-03	A2919	SFC VIS 2 1/2 P0000CNCL (TBA)
M	1554	070	5			3/4		-SN BR	BKN006 BKN012 OVC017	-02	-03	A2919	TWR VIS 1 CIG 004V009 SLP891 P0000 60000 T1 0221033 56055 (TBA)
S	1603	080	3			1		-SN BR	SCT006 SCT009 OVC014	-02	-03	A2918	P0000 (TBA)
S	1606	080	3			1		-SN BR	FEW006 BKN009 OVC016	-02	-03	A2918	P0000CNCL (TBA)
S	1619	000	0			1		-SN BR	SCT006 BKN009 OVC014	-02	-03	A2917	SFC VIS 1 3/4 CIG 008V011 P0000 (TBA)
M	1654	150	3			1		BR	BKN007 OVC012	-02	-03	A2916	SFC VIS 3 SNE49 CIG 005V009 SLP880 P0000 T1 0221028 (TBA)
S	1704	160	3			1		-SN BR	FEW007 OVC012	-02	-03	A2915	SFC VIS 2 1/2 SNB01 P0000 (TBA)
S	1739	200	15			4		-SN BR	SCT010 OVC015	-02	-03	A2915	SNB01 P0000 (TBA)
M	1754	210	16			7		-SN	OVC014	-02	-03	A2916	SNB01 SLP880 P0000 T10171033 (TBA)

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Table 1a cont'd

UNEDITED SURFACE WEATHER OBSERVATIONS (METAR/SPEC)	LATITUDE	LONGITUDE	STATION ELEVATION FT. (MSL)	TIME CONVERSION	DAY	MONTH	YEAR	SID	STATION (TYPE, NAME, STATE)
	42°14'N	83°20'N	633	+5	09	01	1997	DTW	ASOS DETROIT, MI

TYPE M/S	TIME (LST)	WIND				VISIBILITY		PRESENT WEATHER	SKY CONDITION	TEMP	DEW POINT	ALTIMETER	REMARKS AND SUPPLEMENTAL CODED DATA
		DIR TRUE	SPD KTS	GUST KTS	VARIABILITY TRUE	SURFACE STATUTE MILES	RUNWAY VISUAL RANGE (FEET)			°C	°C	INS.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
M	1854	220	21	27		1 3/4M		-SN BLSN	BKN017 OVC021	-02	-04	A2916	PK WND 22027/2333 TWR VIS 3 PEB32E47 SLP881 4/004 P0000 60000 T10221044 11017 21039 550
S	1904	220	17			3		-SN BLSN	BKN017 OVC023	-03	-04	A2916	SFC VIS 4 P0000 (TBA)
S	1918	220	22			2		-SN	BKN017 OVC022	-03	-05	A2916	TWR VIS 3 P0000 (TBA)
S	1925	210	18	29		1 1/2M		-SN	BKN017 OVC024	-03	-05	A2916	PK WND 21029/0019 TWR VIS 2 1/2 P0000 (TBA)
M	1954	220	18			1		-SN BR	SCT010 OVC018	-03	-04	A2916	PK WND 21029/0019 TWR VIS 2 1/2 SLP881 P0000 T10331044 (TBA)
S	1958	220	18			1		-SN BR	SCT007 BKN014 OVC018	-03	-04	A2916	P0000 (TBA)
S	2044	220	19	25		3		-SN BR	OVC015	-03	-05	A2916	TWR VIS 4 P0000 (TBA)
M	2054	220	21			7		-SN	BKN015 OVC024	-03	-06	A2916	SLP883 P0000 T10331056 (TBA)
S	2104	220	20			2 1/2M		-SN BR	BKN017 OVC022	-03	-06	A2916	TWR VIS 4 P0000 (TBA)
M	2154	230	18	26		3		-SN BR	BKN017 BKN025 OVC030	-04	-06	A2917	PK WND 22026/0250 TWR VIS 4 SLP884 P0000 60000 T10391061 53002 (TBA)
M	2254	240	18	25		10			BKN022 BKN028 OVC065	-04	-08	A2918	PK WND 24031/0259 SLP887 SNE41 P0000 T10441078 (TBA)
M	2354	240	18			10			OVC022	-04	-08	A2919	PK WND 23027/0405 SLP892 P0000 T10441083 41017 1050 (TBA)
									*** End of File ***				

Table 1a cont'd

UNEDITED SURFACE WEATHER OBSERVATIONS (METAR/SPEC)

LATITUDE	LONGITUDE	STATION ELEVATION FT. (MSL)	TIME CONVERSION	DAY	MONTH	YEAR	SID	STATION (TYPE, NAME, STATE)
42°14'N	83°20'N	633	+5	09	01	1997	DTW	ASOS DETROIT, MI

TIME LST	TOTAL SKY COVER (0-8)	TEMP. DRY-BULB	DEW POINT	TEMP. WET BULB	RELATIVE HUMIDITY (%)	STATION PRESSURE (INS)	PRESSURE TENDENCY	NET 3-HR CHANGE	HOURLY PRECIPITATION (INS)	HR
16	17	18	19	20	21	22	23	24	25	
0054		-4.4	-6.9	-5.8	71	29.41	6	036	0.00	00-01
0154		-3.9	-6.3	-5.3	72	29.39			0.00	01-02
0254		-3.9	-7.8	-5.1	75	29.35			0.00	02-03
0354		-3.3	-7.8	-4.7	71	29.27	8	044	0.00	03-04
0454		-3.9	-7.2	-5.0	78	29.24			0.00	04-05
0554		-3.9	-6.7	-4.8	81	29.19			0.00	05-06
0654		-4.4	-6.1	-5.0	88	29.14	8	043	T	06-07
0754		-4.4	-5.6	-4.8	91	29.05			T	07-08
0854		-4.4	-6.1	-5.0	88	29.00			T	08-09
0954		-2.8	-4.4	-3.4	89	28.91	6	076	T	09-10
1054		-3.3	-5.0	-3.9	88	28.85			T	10-11
1154		-3.9	-5.0	-4.3	92	28.77			T	11-12
1254		-3.9	-5.0	-4.3	92	28.68	8	085	T	12-13
1354		-3.9	-5.0	-4.3	92	28.60			T	13-14
1454		-3.3	-4.4	-3.7	92	28.55			T	14-15
1554		-2.2	-3.3	-2.6	92	28.52	6	055	T	15-16
1654		-2.2	-2.8	-2.4	96	28.50			T	16-17
1754		-1.7	-3.3	-2.3	89	28.50			T	17-18
1854		-2.2	-4.4	-3.0	85	28.50	5	008	T	18-19
1954		-3.3	-4.4	-3.7	92	28.50			T	19-20
2054		-3.3	-5.6	-4.1	84	28.50			T	20-21
2154		-3.9	-6.1	-4.6	85	28.51	3	002	T	21-22
2254		-4.4	-7.8	-5.5	77	28.52			T	22-23
2354		-4.4	-8.3	-5.6	75	28.52			T	23-24

SYNOPTIC DATA

TIME	NO	LOW CLOUD TYPE	MID CLOUD TYPE	HIGH CLOUD TYPE	MAX TEMP (.1 C)	MIN TEMP (.1 C)	PRECIP (INS)	SNOW FALL (INS)	SNOW DEPTH (INS)	STATION PRESSURE (INS)	BAROGRAPH	BARR CORR	LOCAL USE
26	27	28	29	30	31	32	33	34	35	36	37	38	39

WEATHER AND OBSTRUCTION TO VISION

TYPE	BEGIN	ENDED	TYPE	BEGIN	ENDED	TYPE	BEGIN	ENDED	TYPE	BEGIN	ENDED
40	41	42	40	41	42	40	41	42	40	41	42
-FZRA	1050	1115	-SN	1750	1755						
-SN	1115	1255	-SN	1805	1835						
BR	1130	1155	BR	1835	1850						
FZFG	1155	1200	BLSN	1850	1915						
BR	1200	1255	-SN	1850	2050						
SN	1255	1300	BR	1940	2050						
FZFG	1255	1300	UP	2050	2055						
-SN	1300	1340	-SN	2055	2245						
BR	1300	1340	BR	2100	2155						
FZFG	1340	1345	-RA	2305	2310						
SN	1340	1355									
-SN	1355	1400									
SN	1400	1425									
-SN	1425	1455									
SN	1455	1505									
-SN	1505	1650									
BR	1535	1550									
BR	1600	1755									
-SN	1705	1745									

SUMMARY OF THE DAY (MIDNIGHT TO MIDNIGHT)

PEAK WINDS			FASTEST 2-MIN WIND			SUNRISE TIME (LST)	SUNSET TIME (LST)	TOTAL SUNSHINE (MIN)	PERCENT PSBL SUNSHINE	CHARACTER SUNRISE	CHARACTER SUNSET	SKY COVER		24-HR MAX TEMP. (0.1 C)	24-HR MIN TEMP. (0.1 C)	24-HR PRECIP. WATER EQUIV (INS)	24-HR SNOW-FALL UNMLTD	1200 UTC SNOW DEPTH (INS)	WATER EQUIV. (INS)	STATION PRESSURE	SEA LEVEL PRESSURE
SPEED (KTS)	DIREC-TION	TIME (LST)	SPEED (KTS)	DIREC-TION	TIME (LST)							SUNRISE TO SUNSET	MIDNIGHT TO MIDNIGHT								
43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
36	240	2210	30	230	2211			M	M					-1.7	-5.0	T					

REMARKS, NOTES AND MISCELLANOUS PHENOMENA 65 :

TIME CHECK-CLOCK CORRECT TO THE NEAREST MINUTE AT: / / /

table 1b

SURFACE WEATHER OBSERVATIONS (METAR/SPECI)

LATITUDE: 42° 13' N | LONGITUDE: 83° 45' W | STATION ELEVATION PL (MSL): 839 | TIME CONVERSION (LST to UTC): 5 | DAY: 09 | MONTH: 01 | YEAR: 97 | SID: KARB | STATION (Type, Name, State): ATCT, ANN ARBOR, MI

TYPE MOD (1)	TIME LST/UTC (2)	WIND DIRECTION (True) (3)	WIND SPEED (Knots) (4)	WIND GUST (Knots) (5)	WIND VARIABILITY (True) (6)	VISIBILITY SURFACE (7a)	VISIBILITY TOWER (7b)	VISIBILITY RUNWAY VISUAL RANGE (Feet) (8)	PRESENT WEATHER (9)	SKY CONDITION (10)	TEMP (°C) (11)	DEW POINT (°C) (12)	ALTIMETER SETTING (Ins.) (13)	REMARKS AND SUPPLEMENTAL CODED DATA (14)	TOTAL SKY COVER (0-8) (17)	TEMP. DRY BULB (0.1 °C) (19)	TEMP. WET BULB (0.1 °C) (20)	STATION PRESSURE (Ins.) (22)
M	1247	080	14	23		2			-SN	OVC 013			2973		8			
M	1347	070	12	20		5			-SN	SCT012 BKN020 OVC030			2968		8			
S	1423	070	12	20		2			-SN	OVC010			2965		8			
M	1452	070	15	24		1			-SN BR	OVC010			2958		8			
M	1547	060	12	19		3/4			-SN BR	SCT009 BKN012 OVC019			2951		8			
M	1648	070	10			1 1/4			-SN BR	OVC010			2946		8			
M	1749	070	10	19		1			-SN BR	OVC014			2935	PRESFR	8			
S	1830	060	12			4			-SN BR	OVC012			2931		8			
M	1847	070	15			1			-SN BR	OVC010			2929		8			
M	1947	080	13			(1)			-SN BR	(BKN010 OVC030)			2923		8			
M	2053	080	08			(4)			-SN BR	(FEW006 OVC020)			2920		8			
S	2121	100	08			2 1/2			-SN BR	BKN016 OVC021			2918		8			
M	2150	110	05			1 1/2			-SN BR	OVC011			2917		8			
M	2250	210	08			5			-SN BR	OVC016			2916		8			
M	2345	220	15			5			-SN BR	OVC015			2916		8			
M	0045	240	18			3			-SN BR	OVC025			2917	LAST	8			
S	0058	240	18			1			-SN BR	OVC022			2917	LAST	8			

TIME LST/UTC (28)	NO.	PRECIP. (Ins.) (33)	SNOW FALL (Ins.) (34)	SNOW DEPTH (Ins.) (35)	MAX. TEMP. (0.1 °C) (31)	MIN. TEMP. (0.1 °C) (32)	STATION PRESSURE (36)	BAROGRAPH (37)	BARO. CORR. (38)
MID. TO	(27)								
	1								
	2								
	3								
	4								
MID									

SUMMARY OF DAY (Midnight to Midnight)

24-HR. MAXIMUM TEMP. (0.1 °C) (57)	24-HR. MINIMUM TEMP. (0.1 °C) (58)	24-HR. PRECIP. WATER EQUIV. (Ins.) (59)	24-HR. SNOWFALL UNSETTD. (Ins.) (60)	1200 UTC SNOW DEPTH (Ins.) (61)

REMARKS, NOTES AND MISCELLANEOUS PHENOMENA (65)

TIMECHECK - CLOCK CORRECT TO NEAREST MINUTE AT: / / /

Table 1b cont'd

SURFACE WEATHER OBSERVATIONS (METAR/SPECI)

LATITUDE: 42° 13' N | LONGITUDE: 83° 45' W | STATION ELEVATION Ft. (MSL): 839 | TIME CONVERSION (LST to UTC): 5 Hrs. | DAY: 10 | MONTH: 01 | YEAR: 97 | WBAN: KARB | STATION (Type, Name, State): ATCT, ANN ARBOR, MI

TYPE (1)	TIME LST/UTC (2)	WIND: DIRECTION (Tens) (3)	WIND: SPEED (Knots) (4)	WIND: GUST (Knots) (5)	WIND: VARIABILITY (Tens) (6)	VISIBILITY: SURFACE (7a)	VISIBILITY: TOWER (7b)	RUNWAY VISUAL RANGE (Feet) (8)	PRESENT WEATHER (9)	SKY CONDITION (10)	TEMP (°C) (11)	DEW POINT (°C) (12)	ALTIMETER SETTING (Ins.) (13)	REMARKS AND SUPPLEMENTAL CODED DATA (14)	TOTAL SKY COVER (15-8) (17)	TEMP. DRY BULB (0.1°C) (19)	TEMP. WET BULB (0.1°C) (20)	STATION PRESSURE (Ins.) (22)
M	1256	250	10			1¾			-SN	OVC015			2920		8			
M	1346	250	12			1¾			-SN	OVC030			2921		8			
M	1446	260	13			1¾			-SN BR	BKN025 OVC035			2922		8			
M	1545	2305	G21			¾			-SN BR	BKN010 OVC020			2924		8			
S	1620	2605	G25			10				BKN015			2925		7			
M	1650	2405	G26			7				SCT015 BKN020 BKN080			2926		7			
M	1755	2402	G28			7				BKN020 BKN100			2928		7			
M	1845	2402	G28			7			BLSN	SCT020 BKN100			2928		7			
M	1945	2402	G30			8			BL SN	SCT020 BKN045 OVC080			2930		8			
M	2050	2402	G30			10			BLSN	BKN045 BKN080			2935		7			
M	2150	2302	30			7			BLSN	SCT030 OVC042			2938		8			
M	2245	2304	30			2½			-SN BR	BKN024 OVC046			2940		8			
S	2301	2305	32			1			-SN BR	BKN024 OVC044			2941		8			
M	2345	2402				1½			-SN BLSN	BKN016 OVC025			2944		8			
M	0045	2402	15	20		2½			-SN BLSN	OVC040			2946	LAST	8			

TIME ☐ LST ☐ UTC (23)	NO.	PRECIP. (Ins.) (33)	SNOW FALL (Ins.) (34)	SNOW DEPTH (Ins.) (35)	MAX. TEMP. (0.1°C) (31)	MIN. TEMP. (0.1°C) (32)	STATION PRESSURE (30)	BAROGRAPH (37)	BARO. CORR. (38)
MTD. TD (27)									
	1								
	2								
	3								
	4								
RTD									

SUMMARY OF DAY (Midnight to Midnight)

24-HR. MAXIMUM TEMP. (0.1°C) (57)	24-HR. MINIMUM TEMP. (0.1°C) (58)	24-HR. PRECIP. WATER EQUIV. (Ins.) (59)	24-HR. SNOWFALL UNRLTD. (Ins.) (60)	1200 UTC SNOW DEPTH (Ins.) (61)

REMARKS, NOTES AND MISCELLANEOUS PHENOMENA (65)

TIMECHECK – CLOCK CORRECT TO NEAREST MINUTE AT: / / /

MF1M-10C (1-96) (PRESCRIBED BY FMH-1) | U.S. DEPARTMENT OF COMMERCE, NOAA, NATIONAL WEATHER SERVICE | (SUPERSEDES MF1-10C – PREVIOUS VERSIONS OB

*U.S.GPO:1996-410-0

Table 2a

Data Type: WMO SOUNDING
Project ID: WMO SOUNDING, DETROIT/PONTIAC
Launch Site Type/Site ID: FIXED, DTX [72632]
Launch Location (lon,lat,alt): 83 28.00W, 42 42.00N, -83.4667, 42.7000, 360
GMT Launch Time (y,m,d,h,m,s): 1997, 01, 10, 00:00:00 [nominal]
Sonde Type/ID/Sensor ID/Tx Freq: NOT AVAILABLE
Met Processor/Met Smoothing: NOT AVAILABLE
Winds Type/Processor/Smoothing: NOT AVAILABLE
Pre-launch Surface Obs Source: NOT AVAILABLE
System Operator/Comments: WMO SOUNDING IN CLASS FORMAT
/
/

Time sec	Press mb	Temp C	Dewpt C	RH %	Uwind m/s	Vwind m/s	Wspd m/s	Dir deg	dZ m/s	Lon deg	Lat deg	Rng km	Ang deg	Alt m	Qp mb	Qt C	Qh %	Qu m/s	Qv m/s	Quv m/s
1.0	1000.0	999.0	999.0	999.0	999.0	999.0	999.0	999.0	99.0	-83.46667	42.70000	999.0	999.0	-93.0	99.0	99.0	99.0	99.0	99.0	99.0
2.0	948.0	-5.7	-6.7	92.6	1.6	1.3	2.1	230.0	99.0	-83.46667	42.70000	999.0	999.0	360.0	99.0	99.0	99.0	99.0	99.0	99.0
3.0	944.0	-4.7	-7.6	80.1	1.5	1.7	2.3	222.0	99.0	-83.46667	42.70000	999.0	999.0	377.4	99.0	99.0	99.0	99.0	99.0	99.0
4.0	925.0	-4.7	-5.1	97.0	1.2	3.4	3.6	200.0	99.0	-83.46667	42.70000	999.0	999.0	521.0	99.0	99.0	99.0	99.0	99.0	99.0
5.0	914.7	-5.3	-5.6	97.1	0.4	4.1	4.1	185.0	99.0	-83.46667	42.70000	999.0	999.0	609.6	99.0	99.0	99.0	99.0	99.0	99.0
6.0	879.7	-7.1	-7.5	97.4	-2.6	5.6	6.2	155.0	99.0	-83.46667	42.70000	999.0	999.0	914.4	99.0	99.0	99.0	99.0	99.0	99.0
7.0	850.0	-8.7	-9.0	97.7	-3.9	6.7	7.7	150.0	99.0	-83.46667	42.70000	999.0	999.0	1181.0	99.0	99.0	99.0	99.0	99.0	99.0
8.0	846.0	-8.8	-9.1	97.6	-4.1	7.1	8.2	150.0	99.0	-83.46667	42.70000	999.0	999.0	1219.2	99.0	99.0	99.0	99.0	99.0	99.0
9.0	781.7	-10.6	-11.0	96.6	-3.5	9.7	10.3	160.0	99.0	-83.46667	42.70000	999.0	999.0	1828.8	99.0	99.0	99.0	99.0	99.0	99.0
10.0	700.0	-12.9	-13.5	95.2	0.9	15.1	15.2	183.5	99.0	-83.46667	42.70000	999.0	999.0	2674.0	99.0	99.0	99.0	99.0	99.0	99.0
11.0	649.0	-15.9	-18.0	83.9	3.7	18.6	18.9	191.3	99.0	-83.46667	42.70000	999.0	999.0	3249.2	99.0	99.0	99.0	99.0	99.0	99.0
12.0	614.5	-19.1	-26.9	50.1	5.6	20.9	21.6	195.0	99.0	-83.46667	42.70000	999.0	999.0	3657.6	99.0	99.0	99.0	99.0	99.0	99.0
13.0	583.0	-22.1	-35.1	29.8	5.5	20.6	21.3	195.0	99.0	-83.46667	42.70000	999.0	999.0	4045.2	99.0	99.0	99.0	99.0	99.0	99.0
14.0	565.5	-24.1	-35.1	35.5	5.5	20.4	21.1	195.0	99.0	-83.46667	42.70000	999.0	999.0	4267.2	99.0	99.0	99.0	99.0	99.0	99.0
15.0	519.6	-29.4	-35.2	57.4	5.3	19.9	20.6	195.0	99.0	-83.46667	42.70000	999.0	999.0	4876.8	99.0	99.0	99.0	99.0	99.0	99.0
16.0	500.0	-31.7	-35.2	71.1	3.5	19.8	20.1	190.0	99.0	-83.46667	42.70000	999.0	999.0	5150.0	99.0	99.0	99.0	99.0	99.0	99.0
17.0	485.0	-33.3	-35.7	78.9	3.4	19.1	19.4	190.0	99.0	-83.46667	42.70000	999.0	999.0	5365.9	99.0	99.0	99.0	99.0	99.0	99.0
18.0	476.8	-34.0	-38.1	66.2	3.3	18.7	19.0	190.0	99.0	-83.46667	42.70000	999.0	999.0	5486.4	99.0	99.0	99.0	99.0	99.0	99.0
19.0	475.0	-34.1	-38.6	63.7	3.4	18.6	18.9	190.2	99.0	-83.46667	42.70000	999.0	999.0	5513.6	99.0	99.0	99.0	99.0	99.0	99.0
20.0	459.0	-34.1	-49.1	20.5	3.8	17.7	18.1	192.1	99.0	-83.46667	42.70000	999.0	999.0	5754.2	99.0	99.0	99.0	99.0	99.0	99.0
21.0	437.1	-35.5	-51.5	17.9	4.4	16.4	17.0	195.0	99.0	-83.46667	42.70000	999.0	999.0	6096.0	99.0	99.0	99.0	99.0	99.0	99.0
22.0	413.0	-37.1	-54.1	15.4	4.5	16.7	17.3	195.0	99.0	-83.46667	42.70000	999.0	999.0	6489.0	99.0	99.0	99.0	99.0	99.0	99.0
23.0	400.0	-37.3	-54.3	15.3	4.5	16.9	17.5	195.0	99.0	-83.46667	42.70000	999.0	999.0	6710.0	99.0	99.0	99.0	99.0	99.0	99.0
24.0	369.0	-37.1	-54.1	15.4	6.0	15.7	16.8	201.1	99.0	-83.46667	42.70000	999.0	999.0	7265.1	99.0	99.0	99.0	99.0	99.0	99.0
25.0	350.4	-38.1	-55.1	15.1	7.0	14.9	16.5	205.0	99.0	-83.46667	42.70000	999.0	999.0	7620.0	99.0	99.0	99.0	99.0	99.0	99.0
26.0	335.1	-38.9	-55.9	14.9	7.7	13.4	15.4	210.0	99.0	-83.46667	42.70000	999.0	999.0	7924.8	99.0	99.0	99.0	99.0	99.0	99.0
27.0	300.0	-40.7	-57.7	14.4	16.6	19.7	25.8	220.1	99.0	-83.46667	42.70000	999.0	999.0	8680.0	99.0	99.0	99.0	99.0	99.0	99.0
28.0	256.1	-42.8	-58.9	15.4	27.6	27.6	39.1	225.0	99.0	-83.46667	42.70000	999.0	999.0	9753.6	99.0	99.0	99.0	99.0	99.0	99.0
29.0	250.0	-43.1	-59.1	15.5	26.9	26.9	38.1	225.0	99.0	-83.46667	42.70000	999.0	999.0	9920.0	99.0	99.0	99.0	99.0	99.0	99.0
30.0	223.6	-44.8	-60.8	15.0	28.4	28.4	40.1	225.0	99.0	-83.46667	42.70000	999.0	999.0	10668.0	99.0	99.0	99.0	99.0	99.0	99.0
31.0	204.0	-46.0	-62.0	14.6	28.0	28.0	39.6	225.0	99.0	-83.46667	42.70000	999.0	999.0	11277.6	99.0	99.0	99.0	99.0	99.0	99.0
32.0	200.0	-46.3	-62.3	14.6	28.7	28.7	40.6	225.0	99.0	-83.46667	42.70000	999.0	999.0	11410.0	99.0	99.0	99.0	99.0	99.0	99.0
33.0	186.2	-47.2	-63.0	14.8	35.6	35.7	50.4	225.0	99.0	-83.46667	42.70000	999.0	999.0	11887.2	99.0	99.0	99.0	99.0	99.0	99.0
34.0	177.8	-47.8	-63.4	15.0	29.8	29.8	42.2	225.0	99.0	-83.46667	42.70000	999.0	999.0	12192.0	99.0	99.0	99.0	99.0	99.0	99.0
35.0	154.7	-49.4	-64.5	15.4	37.4	31.4	48.9	230.0	99.0	-83.46667	42.70000	999.0	999.0	13106.4	99.0	99.0	99.0	99.0	99.0	99.0
36.0	150.0	-49.7	-64.7	15.5	37.0	31.1	48.4	230.0	99.0	-83.46667	42.70000	999.0	999.0	13310.0	99.0	99.0	99.0	99.0	99.0	99.0
37.0	139.0	-49.1	-64.1	15.7	35.6	29.9	46.5	230.0	99.0	-83.46667	42.70000	999.0	999.0	13808.1	99.0	99.0	99.0	99.0	99.0	99.0
38.0	113.0	-55.3	-69.3	15.9	32.1	27.0	41.9	230.0	99.0	-83.46667	42.70000	999.0	999.0	15150.3	99.0	99.0	99.0	99.0	99.0	99.0
39.0	111.4	-55.3	-69.3	15.9	31.9	26.8	41.7	230.0	99.0	-83.46667	42.70000	999.0	999.0	15240.0	99.0	99.0	99.0	99.0	99.0	99.0
40.0	101.3	-55.3	-69.3	15.9	33.9	28.4	44.2	230.0	99.0	-83.46667	42.70000	999.0	999.0	15849.6	99.0	99.0	99.0	99.0	99.0	99.0
41.0	100.0	-55.3	-69.3	15.9	33.9	28.4	44.2	230.0	99.0	-83.46667	42.70000	999.0	999.0	15930.0	99.0	99.0	99.0	99.0	99.0	99.0
42.0	96.5	-56.1	-70.1	15.7	32.7	27.4	42.7	230.0	99.0	-83.46667	42.70000	999.0	999.0	16154.4	99.0	99.0	99.0	99.0	99.0	99.0
43.0	93.9	-56.7	-70.7	15.5	999.0	999.0	999.0	999.0	99.0	-83.46667	42.70000	999.0	999.0	16331.1	99.0	99.0	99.0	99.0	99.0	99.0

Table 2b

Data Type: WMO SOUNDING
Project ID: WMO SOUNDING, WILMINGTON
Launch Site Type/Site ID: FIXED, ILN [72426]
Launch Location (lon,lat,alt): 83 48.00W, 39 26.00N, -83.8000, 39.4333, 323
GMT Launch Time (y,m,d,h,m,s): 1997, 01, 10, 00:00:00 [nominal]
Sonde Type/ID/Sensor ID/Tx Freq: NOT AVAILABLE
Met Processor/Met Smoothing: NOT AVAILABLE
Winds Type/Processor/Smoothing: NOT AVAILABLE
Pre-launch Surface Obs Source: NOT AVAILABLE
System Operator/Comments: WMO SOUNDING IN CLASS FORMAT
/
/

Time sec	Press mb	Temp C	Dewpt C	RH %	Uwind m/s	Vwind m/s	Wspd m/s	Dir deg	dZ m/s	Lon deg	Lat deg	Rng km	Ang deg	Alt m	Qp mb	Qt C	Qh %	Qu m/s	Qv m/s	Quv m/s
1.0	1000.0	999.0	999.0	999.0	999.0	999.0	999.0	999.0	99.0	-83.80000	39.43333	999.0	999.0	-29.0	99.0	99.0	99.0	99.0	99.0	99.0
2.0	957.0	-1.5	-4.5	80.0	12.1	4.4	12.9	250.0	99.0	-83.80000	39.43333	999.0	999.0	323.0	99.0	99.0	99.0	99.0	99.0	99.0
3.0	925.0	-4.3	-5.4	92.0	18.3	10.5	21.1	240.0	99.0	-83.80000	39.43333	999.0	999.0	592.0	99.0	99.0	99.0	99.0	99.0	99.0
4.0	923.0	-4.4	-5.5	92.3	18.3	10.5	21.1	240.0	99.0	-83.80000	39.43333	999.0	999.0	609.6	99.0	99.0	99.0	99.0	99.0	99.0
5.0	892.0	-6.7	-7.1	97.0	17.8	12.2	21.5	235.6	99.0	-83.80000	39.43333	999.0	999.0	876.8	99.0	99.0	99.0	99.0	99.0	99.0
6.0	887.7	-6.9	-7.3	97.0	17.7	12.4	21.6	235.0	99.0	-83.80000	39.43333	999.0	999.0	914.4	99.0	99.0	99.0	99.0	99.0	99.0
7.0	853.6	-8.3	-8.7	96.9	17.7	14.9	23.2	230.0	99.0	-83.80000	39.43333	999.0	999.0	1219.2	99.0	99.0	99.0	99.0	99.0	99.0
8.0	850.0	-8.5	-8.9	96.9	17.7	14.9	23.2	230.0	99.0	-83.80000	39.43333	999.0	999.0	1252.0	99.0	99.0	99.0	99.0	99.0	99.0
9.0	810.0	-11.1	-11.7	95.3	21.9	14.2	26.1	237.0	99.0	-83.80000	39.43333	999.0	999.0	1626.1	99.0	99.0	99.0	99.0	99.0	99.0
10.0	794.0	-10.1	-10.7	95.4	23.6	14.0	27.4	239.3	99.0	-83.80000	39.43333	999.0	999.0	1781.4	99.0	99.0	99.0	99.0	99.0	99.0
11.0	789.1	-10.4	-11.0	95.1	24.1	13.9	27.8	240.0	99.0	-83.80000	39.43333	999.0	999.0	1828.8	99.0	99.0	99.0	99.0	99.0	99.0
12.0	776.0	-11.1	-11.8	94.6	24.3	12.9	27.5	242.1	99.0	-83.80000	39.43333	999.0	999.0	1957.9	99.0	99.0	99.0	99.0	99.0	99.0
13.0	762.0	-9.5	-10.1	95.4	24.6	11.8	27.3	244.4	99.0	-83.80000	39.43333	999.0	999.0	2097.9	99.0	99.0	99.0	99.0	99.0	99.0
14.0	758.4	-9.7	-10.4	94.4	24.7	11.5	27.3	245.0	99.0	-83.80000	39.43333	999.0	999.0	2133.6	99.0	99.0	99.0	99.0	99.0	99.0
15.0	728.9	-11.1	-12.9	86.7	23.3	10.9	25.7	245.0	99.0	-83.80000	39.43333	999.0	999.0	2438.4	99.0	99.0	99.0	99.0	99.0	99.0
16.0	700.4	-12.5	-15.3	79.7	20.9	12.1	24.2	240.0	99.0	-83.80000	39.43333	999.0	999.0	2743.2	99.0	99.0	99.0	99.0	99.0	99.0
17.0	700.0	-12.5	-15.3	79.6	20.9	12.1	24.2	240.0	99.0	-83.80000	39.43333	999.0	999.0	2747.0	99.0	99.0	99.0	99.0	99.0	99.0
18.0	690.0	-12.9	-15.9	78.2	21.4	12.7	24.9	239.2	99.0	-83.80000	39.43333	999.0	999.0	2858.5	99.0	99.0	99.0	99.0	99.0	99.0
19.0	667.0	-14.9	-22.9	50.5	22.4	14.2	26.5	237.7	99.0	-83.80000	39.43333	999.0	999.0	3116.1	99.0	99.0	99.0	99.0	99.0	99.0
20.0	637.0	-17.1	-23.1	59.6	23.7	16.1	28.7	235.9	99.0	-83.80000	39.43333	999.0	999.0	3463.3	99.0	99.0	99.0	99.0	99.0	99.0
21.0	620.7	-18.3	-26.1	50.7	24.4	17.1	29.8	235.0	99.0	-83.80000	39.43333	999.0	999.0	3657.6	99.0	99.0	99.0	99.0	99.0	99.0
22.0	571.6	-22.1	-35.0	30.0	29.4	17.0	34.0	240.0	99.0	-83.80000	39.43333	999.0	999.0	4267.2	99.0	99.0	99.0	99.0	99.0	99.0
23.0	571.0	-22.1	-35.1	29.8	29.5	17.0	34.1	240.0	99.0	-83.80000	39.43333	999.0	999.0	4275.4	99.0	99.0	99.0	99.0	99.0	99.0
24.0	525.8	-25.2	-36.5	34.2	36.5	21.1	42.2	240.0	99.0	-83.80000	39.43333	999.0	999.0	4876.8	99.0	99.0	99.0	99.0	99.0	99.0
25.0	519.0	-25.7	-36.7	35.0	36.5	22.2	42.7	238.6	99.0	-83.80000	39.43333	999.0	999.0	4971.2	99.0	99.0	99.0	99.0	99.0	99.0
26.0	500.0	-27.9	-40.9	27.8	36.2	25.4	44.2	235.0	99.0	-83.80000	39.43333	999.0	999.0	5240.0	99.0	99.0	99.0	99.0	99.0	99.0
27.0	443.1	-35.2	-46.5	30.4	37.1	26.0	45.3	235.0	99.0	-83.80000	39.43333	999.0	999.0	6096.0	99.0	99.0	99.0	99.0	99.0	99.0
28.0	431.0	-36.7	-47.7	31.1	40.7	30.7	50.9	233.0	99.0	-83.80000	39.43333	999.0	999.0	6291.4	99.0	99.0	99.0	99.0	99.0	99.0
29.0	406.0	-35.9	-51.7	18.1	48.1	40.3	62.8	230.0	99.0	-83.80000	39.43333	999.0	999.0	6705.6	99.0	99.0	99.0	99.0	99.0	99.0
30.0	400.0	-35.7	-52.7	15.8	48.9	41.0	63.8	230.0	99.0	-83.80000	39.43333	999.0	999.0	6810.0	99.0	99.0	99.0	99.0	99.0	99.0
31.0	370.0	-33.5	-51.5	14.6	65.0	62.6	90.3	226.1	99.0	-83.80000	39.43333	999.0	999.0	7358.1	99.0	99.0	99.0	99.0	99.0	99.0
32.0	356.4	-34.6	-52.4	14.7	72.4	72.4	102.4	225.0	99.0	-83.80000	39.43333	999.0	999.0	7620.0	99.0	99.0	99.0	99.0	99.0	99.0
33.0	300.0	-38.9	-55.9	14.9	999.0	999.0	999.0	999.0	99.0	-83.80000	39.43333	999.0	999.0	8810.0	99.0	99.0	99.0	99.0	99.0	99.0
34.0	282.0	-42.1	-58.1	15.8	999.0	999.0	999.0	999.0	99.0	-83.80000	39.43333	999.0	999.0	9228.0	99.0	99.0	99.0	99.0	99.0	99.0
35.0	250.0	-42.5	-58.5	15.7	999.0	999.0	999.0	999.0	99.0	-83.80000	39.43333	999.0	999.0	10040.0	99.0	99.0	99.0	99.0	99.0	99.0
36.0	200.0	-45.1	-61.1	14.9	999.0	999.0	999.0	999.0	99.0	-83.80000	39.43333	999.0	999.0	11540.0	99.0	99.0	99.0	99.0	99.0	99.0
37.0	189.0	-44.5	-60.5	15.1	999.0	999.0	999.0	999.0	99.0	-83.80000	39.43333	999.0	999.0	11921.0	99.0	99.0	99.0	99.0	99.0	99.0
38.0	150.0	-49.3	-64.3	15.7	999.0	999.0	999.0	999.0	99.0	-83.80000	39.43333	999.0	999.0	13450.0	99.0	99.0	99.0	99.0	99.0	99.0
39.0	117.0	-59.3	-72.3	17.0	999.0	999.0	999.0	999.0	99.0	-83.80000	39.43333	999.0	999.0	15045.2	99.0	99.0	99.0	99.0	99.0	99.0
40.0	100.0	-57.3	-70.3	17.7	999.0	999.0	999.0	999.0	99.0	-83.80000	39.43333	999.0	999.0	16030.0	99.0	99.0	99.0	99.0	99.0	99.0
41.0	90.6	-60.1	-73.1	16.7	999.0	999.0	999.0	999.0	99.0	-83.80000	39.43333	999.0	999.0	16650.0	99.0	99.0	99.0	99.0	99.0	99.0
42.0	79.2	-63.5	-75.5	18.1	999.0	999.0	999.0	999.0	99.0	-83.80000	39.43333	999.0	999.0	17483.7	99.0	99.0	99.0	99.0	99.0	99.0
43.0	75.6	-61.5	-74.5	16.2	999.0	999.0	999.0	999.0	99.0	-83.80000	39.43333	999.0	999.0	17769.7	99.0	99.0	99.0	99.0	99.0	99.0
44.0	70.0	-65.3	-77.3	17.5	999.0	999.0	999.0	999.0	99.0	-83.80000	39.43333	999.0	999.0	18240.0	99.0	99.0	99.0	99.0	99.0	99.0
45.0	58.5	-61.5	-74.5	16.2	999.0	999.0	999.0	999.0	99.0	-83.80000	39.43333	999.0	999.0	19337.0	99.0	99.0	99.0	99.0	99.0	99.0
46.0	51.2	-65.1	-77.1	17.6	999.0	999.0	999.0	999.0	99.0	-83.80000	39.43333	999.0	999.0	20156.4	99.0	99.0	99.0	99.0	99.0	99.0
47.0	50.0	-64.1	-76.1	17.9	999.0	999.0	999.0	999.0	99.0	-83.80000	39.43333	999.0	999.0	20300.0	99.0	99.0	99.0	99.0	99.0	99.0
48.0	46.2	-62.1	-74.1	18.6	999.0	999.0	999.0	999.0	99.0	-83.80000	39.43333	999.0	999.0	20792.8	99.0	99.0	99.0	99.0	99.0	99.0
49.0	34.5	-61.1	-74.1	16.4	999.0	999.0	999.0	999.0	99.0	-83.80000	39.43333	999.0	999.0	22591.7	99.0	99.0	99.0	99.0	99.0	99.0
50.0	30.0	-63.1	-75.1	18.3	999.0	999.0	999.0	999.0	99.0	-83.80000	39.43333	999.0	999.0	23450.0	99.0	99.0	99.0	99.0	99.0	99.0
51.0	22.5	-64.1	-76.1	17.9	999.0	999.0	999.0	999.0	99.0	-83.80000	39.43333	999.0	999.0	25222.1	99.0	99.0	99.0	99.0	99.0	99.0

Table 3a

HHMMSS	XDTX	YDTX	ALT(m)	SMSPD(kt)	TSND(C)	TTOT(C)
204218	-72.520	-115.388	3352.800	-99.900	-99.900	-99.900
204222	-72.168	-114.684	3352.800	-99.900	-99.900	-99.900
204227	-71.483	-114.221	3352.800	342.820	-14.500	0.979
204232	-71.242	-113.425	3352.800	324.163	-14.500	-0.660
204236	-70.779	-112.962	3352.800	326.336	-14.500	-0.474
204241	-70.316	-112.258	3352.800	328.182	-14.500	-0.314
204245	-69.853	-111.573	3352.800	328.182	-14.500	-0.314
204250	-69.390	-111.110	3352.800	343.682	-14.500	1.057
204255	-69.168	-110.184	3352.800	324.052	-14.500	-0.669
204259	-68.576	-109.832	3352.800	347.982	-14.500	1.449
204304	-68.113	-109.129	3352.800	321.328	-14.500	-0.901
204308	-67.779	-108.443	3352.800	328.143	-14.500	-0.318
204313	-67.316	-107.869	3352.800	317.776	-14.500	-1.200
204318	-66.853	-107.277	3352.800	333.122	-14.500	0.116
204322	-66.502	-106.480	3352.800	322.494	-14.500	-0.802
204327	-66.150	-105.888	3352.800	342.510	-14.500	0.951
204332	-65.576	-105.203	3352.800	312.577	-14.500	-1.631
204336	-65.224	-104.629	3352.800	330.344	-14.500	-0.127
204341	-64.872	-103.925	3352.800	320.899	-14.500	-0.937
204346	-64.409	-103.240	3352.800	332.028	-14.500	0.020
204350	-63.835	-102.777	3352.800	329.438	-14.500	-0.206
204355	-63.483	-102.073	3352.800	320.457	-14.500	-0.974
204359	-63.150	-101.388	3352.800	313.630	-14.500	-1.545
204404	-62.798	-100.795	3352.800	309.080	-14.500	-1.918
204409	-62.335	-100.221	3352.800	305.622	-14.500	-2.198
204413	-61.872	-99.647	3352.800	333.438	-14.500	0.144
204418	-61.520	-98.832	3352.800	331.357	-14.500	-0.039
204422	-60.946	-98.369	3352.800	335.985	-14.500	0.368
204427	-60.594	-97.684	3352.800	321.770	-14.500	-0.863
204432	-60.242	-96.981	3352.800	301.985	-14.500	-2.489
204436	-59.779	-96.629	3352.800	314.919	-14.500	-1.438
204441	-59.446	-95.832	3352.800	315.108	-14.500	-1.422
204445	-59.094	-95.129	3352.800	341.594	-14.500	0.869
204450	-58.742	-94.443	3352.800	310.333	-14.500	-1.815
204455	-58.279	-93.981	3352.800	291.519	-14.500	-3.307
204459	-57.816	-93.518	3352.800	280.248	-14.500	-4.156
204504	-57.465	-92.925	3352.800	283.380	-14.500	-3.923
204508	-56.891	-92.592	3352.800	281.684	-14.500	-4.049
204513	-56.428	-92.129	3078.480	288.157	-13.000	-2.064
204518	-55.854	-91.666	3352.800	282.477	-14.500	-3.990
204522	-55.279	-91.425	3352.800	281.092	-14.500	-4.093
204527	-54.687	-91.203	3352.800	259.404	-14.500	-5.637
204531	-54.224	-90.851	3352.800	303.077	-14.500	-2.402
204536	-53.298	-91.073	3352.800	307.601	-14.500	-2.038
204541	-52.965	-90.499	3352.800	334.087	-14.500	0.201
204545	-52.613	-89.814	3352.800	365.214	-14.500	3.068
204550	-51.687	-90.499	3352.800	383.646	-14.500	4.886
204555	-51.113	-89.925	3352.800	348.602	-14.500	1.506
204559	-50.650	-89.684	3352.800	275.268	-14.500	-4.520
204604	-50.057	-89.462	3352.800	231.521	-14.500	-7.440
204608	-49.724	-89.110	3352.800	255.130	-14.500	-5.927
204613	-49.131	-88.758	3322.320	244.564	-14.500	-6.622
204618	-48.668	-88.425	3322.320	268.436	-14.500	-5.009
204622	-48.205	-87.962	3291.840	263.734	-14.500	-5.339
204627	-47.742	-87.499	3261.360	280.943	-14.500	-4.104
204631	-47.409	-86.907	3230.880	294.888	-14.500	-3.047
204636	-47.057	-86.221	3200.400	262.615	-14.500	-5.416
204641	-46.705	-85.981	3169.920	248.569	-14.500	-6.362
204645	-46.354	-85.518	3139.440	259.084	-14.500	-5.659
204650	-46.131	-84.721	3108.960	267.516	-13.000	-3.574
204655	-45.780	-84.370	3078.480	280.794	-13.000	-2.615
204659	-45.428	-83.795	3048.000	244.449	-13.000	-5.130
204704	-45.094	-83.333	2987.040	266.003	-13.000	-3.681
204708	-44.854	-82.740	2956.560	265.840	-13.000	-3.692
204713	-44.502	-82.166	2926.080	265.840	-13.000	-3.692
204718	-44.168	-81.703	2865.120	276.010	-12.700	-2.666
204722	-43.928	-81.018	2834.640	278.251	-12.700	-2.503
204727	-43.576	-80.425	2804.160	278.251	-12.700	-2.503
204731	-43.243	-79.962	2773.680	258.464	-12.700	-3.901
204736	-42.780	-79.629	2743.200	258.298	-12.700	-3.913
204741	-42.428	-79.036	2682.240	258.658	-12.700	-3.888
204745	-41.854	-78.925	2651.760	286.886	-12.700	-1.860
204750	-41.502	-78.240	2621.280	277.481	-11.500	-1.359
204754	-40.928	-77.999	2590.800	289.163	-11.500	-0.487
204759	-40.465	-77.536	2560.320	262.352	-11.500	-2.435
204804	-40.002	-77.184	2529.840	254.926	-11.500	-2.941
204808	-39.650	-76.721	2499.360	249.395	-11.500	-3.308
204813	-39.076	-76.499	2438.400	259.725	-11.500	-2.615
204817	-38.613	-76.036	2407.920	274.612	-11.500	-1.568
204822	-38.020	-75.684	2377.440	269.655	-11.500	-1.923
204827	-37.557	-75.333	2346.960	256.425	-11.000	-2.340
204831	-37.094	-74.999	2316.480	241.405	-11.000	-3.324
204836	-36.631	-74.647	2286.000	263.587	-11.000	-1.849
204841	-36.057	-74.184	2255.520	266.487	-11.000	-1.647
204845	-35.706	-73.721	2225.040	281.376	-11.000	-0.572
204850	-35.132	-73.370	2194.560	248.040	-11.000	-2.897
204855	-34.669	-73.147	2164.080	248.180	-11.000	-2.888
204859	-34.206	-72.796	2164.080	235.065	-11.000	-3.722
204904	-33.743	-72.444	2133.600	251.324	-11.000	-2.681
204908	-33.169	-72.221	2133.600	259.517	-11.000	-2.129
204913	-32.706	-71.759	2133.600	251.224	-11.000	-2.687
204918	-32.243	-71.518	2133.600	259.072	-11.000	-2.160
204922	-31.669	-71.166	2133.600	241.276	-11.000	-3.333
204927	-31.206	-70.944	2133.600	262.656	-11.000	-1.914
204932	-30.613	-70.592	2133.600	234.952	-11.000	-3.729
204936	-30.150	-70.481	2133.600	257.368	-11.000	-2.276
204941	-29.576	-70.129	2133.600	234.818	-11.000	-3.738
204945	-29.113	-69.907	2133.600	253.599	-11.000	-2.529
204950	-28.539	-69.666	2133.600	231.059	-11.000	-3.968
204955	-28.076	-69.444	2133.600	253.637	-11.000	-2.527
204959	-27.502	-69.092	2133.600	249.747	-11.000	-2.785
205004	-27.039	-68.740	2133.600	260.516	-11.000	-2.061
205008	-26.446	-68.629	2133.600	239.108	-11.000	-3.470
205013	-25.983	-68.388	2133.600	239.565	-11.000	-3.441
205018	-25.409	-68.277	2133.600	221.773	-11.000	-4.522
205022	-24.946	-68.277	2133.600	211.934	-11.000	-5.084
205027	-24.483	-68.277	2133.600	203.044	-11.000	-5.570
205031	-24.020	-68.518	2103.120	196.330	-10.200	-5.123
205036	-23.669	-68.740	2103.120	190.536	-10.200	-5.418
205041	-23.335	-68.981	2103.120	186.597	-10.200	-5.614
205045	-22.983	-69.314	2133.600	180.877	-11.000	-6.691
205050	-22.632	-69.444	2133.600	181.480	-11.000	-6.662
205054	-22.280	-69.666	2133.600	192.072	-11.000	-6.141
205059	-21.817	-70.018	2133.600	174.195	-11.000	-7.003
205104	-21.595	-70.129	2133.600	175.733	-11.000	-6.933
205108	-21.243	-70.370	2133.600	166.220	-11.000	-7.361
205113	-20.780	-70.592	2133.600	191.354	-11.000	-6.177
205117	-20.428	-70.833	2103.120	166.221	-10.200	-6.561
205122	-20.206	-70.944	2072.640	167.788	-10.200	-6.492
205127	-19.743	-71.166	2072.640	154.612	-10.200	-7.051
205131	-19.502	-71.407	2042.160	201.531	-10.200	-4.851
205136	-19.039	-71.759	2011.680	185.699	-10.200	-5.658
205141	-18.706	-71.981	2011.680	198.772	-10.200	-4.996
205145	-18.354	-72.221	1981.200	174.275	-10.200	-6.200
205150	-18.002	-72.444	1950.720	187.978	-10.200	-5.546
205154	-17.650	-72.796	1950.720	184.448	-10.200	-5.719
205159	-17.317	-73.018	1920.240	179.812	-10.200	-5.941
205204	-16.965	-73.147	1920.240	179.416	-10.200	-5.960
205208	-16.613	-73.481	1889.760	182.947	-10.200	-5.792
205213	-16.261	-73.721	1859.280	186.661	-9.300	-4.711
205217	-15.928	-73.944	1859.280	175.682	-9.300	-5.235

Table 3a-cont'd

205222	-15.576	-74.184	1859.280	174.346	-9.300	-5.296
205227	-15.224	-74.407	1828.800	187.930	-9.300	-4.648
205231	-14.872	-74.759	1798.320	187.094	-9.300	-4.690
205236	-14.539	-74.999	1798.320	185.724	-9.300	-4.757
205240	-14.187	-75.221	1767.840	175.877	-9.300	-5.226
205245	-13.835	-75.462	1737.360	176.380	-9.300	-5.202
205250	-13.484	-75.684	1706.880	175.883	-9.300	-5.226
205254	-13.150	-75.925	1676.400	174.852	-9.300	-5.273
205259	-12.909	-76.258	1645.920	188.385	-9.300	-4.626
205303	-12.447	-76.499	1645.920	175.704	-9.300	-5.234
205308	-12.224	-76.721	1615.440	186.822	-9.000	-4.403
205313	-11.872	-77.073	1584.960	176.185	-9.000	-4.912
205317	-11.521	-77.314	1554.480	176.260	-9.000	-4.908
205322	-11.298	-77.536	1524.000	177.965	-9.000	-4.829
205326	-10.835	-77.777	1493.520	174.567	-9.000	-4.986
205331	-10.595	-78.110	1432.560	190.374	-9.000	-4.227
205336	-10.243	-78.351	1402.080	176.941	-9.000	-4.876
205340	-10.021	-78.703	1371.600	165.135	-7.600	-4.008
205345	-9.780	-78.925	1341.120	156.005	-7.600	-4.395
205349	-9.669	-79.277	1280.160	169.865	-7.600	-3.800
205354	-9.447	-79.740	1280.160	191.389	-7.600	-2.776
205359	-9.317	-80.203	1249.680	171.781	-7.600	-3.713
205403	-9.317	-80.425	1219.200	164.524	-7.600	-4.035
205408	-9.317	-80.888	1219.200	133.360	-7.600	-5.258
205412	-9.206	-81.129	1219.200	133.360	-7.600	-5.258
205417	-9.206	-81.351	1219.200	138.245	-7.600	-5.083
205422	-8.854	-81.703	1188.720	150.164	-7.600	-4.630
205426	-8.521	-81.814	1188.720	171.658	-7.600	-3.719
205431	-8.169	-81.944	1097.280	174.775	-6.300	-2.277
205435	-7.817	-81.592	762.000	3989.117	-4.700	2091.209
205440	-16.150	-55.555	738.226	3951.583	-4.700	2051.953
205445	-16.039	-55.555	736.092	3893.976	-4.700	1992.425
205449	-15.928	-55.555	733.958	49.377	-4.700	-4.379
205454	-15.798	-55.555	731.825	49.691	-4.700	-4.375
205458	-15.687	-55.555	729.691	49.350	-4.700	-4.379
205503	-15.576	-55.555	727.558	-99.900	-99.900	-99.900

HHMMSS	XDTX	YDTX	ALT(m)	SMSPD(kt)	TSND(C)	TTOT(C)
204513	-79.687	-105.777	4084.320	-99.900	-99.900	-99.900
204518	-78.761	-105.314	4053.840	-99.900	-99.900	-99.900
204522	-77.835	-104.962	4023.360	424.572	-19.800	3.942
204527	-76.909	-104.629	3992.880	408.696	-19.800	2.200
204531	-76.113	-104.166	3992.880	420.941	-19.800	3.538
204536	-75.187	-103.573	3962.400	416.673	-19.800	3.067
204541	-74.261	-103.351	3931.920	439.241	-19.800	5.611
204545	-73.205	-103.110	3901.440	426.326	-19.800	4.139
204550	-72.279	-102.777	3901.440	419.109	-19.800	3.335
204555	-71.483	-102.314	3870.960	419.109	-18.000	5.135
204559	-70.427	-102.073	3840.480	410.207	-18.000	4.163
204604	-69.631	-101.610	3810.000	435.295	-18.000	6.957
204608	-68.576	-101.388	3779.520	428.603	-18.000	6.195
204613	-67.650	-100.925	3779.520	435.380	-18.000	6.966
204618	-66.724	-100.573	3749.040	417.914	-18.000	5.003
204622	-65.798	-100.332	3718.560	425.804	-18.000	5.880
204627	-64.761	-99.999	3718.560	421.295	-18.000	5.377
204631	-63.946	-99.536	3688.080	413.461	-18.000	4.516
204636	-63.150	-99.073	3688.080	399.743	-18.000	3.047
204641	-62.224	-98.721	3657.600	407.047	-18.000	3.823
204645	-61.298	-98.369	3657.600	412.122	-18.000	4.370
204650	-60.483	-97.906	3657.600	403.555	-18.000	3.450
204655	-59.557	-97.684	3627.120	389.242	-18.000	1.955
204659	-58.742	-97.332	3657.600	389.242	-18.000	1.955
204704	-57.928	-96.869	3657.600	392.791	-18.000	2.321
204708	-57.002	-96.629	3657.600	389.151	-18.000	1.946
204713	-56.205	-96.295	3657.600	368.127	-18.000	-0.151
204718	-55.502	-95.943	3657.600	355.431	-18.000	-1.361
204722	-54.687	-95.592	3657.600	342.497	-18.000	-2.550
204727	-54.002	-95.240	3657.600	355.722	-18.000	-1.334
204731	-53.187	-94.906	3657.600	349.881	-18.000	-1.876
204736	-52.502	-94.443	3657.600	352.027	-18.000	-1.678
204741	-51.798	-94.092	3657.600	328.194	-18.000	-3.813
204745	-51.113	-93.851	3657.600	321.572	-18.000	-4.380
204750	-50.409	-93.518	3627.120	319.241	-18.000	-4.577
204754	-49.724	-93.166	3627.120	329.659	-18.000	-3.686
204759	-49.020	-92.814	3627.120	314.775	-18.000	-4.950
204804	-48.446	-92.462	3627.120	313.765	-18.000	-5.033
204808	-47.742	-92.129	3627.120	297.763	-18.000	-6.322
204813	-47.168	-91.777	3627.120	306.830	-18.000	-5.600
204817	-46.705	-91.203	3627.120	303.144	-18.000	-5.896
204822	-46.243	-90.610	3627.120	309.774	-18.000	-5.361
204827	-46.020	-89.925	3596.640	297.922	-15.900	-4.210
204831	-45.557	-89.462	3566.160	296.953	-15.900	-4.286
204836	-45.317	-88.758	3535.680	284.142	-15.900	-5.266
204841	-44.743	-88.536	3505.200	320.704	-15.900	-2.354
204845	-44.631	-87.610	3444.240	322.809	-15.900	-2.175
204850	-44.391	-86.907	3413.760	326.210	-15.900	-1.884
204854	-43.928	-86.444	3383.280	301.323	-15.900	-3.941
204859	-43.465	-85.870	3352.800	286.892	-14.500	-3.659
204904	-43.002	-85.407	3322.320	298.724	-14.500	-2.747
204908	-42.428	-84.944	3261.360	287.050	-14.500	-3.647
204913	-41.965	-84.481	3230.880	289.061	-14.500	-3.495
204917	-41.502	-84.018	3200.400	289.060	-14.500	-3.495
204922	-41.039	-83.444	3200.400	305.466	-14.500	-2.210
204927	-40.687	-82.740	3169.920	299.777	-14.500	-2.664
204931	-40.113	-82.518	3139.440	297.527	-14.500	-2.841
204936	-39.650	-81.944	3108.960	281.279	-13.000	-2.579
204941	-39.187	-81.481	3078.480	286.810	-13.000	-2.166
204945	-38.724	-81.018	3048.000	289.060	-13.000	-1.995
204950	-38.150	-80.555	3017.520	278.712	-13.000	-2.769
204954	-37.798	-80.092	2956.560	287.979	-13.000	-2.077
204959	-37.224	-79.629	2926.080	276.461	-13.000	-2.933
205004	-36.761	-79.166	2865.120	286.652	-12.700	-1.877
205008	-36.298	-78.703	2834.640	288.827	-12.700	-1.713
205013	-35.706	-78.240	2773.680	290.594	-12.700	-1.578
205017	-35.243	-77.777	2743.200	300.358	-12.700	-0.818
205022	-34.669	-77.314	2712.720	278.568	-12.700	-2.479
205027	-34.206	-76.962	2682.240	279.267	-12.700	-2.428
205031	-33.632	-76.610	2682.240	259.311	-12.700	-3.844
205036	-33.169	-76.258	2651.760	279.097	-12.700	-2.440
205041	-32.706	-75.684	2651.760	271.100	-12.700	-3.020
205045	-32.132	-75.462	2621.280	281.291	-11.500	-1.079
205050	-31.669	-74.999	2621.280	261.366	-11.500	-2.503
205054	-31.206	-74.647	2590.800	254.769	-11.500	-2.951
205059	-30.743	-74.296	2560.320	254.769	-11.500	-2.951
205104	-30.280	-73.833	2499.360	254.908	-11.500	-2.942
205108	-29.817	-73.481	2468.880	268.513	-11.500	-2.004
205113	-29.224	-73.147	2438.400	258.322	-11.500	-2.711
205117	-28.761	-72.796	2377.440	264.118	-11.500	-2.312
205122	-28.187	-72.555	2346.960	252.153	-11.000	-2.626
205127	-27.835	-72.092	2286.000	293.559	-11.000	0.350
205131	-27.150	-71.518	2255.520	264.300	-11.000	-1.799
205136	-26.798	-71.296	2225.040	264.300	-11.000	-1.799
205141	-26.335	-70.944	2194.560	222.895	-11.000	-4.456
205145	-25.872	-70.592	2164.080	257.272	-11.000	-2.282
205150	-25.298	-70.240	2133.600	254.241	-11.000	-2.486
205154	-24.835	-69.907	2133.600	254.241	-11.000	-2.486
205159	-24.372	-69.555	2133.600	251.520	-11.000	-2.668
205204	-23.909	-69.092	2133.600	239.686	-11.000	-3.433
205208	-23.446	-68.981	2103.120	245.182	-10.200	-2.282
205213	-22.872	-68.740	2133.600	245.512	-11.000	-3.061
205218	-22.280	-68.981	2133.600	246.170	-11.000	-3.018
205222	-21.817	-68.851	2133.600	210.009	-11.000	-5.191
205227	-21.483	-68.981	2133.600	209.981	-11.000	-5.193
205231	-21.021	-69.444	2133.600	179.564	-11.000	-6.753
205236	-20.780	-69.555	2133.600	210.228	-11.000	-5.179
205240	-20.428	-70.018	2133.600	154.614	-11.000	-7.851
205245	-20.317	-70.240	2133.600	174.838	-11.000	-6.974
205250	-20.095	-70.592	2133.600	131.241	-11.000	-8.731
205254	-19.965	-70.833	2133.600	140.526	-11.000	-8.399
205259	-19.743	-71.055	2133.600	143.244	-11.000	-8.297
205304	-19.502	-71.407	2133.600	163.278	-11.000	-7.489
205308	-19.280	-71.759	2133.600	175.788	-11.000	-6.930
205313	-19.039	-72.092	2133.600	161.818	-11.000	-7.551
205317	-18.817	-72.333	2133.600	176.822	-11.000	-6.882
205322	-18.576	-72.796	2133.600	164.312	-11.000	-7.444
205327	-18.354	-73.018	2133.600	176.875	-11.000	-6.879
205331	-18.113	-73.370	2133.600	149.561	-11.000	-8.054
205336	-17.891	-73.610	2133.600	163.231	-11.000	-7.491
205340	-17.650	-73.944	2133.600	164.325	-11.000	-7.443
205345	-17.428	-74.296	2133.600	178.170	-11.000	-6.819
205350	-17.187	-74.647	2133.600	169.717	-11.000	-7.206
205354	-17.187	-74.999	2103.120	158.422	-10.200	-6.894
205359	-17.076	-75.333	2103.120	165.558	-10.200	-6.590
205403	-16.965	-75.796	2072.640	165.643	-10.200	-6.586
205408	-16.965	-76.147	2072.640	150.867	-10.200	-7.202
205413	-16.965	-76.388	2042.160	133.240	-10.200	-7.862
205417	-16.854	-76.721	2042.160	155.743	-10.200	-7.005
205422	-16.613	-77.184	2011.680	155.801	-10.200	-7.003
205426	-16.613	-77.425	1981.200	150.484	-10.200	-7.217
205431	-16.391	-77.647	1950.720	160.374	-10.200	-6.812
205436	-16.039	-78.110	1950.720	173.422	-10.200	-6.239
205440	-15.798	-78.351	1920.240	173.574	-10.200	-6.232
205445	-15.576	-78.573	1889.760	151.584	-10.200	-7.174
205449	-15.224	-78.814	1859.280	163.322	-9.300	-5.787
205454	-15.002	-79.166	1828.800	177.542	-9.300	-5.148
205459	-14.650	-79.388	1798.320	176.441	-9.300	-5.200
205503	-14.409	-79.740	1798.320	163.051	-9.300	-5.798
205508	-14.187	-79.962	1767.840	164.487	-9.300	-5.736
205512	-13.947	-80.314	1737.360	163.552	-9.300	-5.777

205517	-13.613	-80.555	1706.880	176.240	-9.300	-5.209
205522	-13.372	-80.888	1676.400	162.396	-9.300	-5.827
205526	-13.150	-81.129	1645.920	163.330	-9.300	-5.786
205531	-12.909	-81.481	1645.920	187.256	-9.300	-4.682
205535	-12.558	-81.944	1615.440	172.362	-9.000	-5.087
205540	-12.558	-82.166	1615.440	165.475	-9.000	-5.394
205545	-12.447	-82.518	1584.960	149.266	-9.000	-6.065
205549	-12.335	-82.981	1584.960	167.583	-9.000	-5.301
205554	-12.335	-83.333	1584.960	182.695	-9.000	-4.604
205559	-12.224	-83.795	1554.480	167.329	-9.000	-5.312
205603	-12.095	-84.129	1554.480	167.329	-9.000	-5.312
205608	-12.095	-84.481	1524.000	166.740	-9.000	-5.338
205612	-12.224	-84.944	1493.520	154.793	-9.000	-5.844
205617	-12.095	-85.184	1493.520	177.639	-9.000	-4.844
205622	-11.872	-85.647	1463.040	176.484	-9.000	-4.898
205626	-11.872	-86.110	1463.040	185.001	-9.000	-4.492
205631	-11.872	-86.444	1432.560	177.855	-9.000	-4.834
205635	-11.872	-86.907	1432.560	161.078	-9.000	-5.583
205640	-11.872	-87.258	1432.560	181.218	-9.000	-4.675
205645	-11.984	-87.721	1402.080	163.908	-9.000	-5.462
205649	-12.224	-87.962	1402.080	158.713	-9.000	-5.682
205654	-12.447	-88.184	1402.080	153.050	-9.000	-5.915
205658	-12.798	-88.425	1371.600	148.315	-7.600	-4.703
205703	-13.021	-88.647	1371.600	157.097	-7.600	-4.349
205708	-13.372	-88.758	1341.120	134.168	-7.600	-5.229
205712	-13.613	-88.888	1341.120	156.102	-7.600	-4.391
205717	-14.076	-88.888	1341.120	150.032	-7.600	-4.635
205722	-14.409	-88.888	1310.640	161.011	-7.600	-4.185
205726	-14.761	-88.888	1310.640	148.780	-7.600	-4.685
205731	-15.113	-88.758	1310.640	167.929	-7.600	-3.886
205735	-15.576	-88.758	1280.160	171.274	-7.600	-3.736
205740	-15.928	-88.888	1280.160	153.765	-7.600	-4.486
205745	-16.150	-88.758	1280.160	153.765	-7.600	-4.486
205749	-16.613	-88.758	1249.680	134.888	-7.600	-5.204
205754	-16.854	-88.758	1249.680	181.946	-7.600	-3.240
205758	-17.428	-88.647	1249.680	147.987	-7.600	-4.716
205803	-17.650	-88.647	1219.200	179.787	-7.600	-3.343
205808	-18.113	-88.536	1219.200	179.190	-7.600	-3.371
205812	-18.576	-88.184	1219.200	185.309	-7.600	-3.077
205817	-18.817	-88.073	1219.200	141.214	-7.600	-4.974
205821	-18.928	-87.962	1219.200	119.429	-7.600	-5.721
205826	-19.169	-87.610	1219.200	134.011	-7.600	-5.235
205831	-19.280	-87.258	1219.200	194.455	-7.600	-2.620
205835	-19.632	-86.795	1219.200	186.263	-7.600	-3.030
205840	-19.743	-86.444	1219.200	190.726	-7.600	-2.809
205844	-19.965	-86.110	1219.200	146.358	-7.600	-4.779
205849	-20.095	-85.870	1249.680	173.119	-7.600	-3.653
205854	-20.558	-85.518	1249.680	174.397	-7.600	-3.594
205858	-20.891	-85.295	1280.160	205.501	-7.600	-2.038
205903	-21.243	-84.944	1310.640	185.394	-7.600	-3.073
205908	-21.595	-84.721	1341.120	187.743	-7.600	-2.958
205912	-21.946	-84.481	1371.600	174.222	-7.600	-3.602
205917	-22.280	-84.258	1371.600	163.627	-7.600	-4.074
205922	-22.521	-84.018	1402.080	185.654	-9.000	-4.460
205926	-22.983	-83.666	1432.560	188.976	-9.000	-4.296
205931	-23.335	-83.444	1432.560	198.674	-9.000	-3.801
205935	-23.669	-83.203	1463.040	175.512	-9.000	-4.943
205940	-24.020	-82.981	1463.040	175.744	-9.000	-4.932
205945	-24.372	-82.740	1493.520	186.309	-9.000	-4.428
205949	-24.724	-82.407	1493.520	185.405	-9.000	-4.473
205954	-25.058	-82.166	1493.520	185.172	-9.000	-4.484
205958	-25.409	-81.944	1493.520	-99.900	-99.900	-99.900

Table 3c

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HHMMSS	XDTX	YDTX	ALT(m)	SMSPD(kt)	TSND(C)	TTOT(C)
204250	-80.390	-104.388	3992.880	-99.900	-99.900	-99.900
204255	-79.575	-104.036	3931.920	-99.900	-99.900	-99.900
204259	-78.761	-103.703	3901.440	378.976	-19.800	-0.883
204304	-77.835	-103.573	3840.480	395.337	-18.000	2.585
204309	-76.909	-103.240	3810.000	387.787	-18.000	1.806
204313	-76.224	-102.777	3779.520	373.160	-18.000	0.340
204318	-75.409	-102.536	3718.560	366.526	-18.000	-0.306
204322	-74.594	-102.073	3688.080	381.229	-18.000	1.142
204327	-73.668	-101.962	3657.600	386.774	-18.000	1.703
204332	-72.872	-101.610	3657.600	371.301	-18.000	0.158
204336	-72.057	-101.388	3627.120	371.948	-18.000	0.222
204341	-71.242	-100.925	3627.120	365.529	-18.000	-0.402
204346	-70.427	-100.795	3627.120	365.427	-18.000	-0.412
204350	-69.742	-100.332	3627.120	354.932	-18.000	-1.408
204355	-68.927	-99.999	3657.600	341.167	-18.000	-2.670
204359	-68.242	-99.758	3657.600	335.303	-18.000	-3.192
204404	-67.539	-99.406	3657.600	337.998	-18.000	-2.953
204409	-66.724	-99.073	3657.600	349.184	-18.000	-1.941
204413	-65.927	-98.943	3657.600	348.227	-18.000	-2.029
204418	-65.224	-98.610	3657.600	346.524	-18.000	-2.184
204422	-64.409	-98.258	3627.120	335.338	-18.000	-3.189
204427	-63.724	-98.018	3627.120	344.450	-18.000	-2.373
204432	-62.909	-97.795	3657.600	341.811	-18.000	-2.612
204436	-62.094	-97.555	3657.600	346.675	-18.000	-2.171
204441	-61.409	-97.221	3657.600	338.709	-18.000	-2.890
204445	-60.705	-96.869	3657.600	321.100	-18.000	-4.420
204450	-60.020	-96.629	3657.600	335.521	-18.000	-3.173
204455	-59.205	-96.295	3657.600	333.001	-18.000	-3.395
204459	-58.520	-95.943	3657.600	341.728	-18.000	-2.619
204504	-57.816	-95.592	3657.600	335.825	-18.000	-3.146
204508	-57.002	-95.481	3657.600	342.174	-18.000	-2.579
204513	-56.205	-95.240	3657.600	347.005	-18.000	-2.140
204518	-55.391	-95.129	3657.600	359.110	-18.000	-1.015
204522	-54.687	-94.555	3657.600	357.717	-18.000	-1.146
204527	-53.891	-94.443	3657.600	360.536	-18.000	-0.880
204531	-53.428	-93.740	3657.600	341.192	-18.000	-2.667
204536	-52.724	-93.388	3657.600	374.118	-18.000	0.435
204541	-51.687	-93.388	3657.600	359.394	-18.000	-0.988
204545	-50.983	-93.166	3657.600	359.468	-18.000	-0.981
204550	-50.298	-92.814	3657.600	329.689	-18.000	-3.684
204555	-49.483	-92.592	3657.600	334.243	-18.000	-3.286
204559	-48.798	-92.240	3657.600	344.633	-18.000	-2.357
204604	-48.094	-91.777	3657.600	336.530	-18.000	-3.083
204608	-47.409	-91.425	3657.600	346.902	-18.000	-2.150
204613	-46.705	-90.962	3657.600	341.800	-18.000	-2.613
204618	-46.020	-90.499	3657.600	339.226	-18.000	-2.844
204622	-45.428	-90.036	3657.600	357.357	-18.000	-1.180
204627	-44.743	-89.351	3657.600	347.264	-18.000	-2.117
204631	-44.168	-88.888	3657.600	357.631	-18.000	-1.154
204636	-43.465	-88.425	3627.120	337.059	-18.000	-3.037
204641	-42.891	-87.832	3627.120	351.848	-18.000	-1.695
204645	-42.187	-87.369	3596.640	339.435	-15.900	-0.725
204650	-41.613	-86.907	3566.160	344.554	-15.900	-0.264
204655	-40.798	-86.573	3535.680	342.315	-15.900	-0.466
204659	-40.224	-85.981	3505.200	354.931	-15.900	0.692
204704	-39.539	-85.518	3474.720	352.051	-15.900	0.424
204708	-38.835	-85.055	3474.720	339.678	-15.900	-0.703
204713	-38.261	-84.592	3444.240	341.851	-15.900	-0.508
204718	-37.557	-84.129	3444.240	324.981	-15.900	-1.990
204722	-36.983	-83.666	3413.760	335.490	-15.900	-1.076
204727	-36.409	-83.092	3383.280	335.692	-15.900	-1.058
204731	-35.706	-82.629	3352.800	342.393	-14.500	0.941
204736	-35.020	-82.277	3322.320	355.782	-14.500	2.172
204741	-34.317	-81.703	3291.840	329.838	-14.500	-0.171
204745	-33.743	-81.351	3291.840	325.395	-14.500	-0.554
204750	-33.169	-80.888	3261.360	316.110	-14.500	-1.339
204754	-32.465	-80.425	3261.360	316.831	-14.500	-1.279
204759	-31.891	-80.092	3230.880	318.880	-14.500	-1.107
204804	-31.428	-79.499	3230.880	305.218	-14.500	-2.230
204808	-30.743	-79.166	3200.400	308.799	-14.500	-1.941
204813	-30.150	-78.814	3169.920	306.749	-14.500	-2.107
204817	-29.576	-78.351	3139.440	292.100	-14.500	-3.262
204822	-29.113	-77.888	3108.960	303.371	-13.000	-0.878
204827	-28.428	-77.536	3108.960	296.378	-13.000	-1.431
204831	-27.835	-77.184	3078.480	284.731	-13.000	-2.322
204836	-27.372	-76.851	3048.000	270.689	-13.000	-3.349
204841	-26.909	-76.388	3017.520	275.423	-13.000	-3.009
204845	-26.335	-75.925	3017.520	291.540	-13.000	-1.805
204850	-25.761	-75.573	2987.040	289.287	-13.000	-1.978
204854	-25.298	-75.110	2956.560	269.363	-13.000	-3.444
204859	-24.835	-74.759	2926.080	254.903	-13.000	-4.442
204904	-24.372	-74.407	2895.600	256.187	-13.000	-4.356
204908	-23.798	-74.073	2865.120	271.377	-12.700	-3.000
204913	-23.206	-73.721	2834.640	283.371	-12.700	-2.124
204917	-22.743	-73.259	2773.680	277.692	-12.700	-2.543
204922	-22.169	-73.018	2743.200	282.427	-12.700	-2.194
204927	-21.706	-72.444	2712.720	271.939	-12.700	-2.960
204931	-21.354	-71.981	2682.240	279.935	-12.700	-2.379
204936	-20.669	-71.870	2621.280	265.945	-11.500	-2.185
204941	-20.095	-71.629	2590.800	273.347	-11.500	-1.659
204945	-19.502	-71.407	2560.320	258.369	-11.500	-2.708
204950	-18.928	-71.407	2529.840	251.525	-11.500	-3.167
204954	-18.354	-71.407	2468.880	225.991	-11.500	-4.773
204959	-17.891	-71.407	2438.400	232.142	-11.500	-4.402
205004	-17.317	-71.629	2407.920	224.633	-11.500	-4.854
205008	-16.854	-71.870	2377.440	231.730	-11.500	-4.427
205013	-16.391	-72.092	2377.440	205.990	-11.500	-5.911
205017	-16.039	-72.333	2346.960	204.160	-11.000	-5.510
205022	-15.687	-72.684	2346.960	190.794	-11.000	-6.205
205027	-15.335	-72.907	2346.960	211.429	-11.000	-5.112
205031	-14.872	-73.259	2346.960	183.982	-11.000	-6.542
205036	-14.650	-73.481	2316.480	196.668	-11.000	-5.906
205040	-14.298	-73.833	2286.000	165.650	-11.000	-7.386
205045	-13.947	-73.944	2255.520	180.021	-11.000	-6.732
205050	-13.724	-74.296	2225.040	180.021	-11.000	-6.732
205054	-13.372	-74.647	2225.040	196.174	-11.000	-5.931
205059	-13.261	-75.110	2194.560	188.479	-11.000	-6.321
205103	-13.150	-75.462	2164.080	154.520	-11.000	-7.855
205108	-13.021	-75.684	2164.080	154.635	-11.000	-7.851
205113	-12.909	-76.147	2133.600	162.330	-11.000	-7.529
205117	-12.687	-76.499	2103.120	177.814	-10.200	-6.036
205122	-12.558	-76.851	2072.640	160.187	-10.200	-6.820
205127	-12.447	-77.184	2042.160	153.533	-10.200	-7.095
205131	-12.335	-77.536	2011.680	154.922	-10.200	-7.039
205136	-12.224	-77.888	1981.200	158.168	-10.200	-6.905
205140	-12.095	-78.240	1981.200	155.768	-10.200	-7.004
205145	-11.984	-78.573	1950.720	153.465	-10.200	-7.098
205149	-11.872	-78.925	1920.240	152.708	-10.200	-7.129
205154	-11.761	-79.277	1889.760	170.993	-10.200	-6.349
205159	-11.632	-79.740	1859.280	178.774	-9.300	-5.091
205203	-11.410	-80.092	1859.280	161.743	-9.300	-5.854
205208	-11.298	-80.314	1828.800	131.607	-9.300	-7.019
205213	-11.169	-80.555	1798.320	145.344	-9.300	-6.518
205217	-10.706	-80.777	1767.840	167.079	-9.300	-5.623
205222	-10.372	-81.018	1737.360	182.599	-9.300	-4.908
205226	-10.021	-81.129	1706.880	181.032	-9.300	-4.984
205231	-9.558	-81.351	1676.400	177.175	-9.300	-5.165
205236	-9.206	-81.481	1645.920	174.865	-9.300	-5.273
205240	-8.854	-81.592	1645.920	172.671	-9.300	-5.373
205245	-8.391	-81.703	1615.440	164.978	-9.000	-5.415
205249	-8.169	-81.944	1584.960	181.245	-9.000	-4.673

table 3c - cont'd

205254	-7.706	-82.055	1554.480	197.142	-9.000	-3.881
205258	-7.132	-82.055	1524.000	188.504	-9.000	-4.320
205303	-6.891	-81.944	1493.520	204.248	-9.000	-3.505
205308	-6.317	-81.814	1463.040	171.809	-9.000	-5.112
205312	-5.965	-81.703	1432.560	206.147	-9.000	-3.403
205317	-5.502	-81.481	1402.080	183.369	-9.000	-4.571
205322	-5.150	-81.240	1341.120	203.672	-7.600	-2.136
205326	-4.687	-81.018	1310.640	200.614	-7.600	-2.299
205331	-4.224	-80.888	1280.160	206.870	-7.600	-1.963
205335	-3.891	-80.555	1249.680	204.502	-7.600	-2.092
205340	-3.539	-80.203	1219.200	205.471	-7.600	-2.039
205345	-3.187	-79.851	1188.720	197.777	-7.600	-2.448
205349	-2.965	-79.499	1188.720	201.438	-7.600	-2.256
205354	-2.724	-79.036	1158.240	203.527	-7.600	-2.144
205358	-2.502	-78.573	1127.760	202.726	-7.600	-2.187
205403	-2.261	-78.240	1097.280	199.183	-6.300	-1.075
205408	-1.910	-77.888	1066.800	196.678	-6.300	-1.205
205412	-1.576	-77.536	1066.800	212.285	-6.300	-0.365
205417	-1.336	-77.073	1036.320	199.718	-6.300	-1.046
205422	-0.984	-76.851	1036.320	198.393	-6.300	-1.116
205426	-0.873	-76.388	1005.840	195.096	-6.300	-1.287
205431	-0.521	-76.036	1005.840	205.840	-6.300	-0.719
205435	-0.187	-75.684	975.360	206.498	-6.300	-0.684
205440	-0.058	-75.221	975.360	203.300	-6.300	-0.856
205445	0.276	-74.870	944.880	202.749	-6.300	-0.886
205449	0.405	-74.407	944.880	201.541	-6.300	-0.950
205454	0.739	-74.073	914.400	204.739	-6.300	-0.779
205458	1.090	-73.721	914.400	195.759	-6.300	-1.253
205503	1.331	-73.370	914.400	209.758	-6.300	-0.505
205508	1.664	-72.907	914.400	199.585	-6.300	-1.053
205512	1.905	-72.555	914.400	213.311	-6.300	-0.307
205517	2.127	-72.092	914.400	177.993	-6.300	-2.127
205522	2.368	-71.870	914.400	190.417	-6.300	-1.524
205526	2.590	-71.407	914.400	177.993	-6.300	-2.127
205531	2.831	-71.055	914.400	214.728	-6.300	-0.227
205535	3.183	-70.592	914.400	199.790	-6.300	-1.043
205540	3.405	-70.240	914.400	197.652	-6.300	-1.155
205545	3.646	-69.907	914.400	174.429	-6.300	-2.293
205549	3.868	-69.555	914.400	198.830	-6.300	-1.093
205554	4.220	-69.092	914.400	199.532	-6.300	-1.056
205558	4.442	-68.740	914.400	202.227	-6.300	-0.914
205603	4.683	-68.388	914.400	188.686	-6.300	-1.611
205607	5.035	-68.055	883.920	188.786	-6.300	-1.606
205612	5.257	-67.703	853.440	199.304	-4.700	0.532
205617	5.498	-67.240	853.440	189.622	-4.700	0.036
205621	5.720	-66.888	822.960	201.010	-4.700	0.622
205626	6.072	-66.536	792.480	196.269	-4.700	0.374
205630	6.183	-66.073	762.000	204.468	-4.700	0.806
205635	6.535	-65.740	731.520	192.980	-4.700	0.205
205640	6.757	-65.388	701.040	185.945	-4.700	-0.146
205644	6.998	-65.036	701.040	177.647	-4.700	-0.543
205649	7.220	-64.685	670.560	175.785	-4.700	-0.630
205654	7.461	-64.351	640.080	161.838	-4.700	-1.250
205658	7.683	-64.110	640.080	163.376	-4.700	-1.184
205703	7.924	-63.759	609.600	163.046	-5.700	-2.199
205707	8.146	-63.425	579.120	164.778	-5.700	-2.124
205712	8.387	-63.185	548.640	156.674	-5.700	-2.467
205717	8.498	-62.833	548.640	147.423	-5.700	-2.837
205721	8.738	-62.610	518.160	156.926	-5.700	-2.457
205726	8.961	-62.259	518.160	140.628	-5.700	-3.095
205730	9.072	-62.036	487.680	140.433	-5.700	-3.102
205735	9.313	-61.796	487.680	141.607	-5.700	-3.059
205739	9.535	-61.444	457.200	156.305	-5.700	-2.482
205744	9.664	-61.111	426.720	155.534	-5.700	-2.514
205749	9.887	-60.870	426.720	132.608	-5.700	-3.384
205753	9.998	-60.648	396.240	134.120	-5.700	-3.331
205758	10.109	-60.296	365.760	133.192	-5.700	-3.363
205802	10.331	-60.055	365.760	143.631	-5.700	-2.983
205807	10.572	-59.833	335.280	143.631	-5.700	-2.983
205812	10.683	-59.481	335.280	145.606	-5.700	-2.908
205816	10.924	-59.259	304.800	136.793	-5.700	-3.235
205821	11.035	-59.018	304.800	129.151	-5.700	-3.503
205825	11.257	-58.796	274.320	143.200	-5.700	-2.999
205830	11.498	-58.444	274.320	143.263	-5.700	-2.997
205834	11.609	-58.203	243.840	-99.900	-99.900	-99.900

Table 3d

HHMMSS	XDTX	YDTX	ALT(m)	SMSPD(kt)	TSND(C)	TTOT(C)
203955	-82.594	-98.610	3657.600	-99.900	-99.900	-99.900
203960	-82.131	-97.795	3657.600	-99.900	-99.900	-99.900
204004	-81.779	-96.869	3657.600	383.330	-18.000	1.354
204009	-81.075	-96.518	3657.600	371.281	-18.000	0.156
204014	-80.279	-96.166	3657.600	335.593	-18.000	-3.166
204018	-79.575	-95.943	3657.600	327.041	-18.000	-3.913
204023	-78.890	-95.703	3657.600	325.716	-18.000	-4.027
204027	-78.187	-95.240	3657.600	337.825	-18.000	-2.969
204032	-77.372	-95.369	3657.600	345.285	-18.000	-2.297
204037	-76.576	-95.369	3657.600	327.130	-18.000	-3.905
204041	-75.872	-95.481	3657.600	325.881	-18.000	-4.013
204046	-75.057	-95.481	3657.600	329.216	-18.000	-3.725
204050	-74.261	-95.592	3657.600	316.040	-18.000	-4.845
204055	-73.668	-95.369	3657.600	316.884	-18.000	-4.774
204059	-72.872	-95.481	3657.600	320.223	-18.000	-4.494
204104	-72.057	-95.703	3657.600	352.584	-18.000	-1.626
204109	-71.242	-95.943	3657.600	333.587	-18.000	-3.343
204113	-70.557	-95.943	3657.600	315.155	-18.000	-4.918
204118	-69.853	-95.832	3657.600	314.441	-18.000	-4.977
204123	-69.039	-96.055	3657.600	299.624	-18.000	-6.176
204127	-68.576	-95.703	3657.600	361.504	-18.000	-0.787
204132	-67.539	-96.166	3657.600	340.902	-18.000	-2.693
204136	-66.853	-96.295	3657.600	373.871	-18.000	0.410
204141	-66.039	-96.295	3657.600	312.155	-18.000	-5.166
204146	-65.335	-96.406	3657.600	347.941	-18.000	-2.055
204150	-64.409	-96.629	3657.600	330.889	-18.000	-3.579
204155	-63.724	-96.518	3657.600	332.899	-18.000	-3.404
204159	-63.020	-96.629	3657.600	293.297	-18.000	-6.670
204204	-62.335	-96.629	3657.600	310.154	-18.000	-5.330
204209	-61.520	-96.629	3627.120	326.241	-18.000	-3.982
204213	-60.705	-96.758	3657.600	349.069	-18.000	-1.951
204218	-59.909	-96.518	3657.600	338.227	-18.000	-2.933
204222	-59.205	-96.295	3657.600	325.676	-18.000	-4.030
204227	-58.631	-95.832	3657.600	336.129	-18.000	-3.119
204232	-57.705	-95.832	3657.600	337.124	-18.000	-3.031
204236	-57.002	-95.592	3657.600	349.711	-18.000	-1.892
204241	-56.205	-95.369	3657.600	341.765	-18.000	-2.616
204246	-55.391	-95.129	3657.600	347.844	-18.000	-2.064
204250	-54.687	-94.777	3627.120	336.559	-18.000	-3.081
204255	-54.002	-94.443	3627.120	321.419	-18.000	-4.393
204259	-53.298	-94.203	3627.120	312.030	-18.000	-5.176
204304	-52.613	-93.981	3627.120	317.867	-18.000	-4.692
204309	-51.909	-93.629	3657.600	315.398	-18.000	-4.898
204313	-51.224	-93.388	3657.600	315.632	-18.000	-4.879
204318	-50.520	-93.166	3627.120	313.112	-18.000	-5.087
204322	-49.835	-92.814	3657.600	297.502	-18.000	-6.343
204327	-49.261	-92.592	3657.600	314.510	-18.000	-4.972
204332	-48.557	-92.129	3657.600	286.245	-18.000	-7.208
204336	-48.094	-91.777	3657.600	314.127	-18.000	-5.003
204341	-47.520	-91.203	3657.600	276.990	-18.000	-7.895
204346	-47.057	-90.851	3627.120	300.991	-18.000	-6.068
204350	-46.483	-90.388	3596.640	290.057	-15.900	-4.819
204355	-45.891	-89.925	3596.640	300.684	-15.900	-3.992
204359	-45.428	-89.462	3566.160	300.506	-15.900	-4.006
204404	-44.854	-88.999	3505.200	291.702	-15.900	-4.693
204409	-44.280	-88.647	3474.720	291.702	-15.900	-4.693
204413	-43.817	-88.184	3444.240	282.473	-15.900	-5.391
204418	-43.243	-87.832	3383.280	301.740	-15.900	-3.908
204422	-42.650	-87.258	3352.800	296.061	-14.500	-2.955
204427	-42.076	-87.036	3322.320	307.340	-14.500	-2.059
204432	-41.613	-86.444	3261.360	273.566	-14.500	-4.643
204436	-41.150	-86.110	3230.880	292.989	-14.500	-3.194
204441	-40.687	-85.518	3169.920	280.372	-14.500	-4.146
204445	-40.113	-85.184	3139.440	292.256	-14.500	-3.250
204450	-39.650	-84.721	3108.960	276.508	-13.000	-2.930
204455	-39.187	-84.258	3048.000	287.075	-13.000	-2.145
204459	-38.613	-83.795	3017.520	291.935	-13.000	-1.775
204504	-38.020	-83.444	2956.560	283.591	-13.000	-2.407
204508	-37.557	-83.092	2926.080	281.333	-13.000	-2.575
204513	-37.094	-82.518	2865.120	271.929	-12.700	-2.961
204518	-36.520	-82.277	2804.160	283.404	-12.700	-2.121
204522	-35.946	-81.944	2773.680	287.711	-12.700	-1.797
204527	-35.483	-81.351	2712.720	292.256	-12.700	-1.450
204531	-35.020	-80.888	2682.240	289.125	-12.700	-1.690
204536	-34.557	-80.425	2651.760	276.667	-12.700	-2.618
204541	-33.983	-80.092	2590.800	281.526	-11.500	-1.061
204545	-33.391	-79.740	2560.320	295.225	-11.500	-0.020
204550	-32.928	-79.166	2499.360	291.784	-11.500	-0.286
204555	-32.465	-78.703	2468.880	289.709	-11.500	-0.445
204559	-31.891	-78.351	2407.920	280.642	-11.500	-1.127
204604	-31.317	-77.999	2377.440	282.640	-11.500	-0.978
204608	-30.854	-77.536	2316.480	282.639	-11.000	-0.478
204613	-30.280	-77.184	2286.000	266.230	-11.000	-1.665
204618	-29.817	-76.851	2255.520	280.131	-11.000	-0.664
204622	-29.224	-76.388	2194.560	281.808	-11.000	-0.540
204627	-28.539	-76.388	2164.080	286.095	-11.000	-0.220
204631	-27.965	-76.258	2164.080	263.693	-11.000	-1.842
204636	-27.372	-76.388	2133.600	240.609	-11.000	-3.375
204641	-26.909	-76.147	2133.600	274.238	-11.000	-1.095
204645	-26.224	-76.610	2133.600	257.656	-11.000	-2.256
204650	-25.761	-76.721	2103.120	269.979	-10.200	-0.600
204655	-25.187	-76.962	2072.640	220.606	-10.200	-3.790
204659	-24.724	-77.073	2042.160	243.711	-10.200	-2.377
204704	-24.132	-77.314	1981.200	230.095	-10.200	-3.227
204708	-23.669	-77.536	1950.720	231.499	-10.200	-3.141
204713	-23.206	-77.647	1920.240	208.937	-10.200	-4.450
204717	-22.743	-77.777	1889.760	223.332	-10.200	-3.631
204722	-22.169	-77.999	1859.280	228.386	-9.300	-2.430
204727	-21.706	-78.240	1828.800	227.843	-9.300	-2.463
204731	-21.243	-78.351	1798.320	221.260	-9.300	-2.852
204736	-20.780	-78.703	1798.320	212.944	-9.300	-3.328
204740	-20.317	-78.703	1767.840	218.232	-9.300	-3.027
204745	-19.854	-78.925	1737.360	203.287	-9.300	-3.857
204750	-19.391	-78.925	1706.880	217.229	-9.300	-3.085
204754	-18.817	-78.925	1676.400	209.972	-9.300	-3.493
204759	-18.354	-78.925	1645.920	225.784	-9.300	-2.586
204804	-17.780	-78.925	1584.960	213.584	-9.000	-2.992
204808	-17.317	-78.814	1554.480	212.278	-9.000	-3.065
204813	-16.854	-78.814	1524.000	196.690	-9.000	-3.905
204817	-16.391	-78.814	1463.040	213.121	-9.000	-3.018
204822	-15.798	-78.814	1432.560	216.167	-9.000	-2.845
204827	-15.335	-78.703	1402.080	231.606	-9.000	-1.935
204831	-14.761	-78.814	1371.600	215.290	-7.600	-1.495
204836	-14.298	-78.703	1341.120	213.549	-7.600	-1.594
204840	-13.835	-78.703	1310.640	229.399	-7.600	-0.669
204845	-13.150	-78.703	1280.160	212.878	-7.600	-1.631
204850	-12.798	-78.703	1249.680	228.552	-7.600	-0.720
204854	-12.224	-78.703	1219.200	198.196	-7.600	-2.426
204859	-11.761	-78.573	1188.720	231.033	-7.600	-0.570
204903	-11.169	-78.573	1158.240	215.471	-7.600	-1.485
204908	-10.706	-78.573	1127.760	230.127	-7.600	-0.625
204913	-10.132	-78.573	1127.760	227.368	-7.600	-0.791
204917	-9.558	-78.462	1097.280	212.705	-6.300	-0.341
204922	-9.206	-78.462	1066.800	210.815	-6.300	-0.446
204926	-8.632	-78.462	1066.800	195.400	-6.300	-1.271
204931	-8.169	-78.462	1036.320	210.463	-6.300	-0.466
204936	-7.706	-78.351	1036.320	212.214	-6.300	-0.368
204940	-7.132	-78.351	1036.320	212.214	-6.300	-0.368
204945	-6.669	-78.351	1005.840	213.558	-6.300	-0.293
204949	-6.206	-78.240	1005.840	197.995	-6.300	-1.137
204954	-5.743	-78.240	975.360	204.714	-6.300	-0.780

Table 3d-cont'd

204959	-5.280	-77.999	975.360	197.583	-6.300	-1.158
205003	-4.928	-77.777	944.880	205.774	-6.300	-0.723
205008	-4.465	-77.536	914.400	206.201	-6.300	-0.700
205012	-4.002	-77.314	914.400	206.412	-6.300	-0.688
205017	-3.650	-77.073	914.400	191.507	-6.300	-1.470
205022	-3.298	-76.851	914.400	190.959	-6.300	-1.497
205026	-2.836	-76.610	914.400	203.406	-6.300	-0.851
205031	-2.373	-76.388	914.400	213.072	-6.300	-0.320
205035	-2.039	-76.036	914.400	201.297	-6.300	-0.963
205040	-1.687	-75.796	914.400	186.139	-6.300	-1.737
205045	-1.336	-75.573	914.400	191.378	-6.300	-1.476
205049	-0.873	-75.333	914.400	189.840	-6.300	-1.553
205054	-0.521	-75.110	914.400	212.831	-6.300	-0.334
205059	-0.058	-74.759	914.400	195.638	-6.300	-1.259
205103	0.276	-74.536	914.400	197.176	-6.300	-1.179
205108	0.516	-74.184	914.400	186.967	-6.300	-1.696
205112	0.868	-73.833	914.400	212.578	-6.300	-0.348
205117	1.331	-73.481	914.400	219.612	-6.300	0.052
205122	1.442	-73.018	914.400	216.303	-6.300	-0.138
205126	1.794	-72.684	914.400	193.079	-6.300	-1.390
205131	2.016	-72.333	914.400	207.831	-6.300	-0.611
205135	2.368	-71.870	914.400	198.358	-6.300	-1.118
205140	2.590	-71.518	914.400	209.746	-6.300	-0.506
205145	2.942	-71.166	914.400	201.453	-6.300	-0.955
205149	3.183	-70.703	914.400	200.532	-6.300	-1.004
205154	3.405	-70.370	914.400	202.477	-6.300	-0.900
205159	3.646	-69.907	914.400	187.446	-6.300	-1.672
205203	3.868	-69.555	914.400	204.446	-6.300	-0.795
205208	4.109	-69.092	914.400	200.796	-6.300	-0.990
205212	4.442	-68.740	944.880	202.334	-6.300	-0.908
205217	4.683	-68.388	914.400	202.675	-6.300	-0.890
205221	4.905	-67.925	883.920	192.993	-6.300	-1.394
205226	5.257	-67.703	883.920	204.887	-6.300	-0.771
205231	5.498	-67.240	853.440	189.742	-4.700	0.042
205235	5.720	-66.888	822.960	201.130	-4.700	0.628
205240	6.072	-66.536	792.480	178.642	-4.700	-0.497
205244	6.183	-66.203	762.000	178.775	-4.700	-0.490
205249	6.424	-65.851	762.000	167.287	-4.700	-1.014
205254	6.646	-65.499	731.520	177.879	-4.700	-0.533
205258	6.887	-65.147	701.040	163.275	-4.700	-1.189
205303	7.109	-64.925	670.560	163.606	-4.700	-1.174
205308	7.350	-64.573	670.560	162.068	-4.700	-1.240
205312	7.572	-64.222	640.080	163.952	-4.700	-1.160
205317	7.813	-63.999	640.080	157.056	-4.700	-1.451
205321	7.924	-63.648	609.600	141.797	-5.700	-3.052
205326	8.146	-63.425	579.120	155.720	-5.700	-2.506
205331	8.387	-63.073	579.120	149.877	-5.700	-2.741
205335	8.609	-62.833	548.640	157.934	-5.700	-2.415
205340	8.738	-62.499	548.640	144.090	-5.700	-2.965
205344	8.961	-62.259	518.160	132.903	-5.700	-3.374
205349	9.072	-62.036	487.680	129.426	-5.700	-3.494
205354	9.313	-61.796	487.680	134.140	-5.700	-3.330
205358	9.424	-61.444	457.200	145.249	-5.700	-2.921
205403	9.664	-61.222	457.200	143.517	-5.700	-2.987
205407	9.887	-60.981	426.720	127.616	-5.700	-3.555
205412	9.998	-60.759	396.240	134.626	-5.700	-3.313
205416	10.109	-60.407	396.240	123.379	-5.700	-3.695
205421	10.220	-60.185	365.760	135.337	-5.700	-3.288
205426	10.461	-59.944	365.760	117.159	-5.700	-3.892
205430	10.572	-59.722	335.280	130.465	-5.700	-3.458
205435	10.794	-59.481	335.280	135.236	-5.700	-3.291
205439	10.924	-59.129	304.800	144.596	-5.700	-2.946
205444	11.146	-58.907	304.800	134.490	-5.700	-3.318
205448	11.257	-58.666	274.320	128.948	-5.700	-3.510
205453	11.498	-58.444	274.320	143.244	-5.700	-2.997
205458	11.720	-58.092	243.840	-99.900	-99.900	-99.900

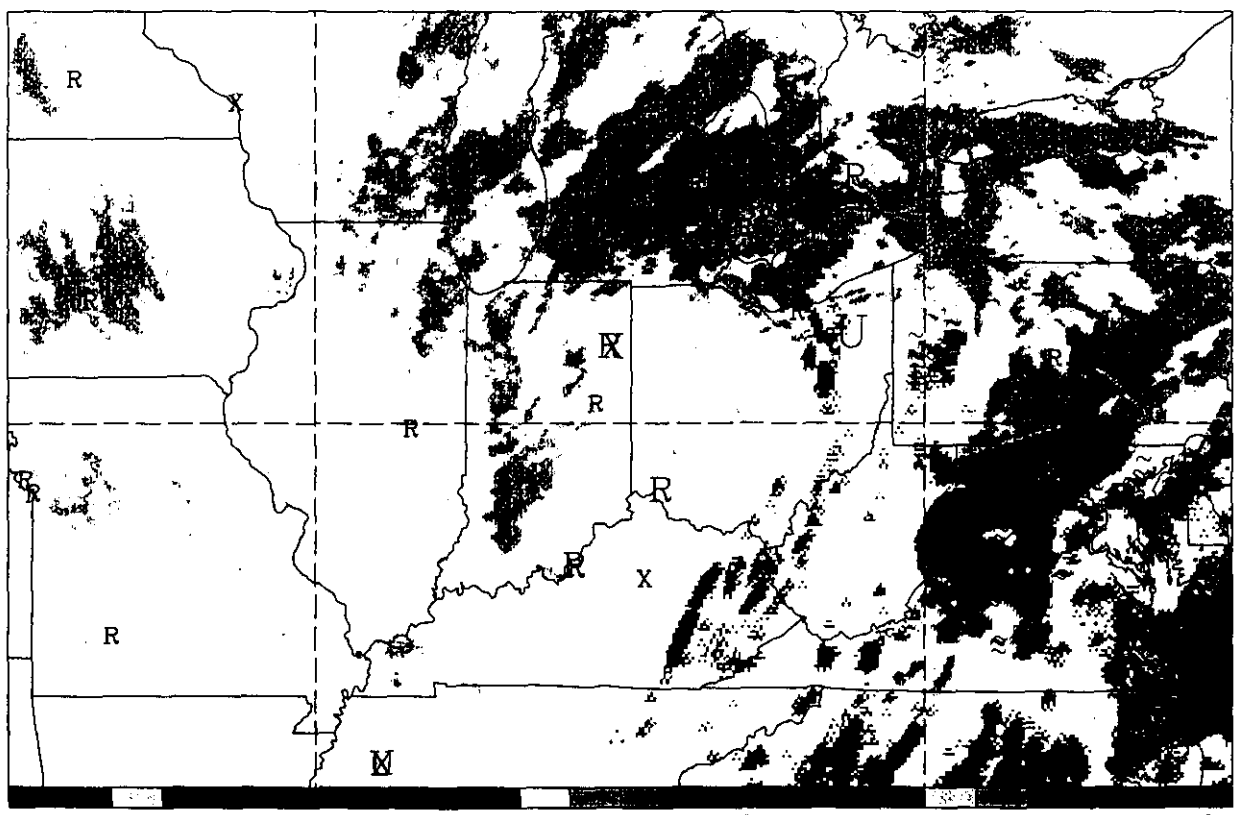
HHMMSS	XDTX	YDTX	ALT(m)	SMSPD(kt)	TSND(C)	TTOT(C)
203804	-40.465	-83.444	3322.320	-99.900	-99.900	-99.900
203809	-39.872	-82.981	3261.360	-99.900	-99.900	-99.900
203814	-39.187	-82.518	3200.400	335.096	-14.500	0.290
203818	-38.613	-81.944	3139.440	347.054	-14.500	1.364
203823	-38.020	-81.351	3108.960	324.507	-13.000	0.870
203827	-37.446	-81.018	3048.000	338.310	-13.000	2.075
203832	-36.872	-80.314	2987.040	338.914	-13.000	2.129
203837	-36.169	-79.851	2926.080	351.355	-13.000	3.260
203841	-35.706	-79.277	2865.120	349.338	-12.700	3.374
203846	-35.020	-78.703	2804.160	325.496	-12.700	1.254
203850	-34.446	-78.351	2743.200	335.344	-12.700	2.112
203855	-33.854	-77.777	2712.720	325.420	-12.700	1.248
203860	-33.280	-77.184	2651.760	334.650	-12.700	2.050
203904	-32.706	-76.721	2590.800	348.918	-11.500	4.535
203909	-32.002	-76.147	2529.840	325.459	-11.500	2.451
203914	-31.428	-75.796	2499.360	335.967	-11.500	3.367
203918	-30.854	-75.221	2468.880	311.674	-11.500	1.294
203923	-30.280	-74.759	2438.400	325.008	-11.500	2.413
203927	-29.687	-74.296	2407.920	316.769	-11.500	1.716
203932	-29.002	-73.944	2377.440	308.495	-11.500	1.035
203936	-28.428	-73.610	2346.960	316.293	-11.000	2.176
203941	-27.613	-73.481	2316.480	313.912	-11.000	1.979
203946	-26.909	-73.259	2316.480	299.271	-11.000	0.796
203950	-26.335	-73.259	2286.000	281.172	-11.000	-0.587
203955	-25.650	-73.370	2255.520	262.123	-11.000	-1.950
203960	-25.058	-73.481	2255.520	268.967	-11.000	-1.472
204004	-24.483	-73.721	2225.040	238.427	-11.000	-3.513
204009	-24.020	-73.721	2225.040	259.680	-11.000	-2.118
204014	-23.335	-74.073	2225.040	244.282	-11.000	-3.140
204018	-22.872	-74.296	2194.560	269.245	-11.000	-1.452
204023	-22.280	-74.536	2194.560	245.426	-11.000	-3.067
204027	-21.706	-74.647	2194.560	240.023	-11.000	-3.412
204032	-21.243	-74.759	2164.080	221.779	-11.000	-4.522
204037	-20.780	-74.999	2164.080	206.571	-11.000	-5.380
204041	-20.317	-75.110	2164.080	228.209	-11.000	-4.141
204046	-19.743	-75.333	2164.080	208.967	-11.000	-5.249
204050	-19.391	-75.462	2164.080	208.967	-11.000	-5.249
204055	-18.928	-75.573	2103.120	187.329	-10.200	-5.578
204059	-18.465	-75.684	2072.640	185.528	-10.200	-5.666
204104	-18.113	-75.796	2042.160	191.861	-10.200	-5.352
204109	-17.650	-76.036	2011.680	181.308	-10.200	-5.870
204113	-17.317	-76.258	1950.720	190.354	-10.200	-5.428
204118	-16.965	-76.499	1920.240	175.449	-10.200	-6.146
204122	-16.613	-76.721	1889.760	179.082	-10.200	-5.976
204127	-16.261	-76.962	1828.800	185.945	-9.300	-4.746
204132	-15.928	-77.314	1798.320	173.536	-9.300	-5.334
204136	-15.687	-77.536	1737.360	173.434	-9.300	-5.338
204141	-15.335	-77.777	1706.880	163.040	-9.300	-5.799
204145	-15.002	-77.999	1676.400	176.987	-9.300	-5.174
204150	-14.761	-78.351	1645.920	187.040	-9.300	-4.692
204155	-14.409	-78.703	1615.440	185.813	-9.000	-4.452
204159	-14.076	-78.925	1584.960	185.711	-9.000	-4.457
204204	-13.835	-79.277	1554.480	160.853	-9.000	-5.592
204208	-13.613	-79.499	1524.000	279.752	-9.000	1.308
204213	-12.687	-80.314	1493.520	219.614	-9.000	-2.648
204218	-12.687	-80.314	1432.560	198.364	-9.000	-3.817
204222	-12.558	-80.425	1402.080	69.450	-9.000	-8.365
204227	-12.335	-80.666	1371.600	139.642	-7.600	-5.032
204231	-11.984	-81.018	1341.120	196.167	-7.600	-2.532
204236	-11.521	-81.351	1310.640	238.612	-7.600	-0.101
204241	-10.947	-81.592	1280.160	183.781	-7.600	-3.151
204245	-10.835	-81.592	1249.680	188.365	-7.600	-2.927
204250	-10.243	-81.703	1249.680	165.860	-7.600	-3.977
204255	-9.780	-81.703	1219.200	217.774	-7.600	-1.354
204259	-9.317	-81.592	1188.720	197.998	-7.600	-2.437
204304	-8.854	-81.592	1158.240	213.672	-7.600	-1.587
204308	-8.280	-81.592	1158.240	196.030	-7.600	-2.539
204313	-7.928	-81.592	1127.760	211.445	-7.600	-1.711
204318	-7.354	-81.481	1097.280	197.248	-6.300	-1.176
204322	-6.891	-81.481	1066.800	201.705	-6.300	-0.941
204327	-6.539	-81.351	1036.320	200.232	-6.300	-1.019
204331	-5.965	-81.351	1036.320	185.498	-6.300	-1.768
204336	-5.613	-81.240	1005.840	212.526	-6.300	-0.351
204340	-5.039	-81.240	975.360	184.174	-6.300	-1.832
204345	-4.687	-81.129	944.880	207.397	-6.300	-0.635
204350	-4.224	-80.888	944.880	197.271	-6.300	-1.174
204354	-3.761	-80.666	914.400	218.703	-6.300	0.000
204359	-3.539	-80.203	914.400	213.742	-6.300	-0.283
204403	-3.187	-79.851	914.400	201.553	-6.300	-0.949
204408	-2.965	-79.499	914.400	201.129	-6.300	-0.972
204413	-2.724	-79.036	914.400	187.426	-6.300	-1.673
204417	-2.502	-78.703	914.400	188.864	-6.300	-1.602
204422	-2.261	-78.351	914.400	187.040	-6.300	-1.692
204427	-1.910	-77.999	914.400	202.995	-6.300	-0.873
204431	-1.687	-77.536	914.400	211.542	-6.300	-0.406
204436	-1.336	-77.184	914.400	197.862	-6.300	-1.144
204440	-1.113	-76.851	914.400	198.907	-6.300	-1.089
204445	-0.873	-76.388	914.400	188.922	-6.300	-1.599
204450	-0.650	-76.036	914.400	202.722	-6.300	-0.887
204454	-0.299	-75.684	914.400	201.249	-6.300	-0.966
204459	-0.058	-75.221	914.400	201.149	-6.300	-0.971
204503	0.164	-74.870	914.400	199.208	-6.300	-1.073
204508	0.516	-74.536	914.400	185.875	-6.300	-1.749
204513	0.739	-74.184	914.400	187.413	-6.300	-1.674
204517	0.979	-73.833	914.400	190.035	-6.300	-1.544
204522	1.201	-73.370	914.400	190.035	-6.300	-1.544
204526	1.553	-73.147	914.400	203.277	-6.300	-0.858
204531	1.794	-72.684	914.400	191.089	-6.300	-1.491
204536	2.016	-72.333	914.400	192.527	-6.300	-1.418
204540	2.257	-71.981	914.400	186.045	-6.300	-1.741
204545	2.590	-71.629	914.400	195.060	-6.300	-1.289
204550	2.720	-71.166	914.400	201.316	-6.300	-0.962
204554	3.053	-70.833	914.400	193.250	-6.300	-1.381
204559	3.294	-70.481	914.400	197.996	-6.300	-1.137
204603	3.516	-70.018	914.400	191.740	-6.300	-1.458
204608	3.757	-69.666	914.400	202.995	-6.300	-0.873
204613	4.109	-69.314	914.400	180.080	-6.300	-2.029
204617	4.220	-68.981	914.400	188.627	-6.300	-1.614
204622	4.572	-68.629	914.400	192.385	-6.300	-1.425
204626	4.794	-68.166	914.400	214.514	-6.300	-0.239
204631	5.146	-67.814	883.920	197.864	-6.300	-1.143
204635	5.257	-67.462	853.440	204.301	-4.700	0.797
204640	5.609	-66.999	822.960	189.034	-4.700	0.007
204645	5.831	-66.666	792.480	197.138	-4.700	0.419
204649	6.072	-66.314	762.000	185.540	-4.700	-0.166
204654	6.424	-65.962	731.520	187.831	-4.700	-0.053
204659	6.646	-65.610	701.040	185.690	-4.700	-0.158
204703	6.887	-65.277	701.040	175.606	-4.700	-0.638
204708	7.109	-64.925	670.560	175.739	-4.700	-0.632
204712	7.350	-64.573	640.080	176.341	-4.700	-0.604
204717	7.572	-64.222	640.080	175.739	-4.700	-0.632
204722	7.813	-63.888	609.600	163.018	-5.700	-2.200
204726	8.035	-63.648	579.120	164.454	-5.700	-2.138
204731	8.275	-63.296	579.120	154.926	-5.700	-2.539
204735	8.387	-62.962	548.640	157.064	-5.700	-2.451
204740	8.609	-62.722	518.160	157.167	-5.700	-2.447
204744	8.850	-62.370	518.160	151.967	-5.700	-2.658
204749	9.072	-62.148	487.680	142.248	-5.700	-3.035
204754	9.201	-61.907	487.680	138.519	-5.700	-3.173
204758	9.424	-61.573	457.200	143.254	-5.700	-2.997
204803	9.664	-61.333	426.720	156.756	-5.700	-2.464

Table 3e-cont

204808	9.775	-60.981	426.720	143.689	-5.700	-2.981
204812	9.998	-60.759	396.240	131.049	-5.700	-3.438
204817	9.998	-60.518	396.240	122.356	-5.700	-3.728
204821	10.220	-60.296	365.760	116.313	-5.700	-3.918
204826	10.331	-60.055	365.760	139.046	-5.700	-3.154
204830	10.572	-59.722	335.280	133.782	-5.700	-3.343
204835	10.683	-59.481	335.280	142.674	-5.700	-3.019
204840	10.924	-59.259	304.800	121.129	-5.700	-3.768
204844	11.035	-59.018	304.800	127.279	-5.700	-3.566
204849	11.257	-58.796	274.320	136.326	-5.700	-3.252
204853	11.387	-58.444	274.320	133.961	-5.700	-3.336
204858	11.609	-58.333	243.840	139.788	-5.700	-3.126
204902	11.850	-58.092	213.360	-99.900	-99.900	-99.900

Fig. 1a

RADAR DATA PLOT FOR 970109 AT 20 Z



C = Clear Icing
X = Mixed Icing
R = Rime Icing
U = No Type Given

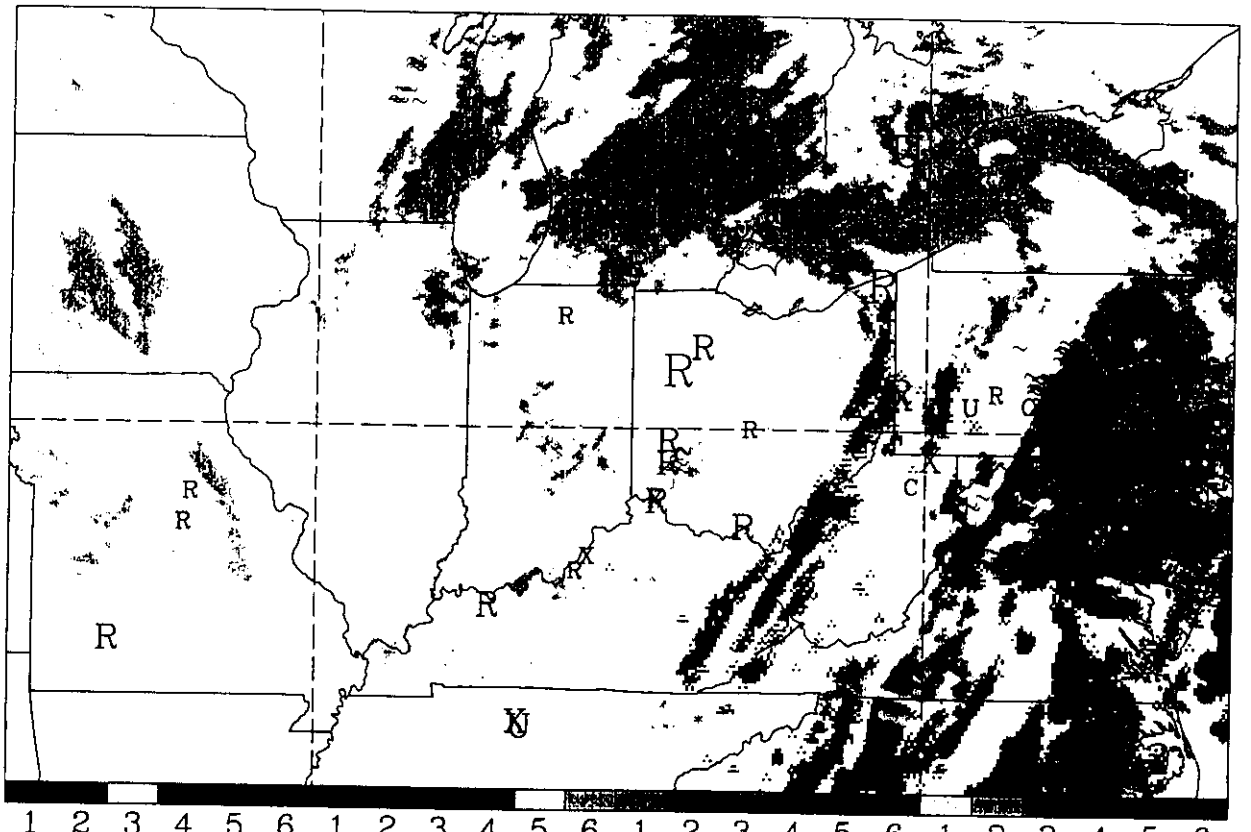
MOD/SEV to SEV = Large
LGT/MOD to MOD = Medium
TRC to LGT = Small
PIREPs are for < 15000 ft MSL

SFC PRECIP SYMBOLS IN YELLOW

ZL	S
ZR	R
IP	L
	TH

Fig. 1b

RADAR DATA PLOT FOR 970109 AT 21 Z



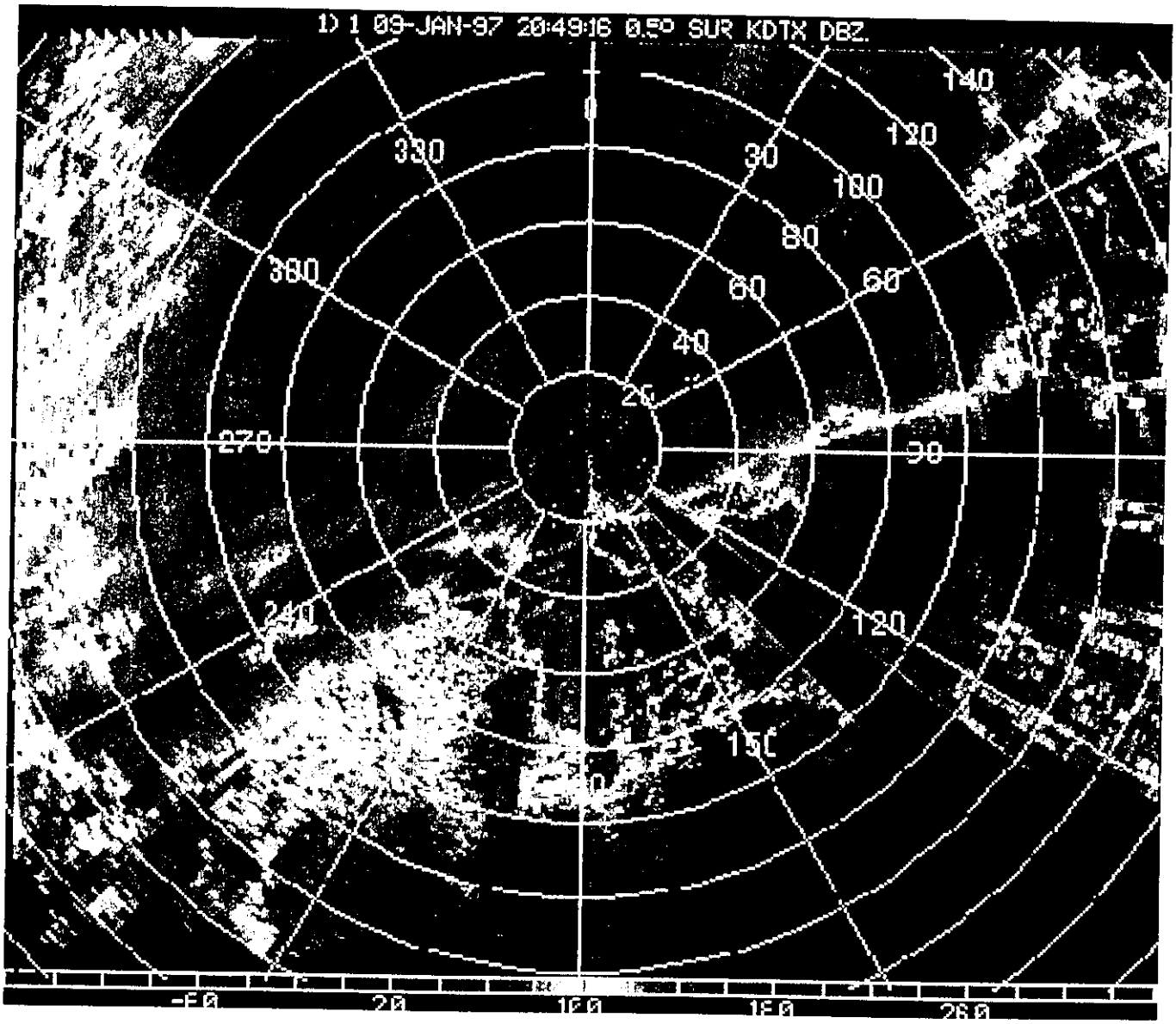
C = Clear Icing
X = Mixed Icing
R = Rime Icing
U = No Type Given

MOD/SEV to SEV = Large
LGT/MOD to MOD = Medium
TRC to LGT = Small
PIREPs are for < 15000 ft MSL

SFC PRECIP SYMBOLS IN YELLOW

ZL	S
ZR	R
IP	L
	TH

Fig. 2a


1) 1 09-JAN-97 20:49:16 0.5° SUR KDTX DBZ.
0
30
60
90
120
150
180
210
240
270
300
330
20
40
60
80
100
120
140
-5.0
20
10.0
15.0
25.0

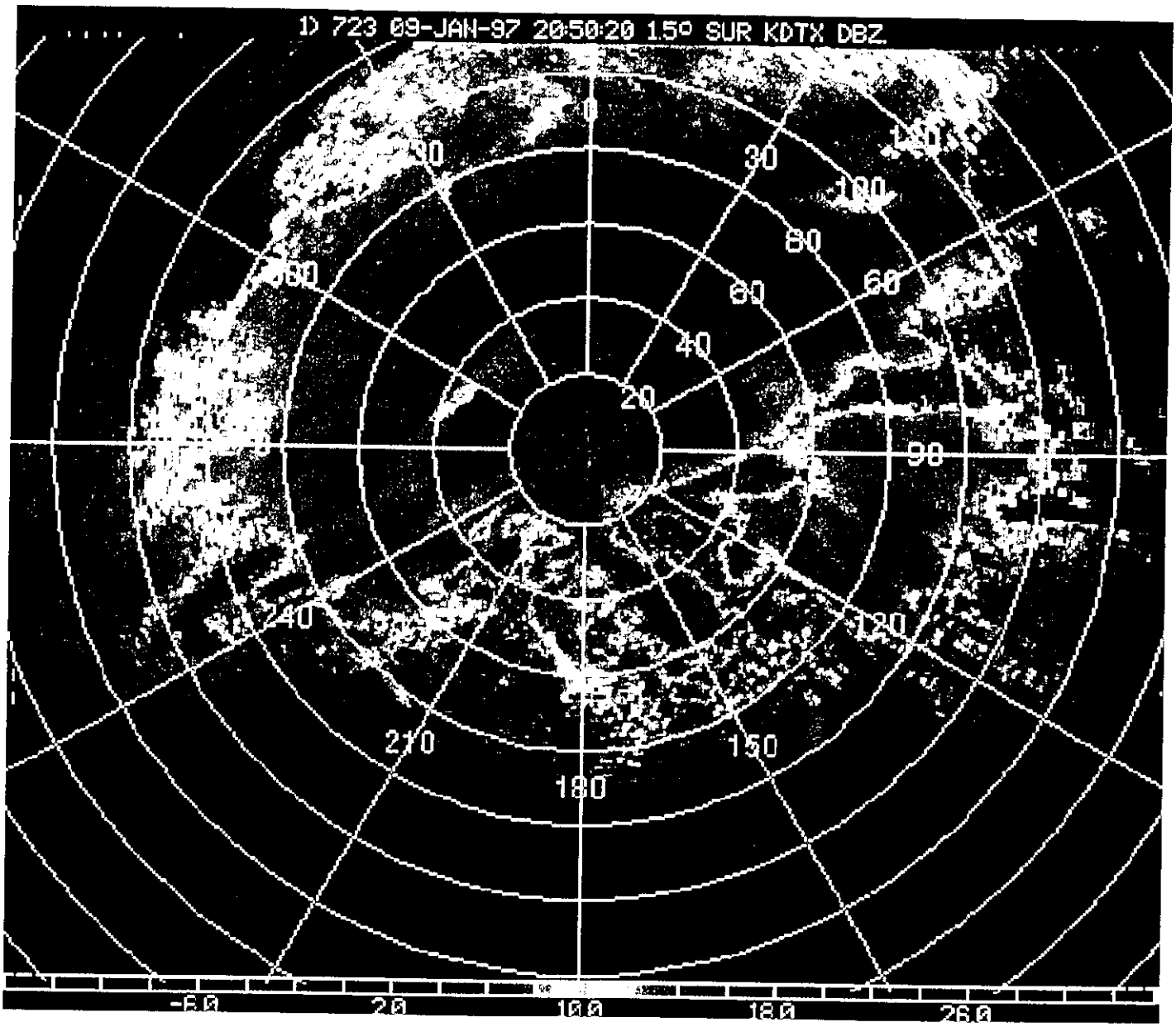

D 723 09-JAN-97 20:50:20 15° SUR KDTX DBZ
0
30
60
90
120
150
180
210
240
270
300
330
20
40
60
80
100
120
-8.0
2.0
10.0
18.0
26.0

Fig. 2c

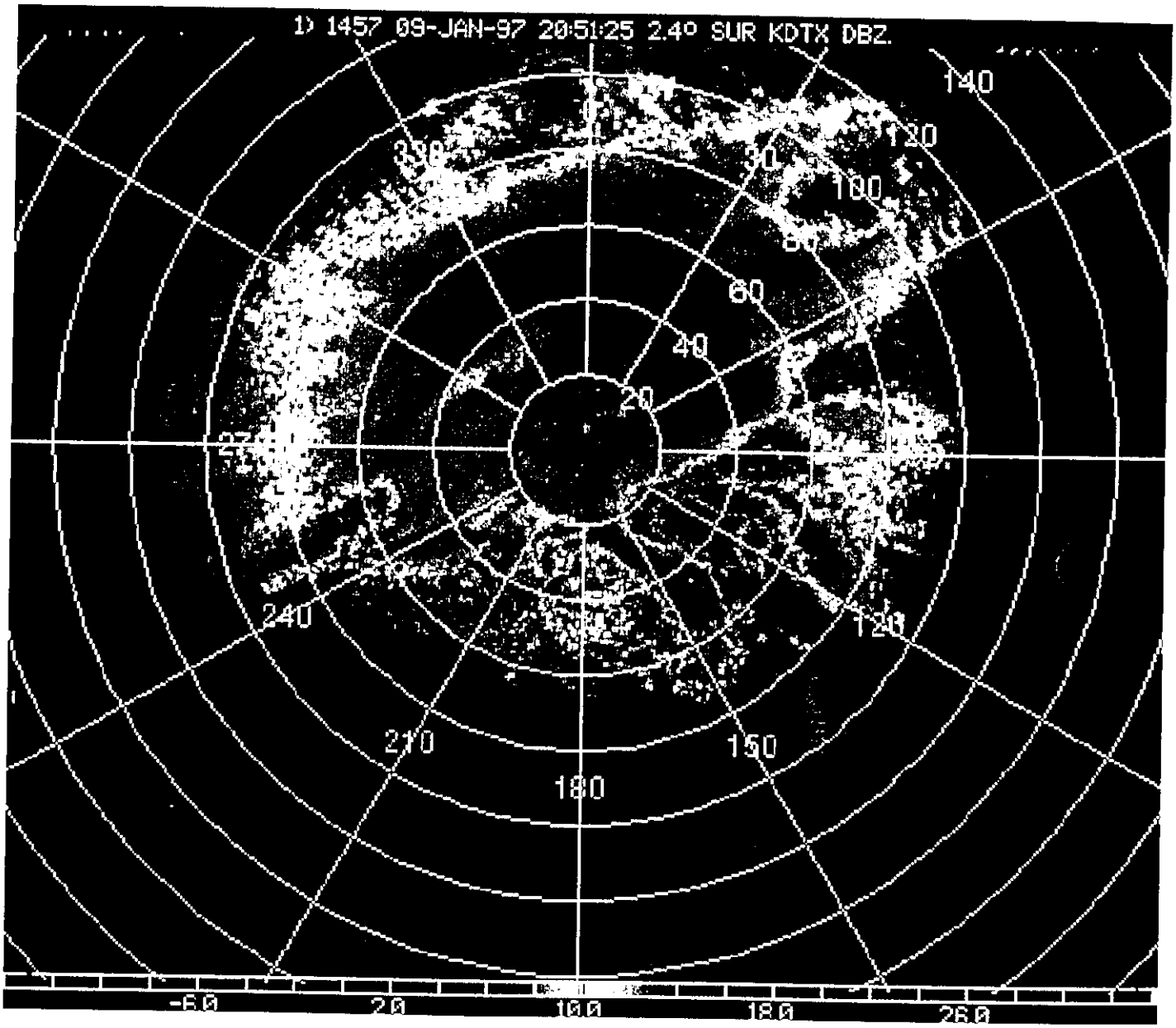
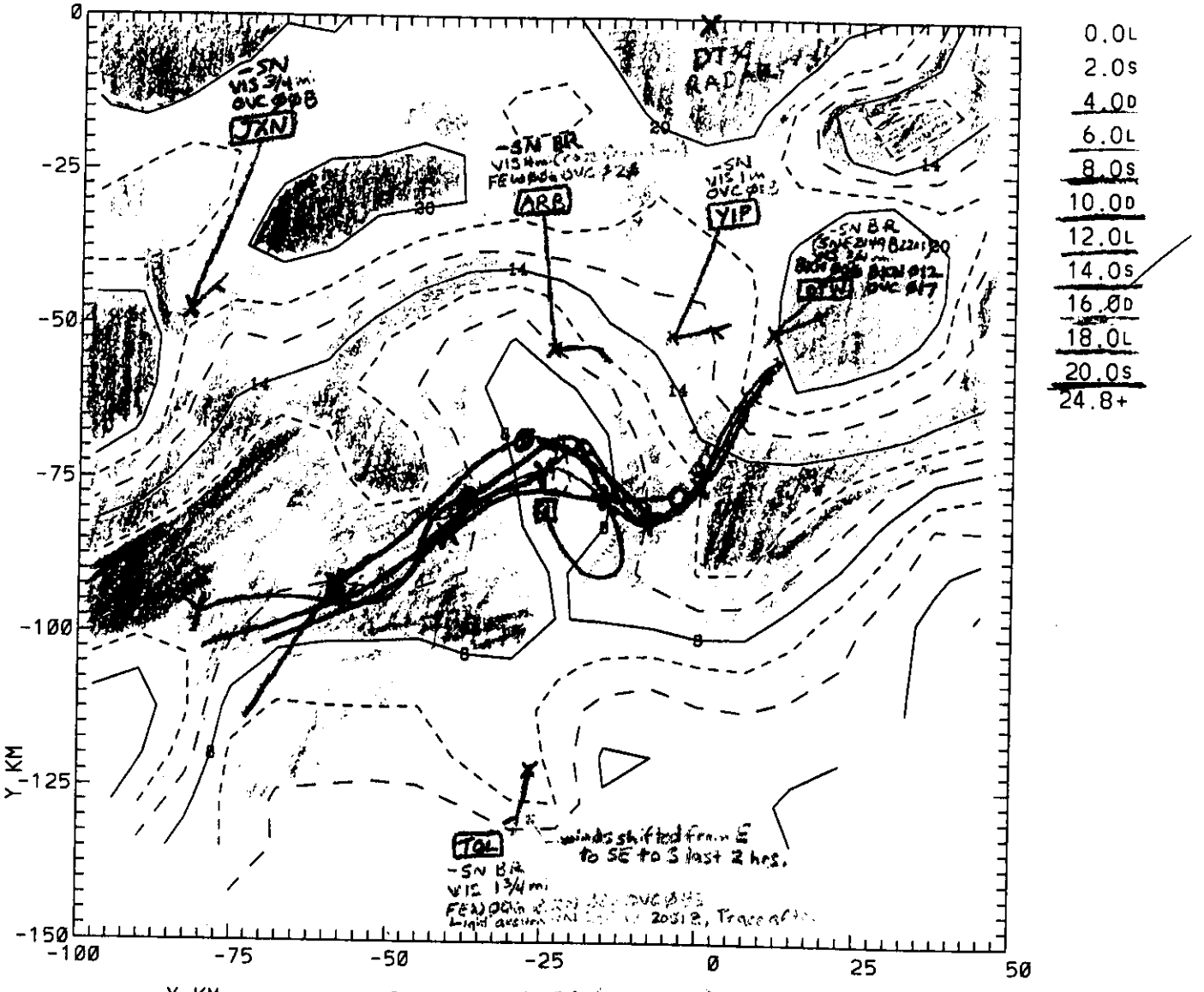

1) 1457 09-JAN-97 20:51:25 2.4° SUR KDTX DBZ
140
120
30
100
60
40
20
240
120
210
150
180
-6.0
2.0
10.0
18.0
26.0

Fig. 3a

97/ 1/ 9 20 49 16-20 54 4 KDTX Z = 0.80 KM DZ
(AS OF 08/20/97) ORIGIN=(0.00, 0.00) KM X-AXIS= 90.0 DEG
DTX Radar Reflectivity - COMAIR 3272



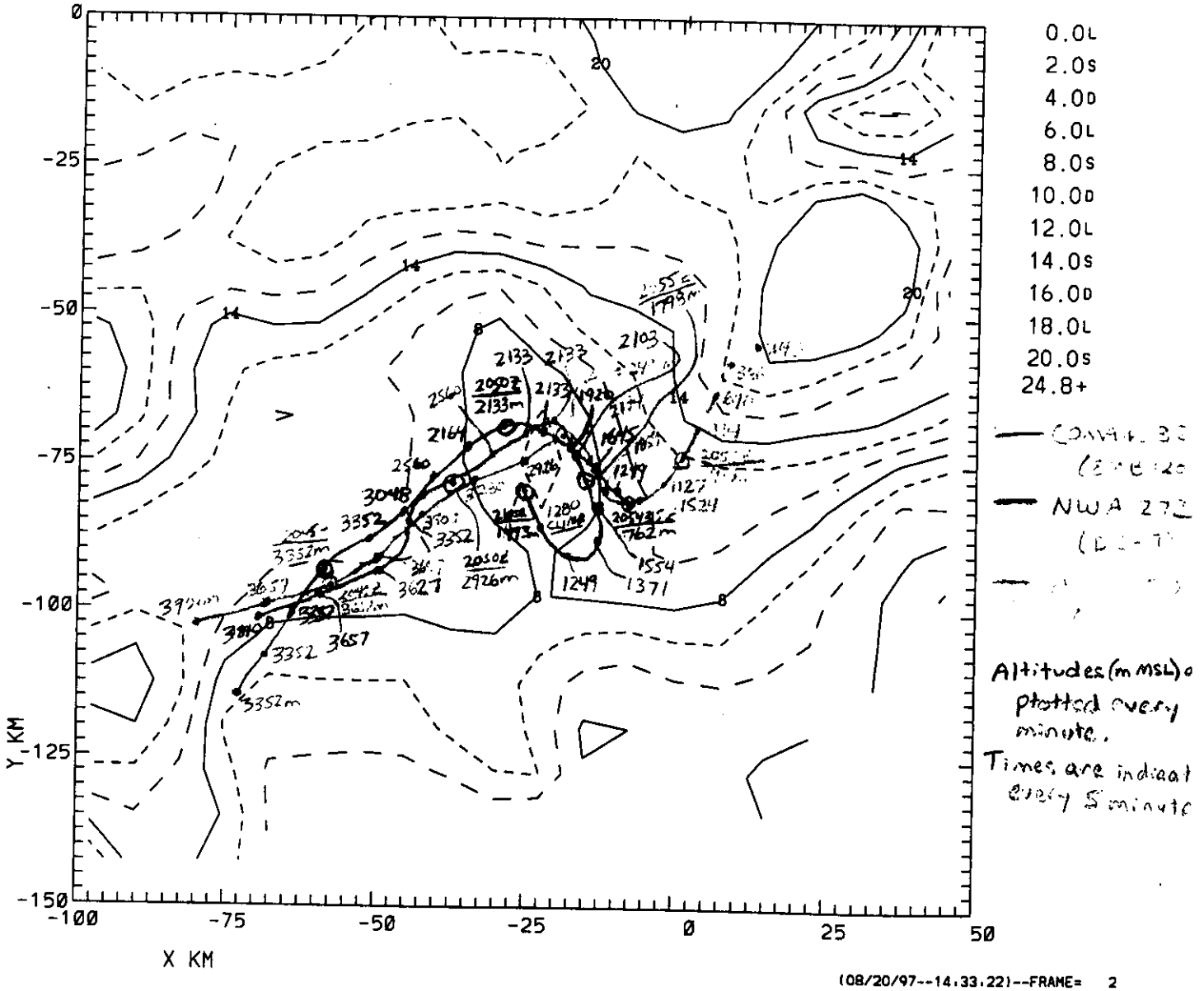
— COMAIR 3272 (EMB 120)
— NWA 272 (DC-9)
— AWE 50 (A[illegible])
— NWA 483 (B-757)
— NWA 202 (A[illegible])

(08/20/97--16:13:49)--FRAME= 1

Y = 2040Z
X = 2045Z
O = 2050Z ON A/C TRACKS
+ = 2055Z
□ = 2100Z

Fig 3b

97/ 1/ 9 20 49 16-20 54 4 KDTX Z = 2.30 KM DZ
(AS OF 08/20/97) ORIGIN=(0.00, 0.00) KM X-AXIS= 90.0 DEG
DTX Radar Reflectivity - COMAIR 3272



(08/20/97--14:33:22)--FRAME= 2

Fig. 4

97/ 1/ 9 20 43 25-20 48 8 KDTX Z = 2.30 KM DZ
(AS OF 08/20/97) ORIGIN=(0.00, 0.00) KM X-AXIS= 90.0 DEG
DTX Radar Reflectivity - COMAIR 3272

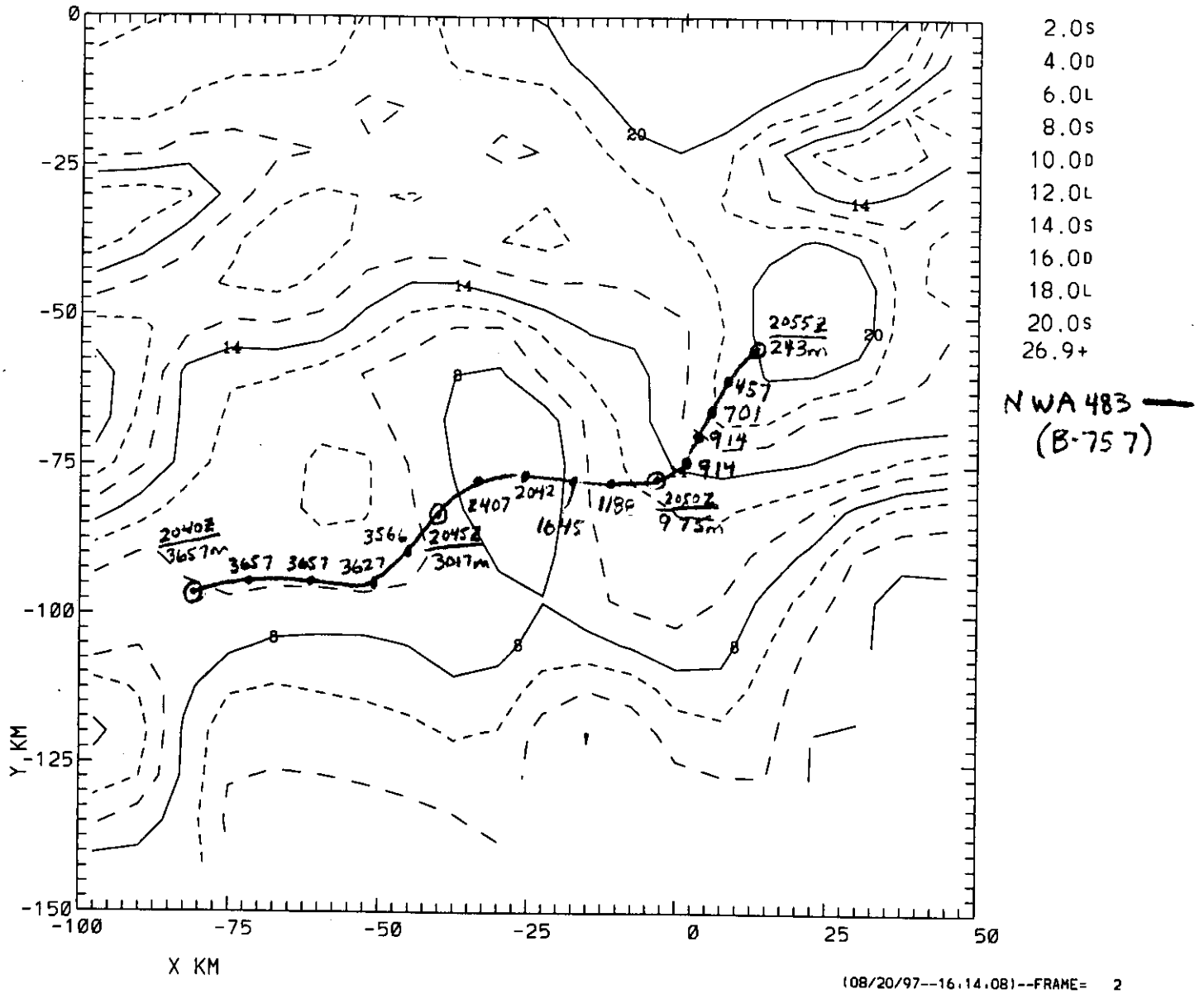
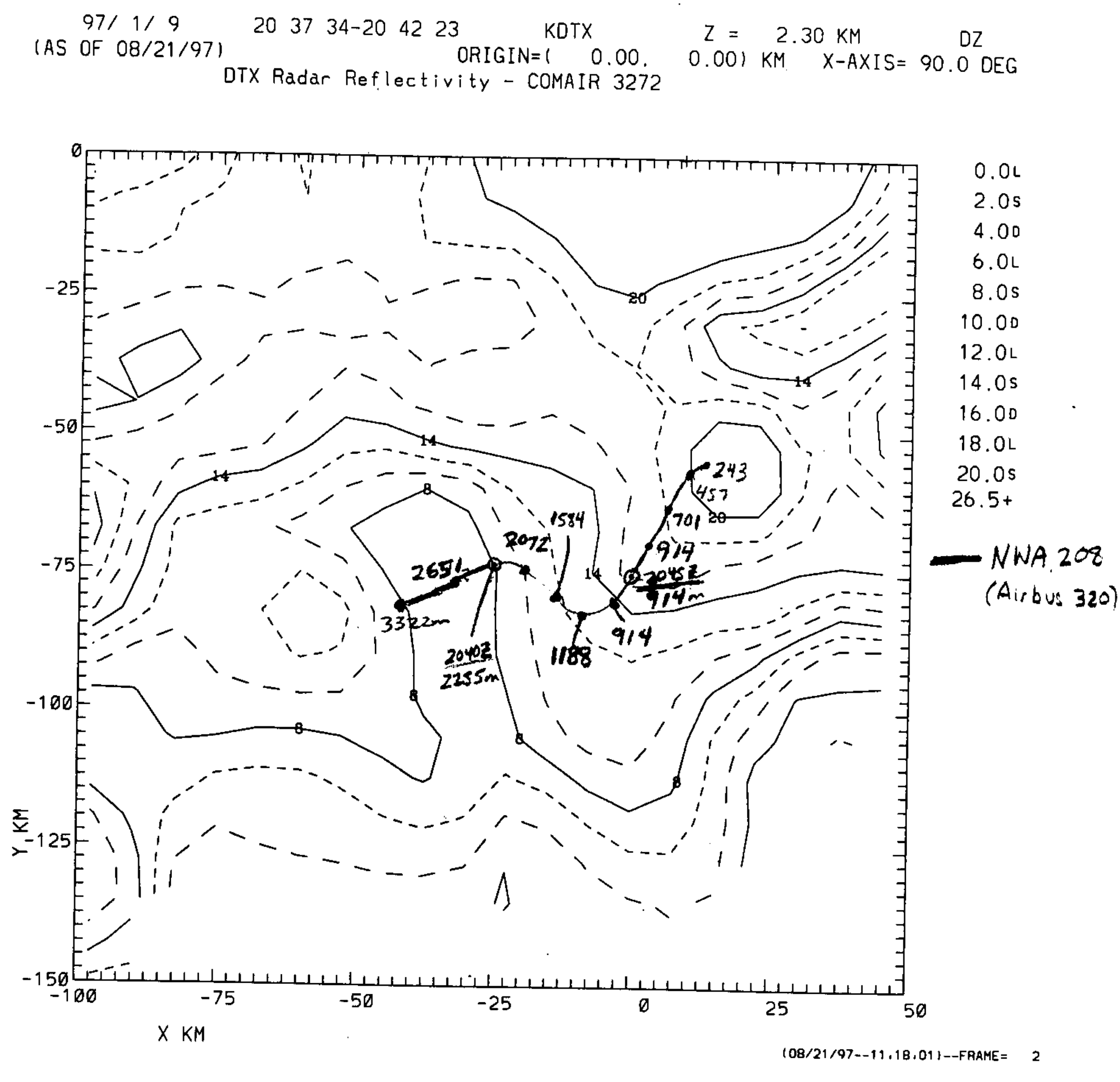


Fig. 5


97/ 1/ 9 20 37 34-20 42 23 KDTX Z = 2.30 KM DZ
(AS OF 08/21/97) ORIGIN=(0.00, 0.00) KM X-AXIS= 90.0 DEG
DTX Radar Reflectivity - COMAIR 3272
0
-25
-50
-75
-100
-125
-150
Y KM
-100
-75
-50
-25
0
25
50
X KM
20
14
14
14
8
8
8
8
8
14
20
0.0L
2.0S
4.0D
6.0L
8.0S
10.0D
12.0L
14.0S
16.0D
18.0L
20.0S
26.5+
243
457
701
914
1584
2072
2651
3322m
20402
2255m
20452
914m
914
1188
NWA 208
(Airbus 320)
(08/21/97--11.18.01)--FRAME= 2

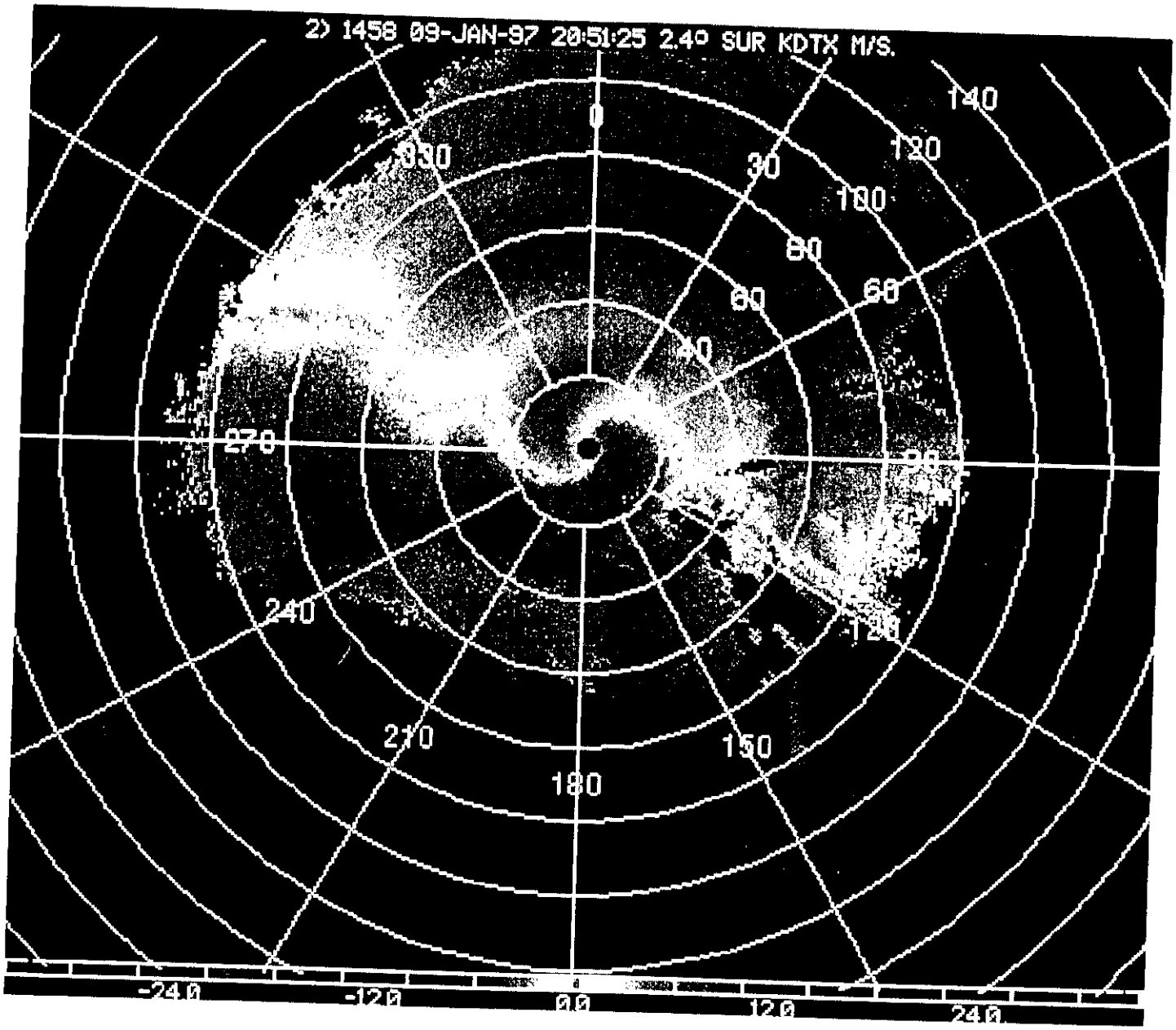
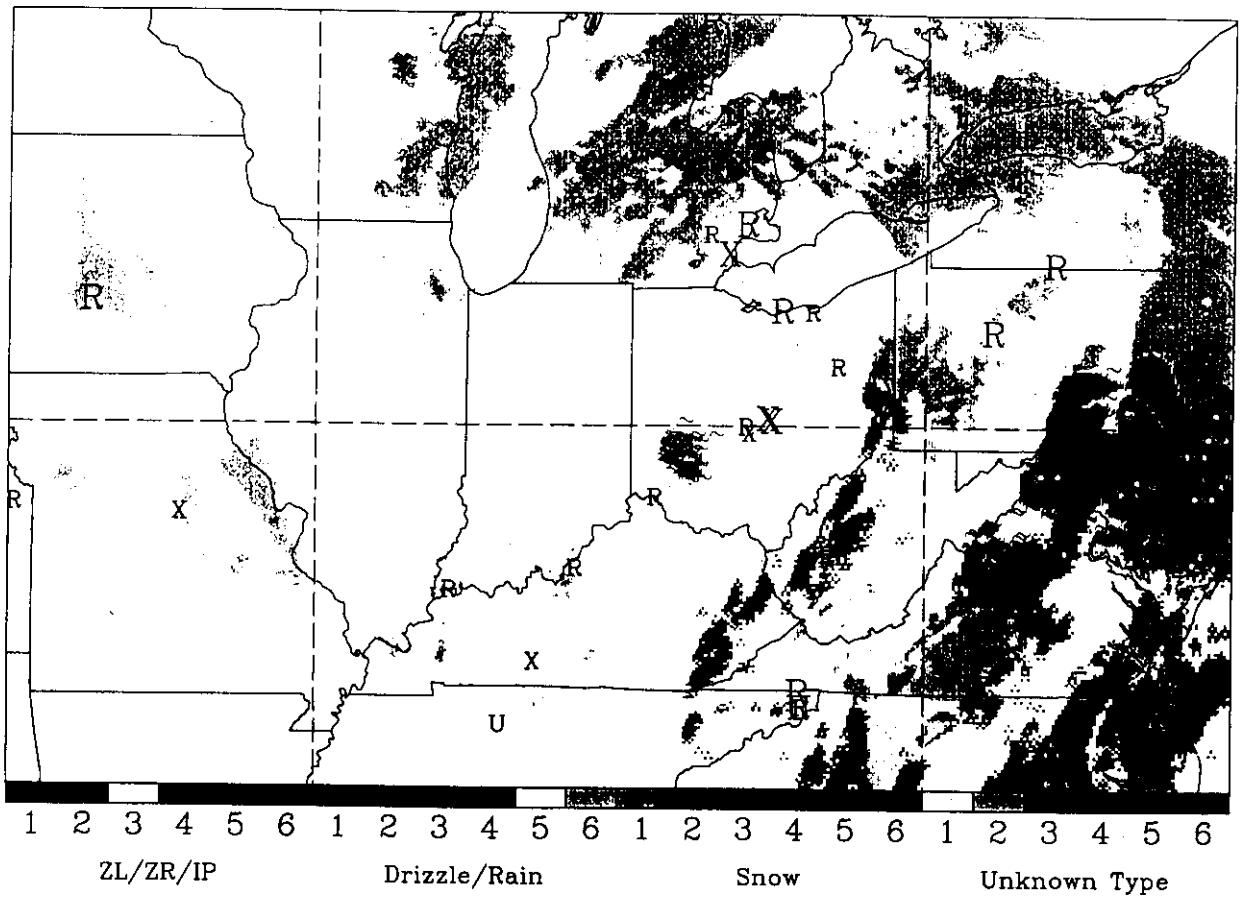

2) 1458 09-JAN-97 20:51:25 2.4° SUR KDTX M/S.
0
30
60
90
120
150
180
210
240
270
300
330
-24.0
-12.0
0.0
12.0
24.0

Fig. 7a

RADAR DATA PLOT FOR 970109 AT 22 Z



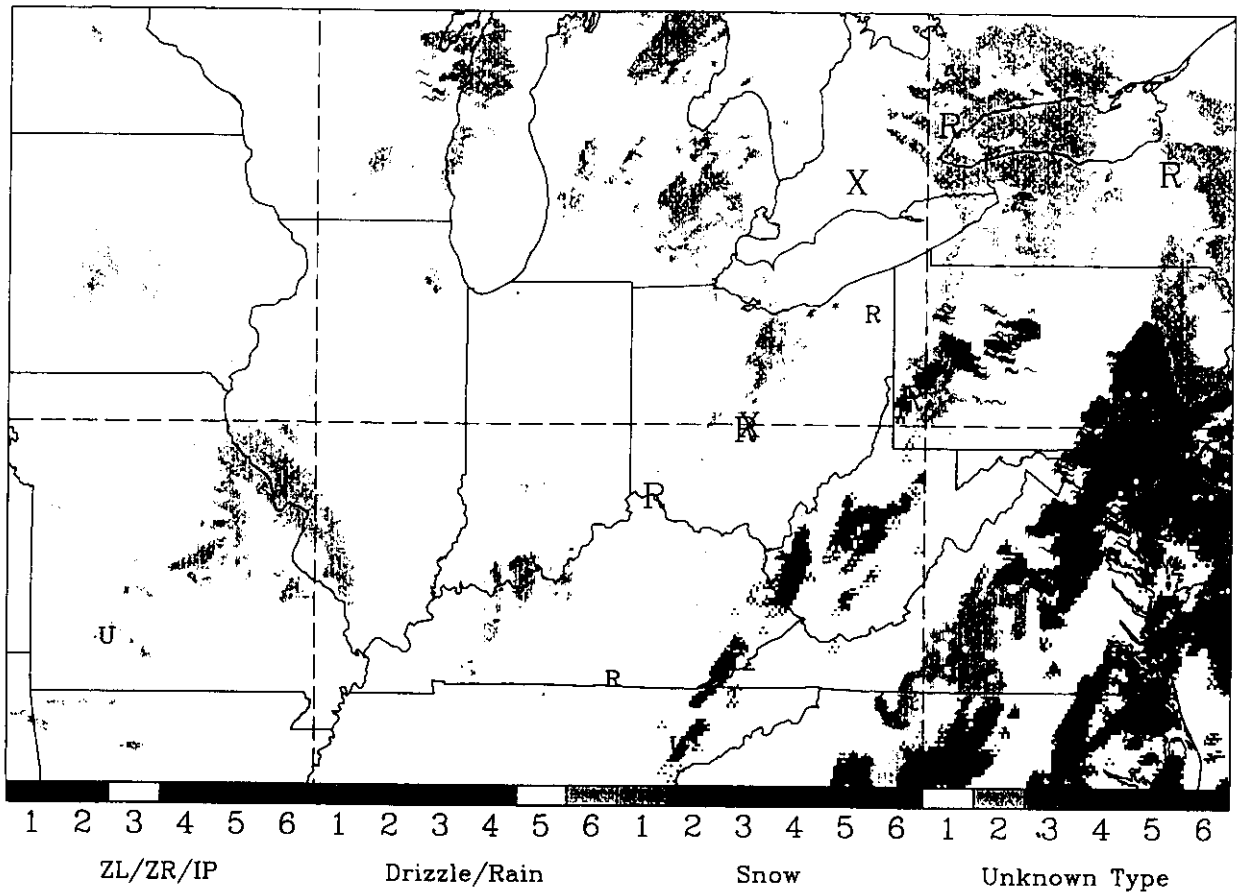
C = Clear Icing	MOD/SEV to SEV = Large
X = Mixed Icing	LGT/MOD to MOD = Medium
R = Rime Icing	TRC to LGT = Small
U = No Type Given	PIREPs are for < 15000 ft MSL

SFC PRECIP SYMBOLS IN YELLOW

ZL	S
ZR	R
IP	L
	TH

Fig. 7b

RADAR DATA PLOT FOR 970109 AT 23 Z



C = Clear Icing
X = Mixed Icing
R = Rime Icing
U = No Type Given

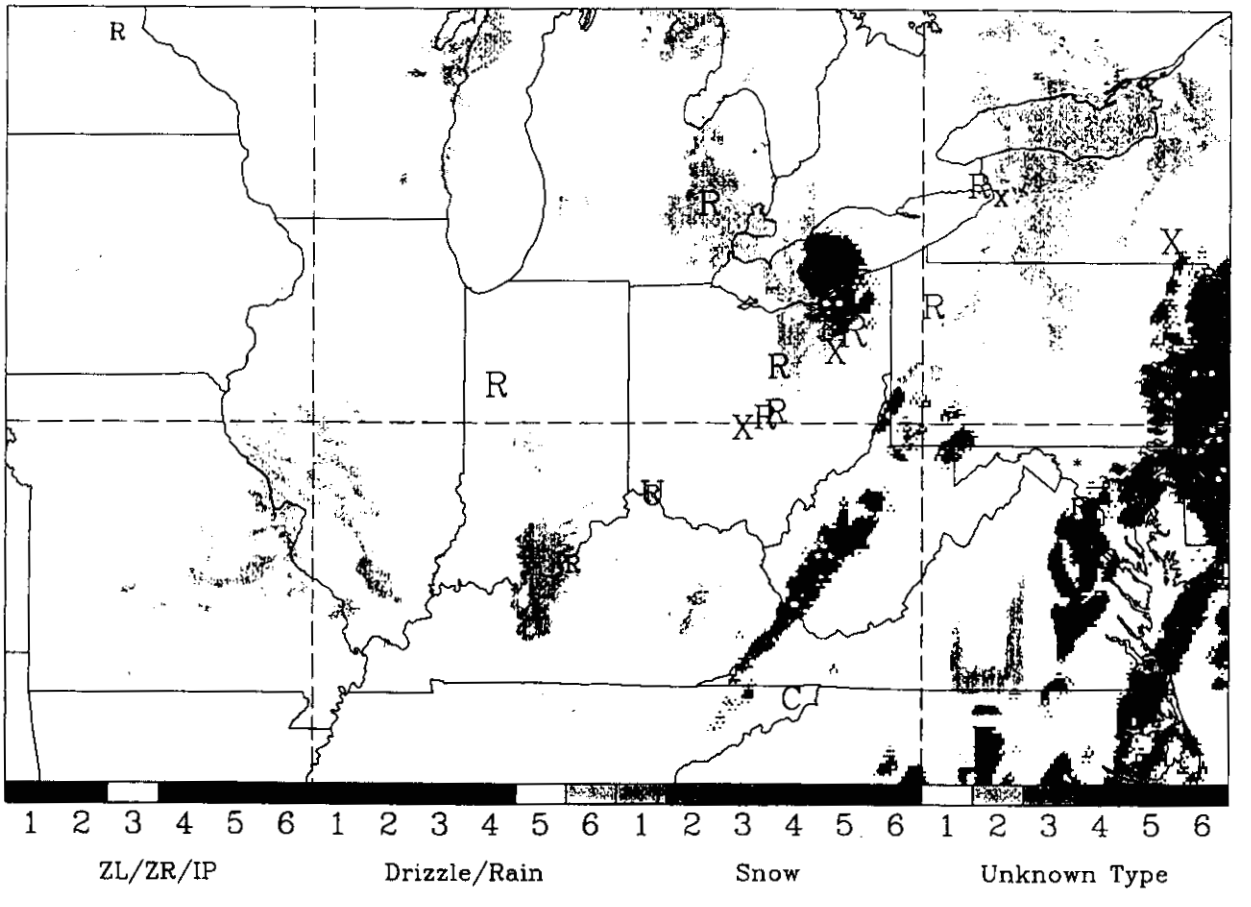
MOD/SEV to SEV = Large
LGT/MOD to MOD = Medium
TRC to LGT = Small
PIREPs are for < 15000 ft MSL

SFC PRECIP SYMBOLS IN YELLOW

ZL	S
ZR	R
IP	L
	TH

Fig. 7c

RADAR DATA PLOT FOR 970110 AT 00 Z



C = Clear Icing	MOD/SEV to SEV = Large
X = Mixed Icing	LGT/MOD to MOD = Medium
R = Rime Icing	TRC to LGT = Small
U = No Type Given	PIREPs are for < 15000 ft MSL

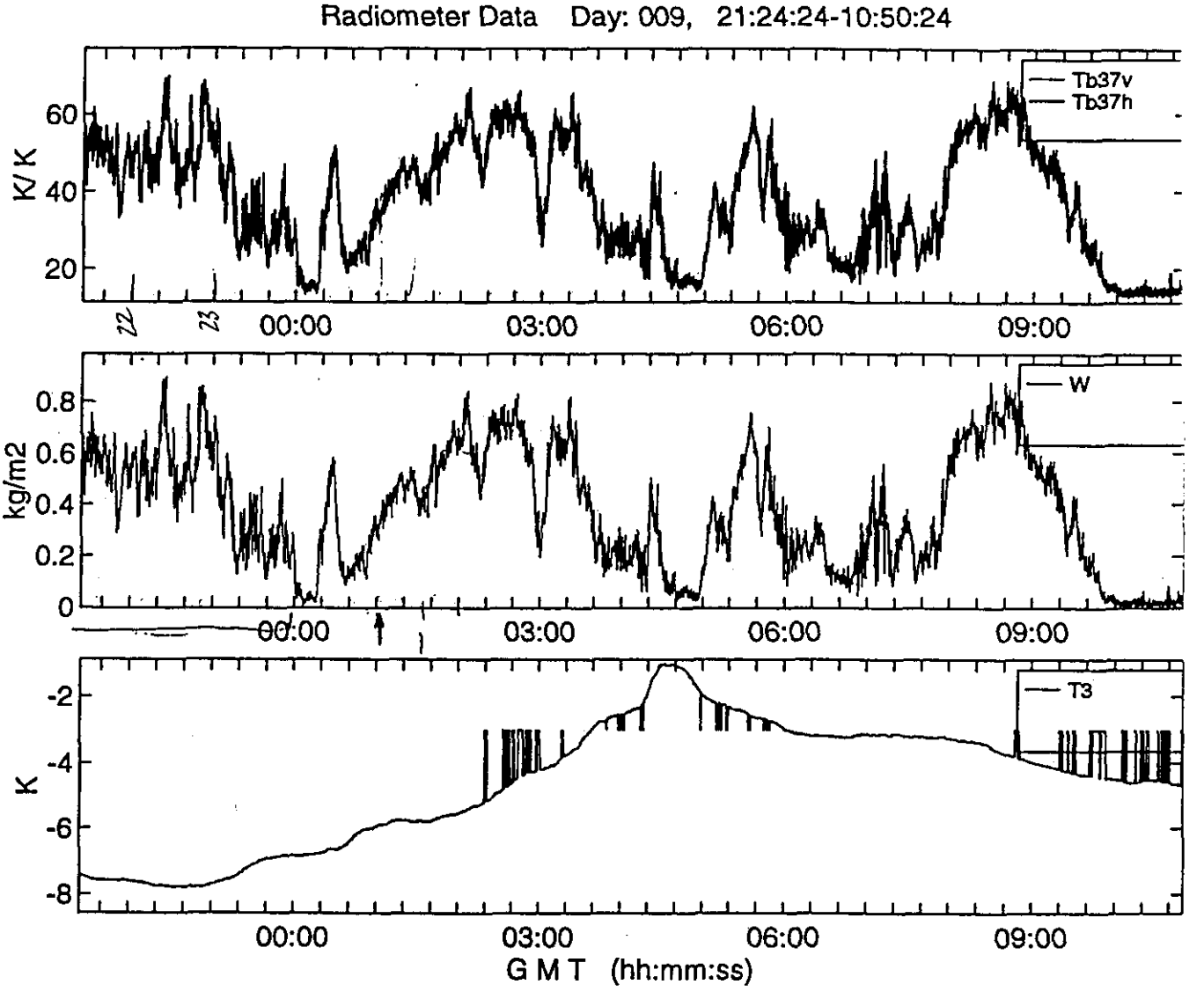
SFC PRECIP SYMBOLS IN YELLOW

ZL	S
ZR	R
IP	L
	TH

Fig. 8

AES radiometer

Toronto area: 43.964N, 79.57W



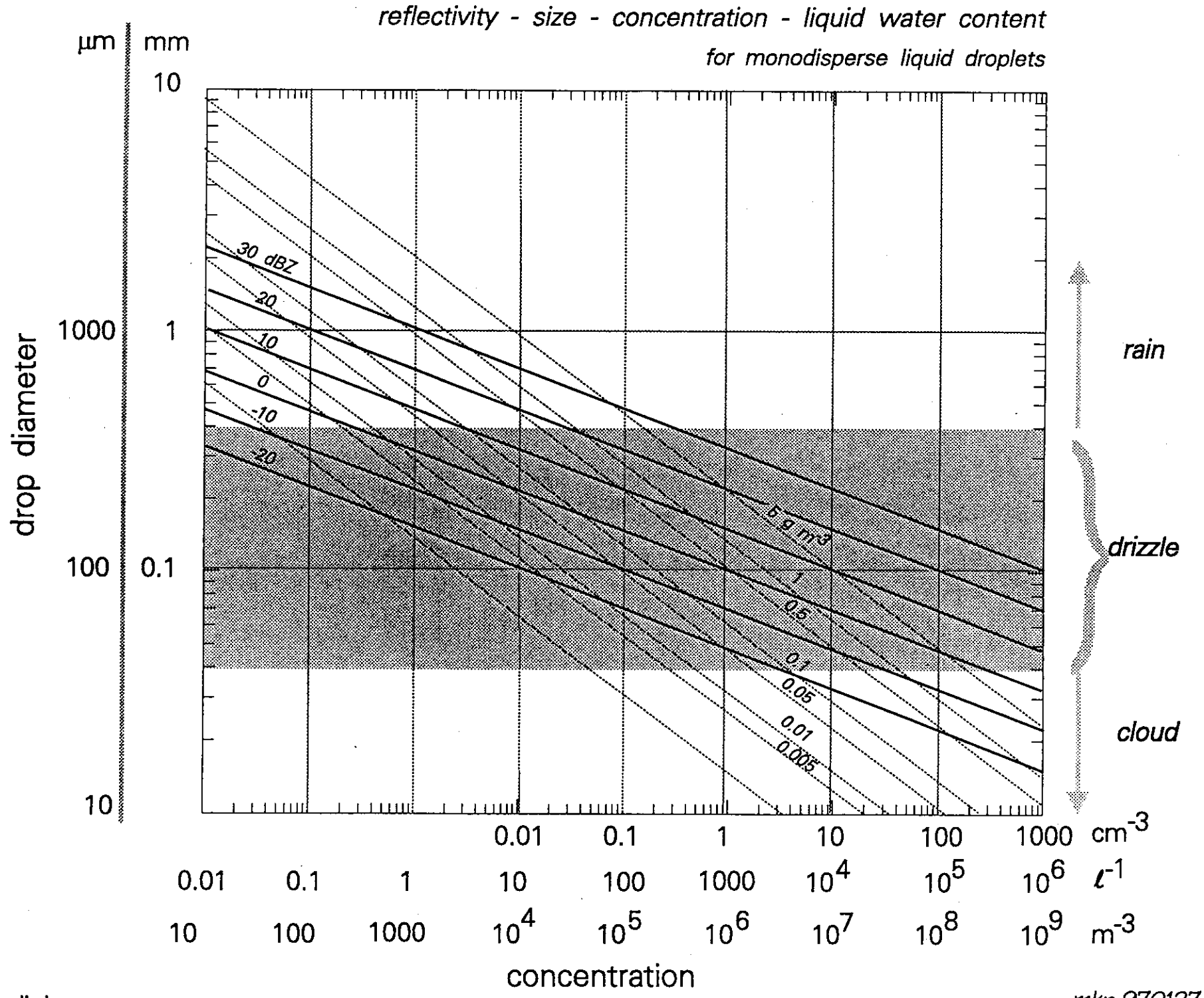

reflectivity - size - concentration - liquid water content
for monodisperse liquid droplets
µm
mm
10
1000
1
100
0.1
10
drop diameter
30 dBZ
20
10
0
-10
-20
5.9 m-3
1
0.5
0.1
0.05
0.01
0.005
rain
drizzle
cloud
0.01
0.1
1
10
100
1000
cm-3
0.01
0.1
1
10
100
1000
10^4
10^5
10^6
ℓ-1
10
100
1000
10^4
10^5
10^6
10^7
10^8
10^9
m-3
concentration
dbzndl.adr
mkp 970127

Fig. 9