Evaluation of Portable Data Collector Potential

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Introduction

In September of 1995 a series of tests were conducted utilizing operational air carrier aircraft in an attempt to determine the potential usefulness that a portable data collector could have in aiding Center-TRACON Automation System (CTAS) performance assessment. The data collector packages consisted of a Global Positioning System (GPS) receiver with portable antenna, a data collection computer attached to the receiver, and a trained observer situated on the flight deck whose primary function was to manually log several parameters from aircraft instruments. Furthermore, ground-tracking radar data from the Federal Aviation Administration's (FAA's) Air Route Traffic Control Center (ARTCC) was acquired for each of the flights conducted. The plan was to determine the potential utility of the resulting data for evaluating CTAS arrival time prediction algorithms.

The three data sets (GPS, radar and observer) have been analyzed and merged into time-correlated data sets for purposes of this analysis. The details of this process are discussed later. In analyzing and comparing the characteristics of these data sets, problems and weaknesses have been identified with each. These are then examined and recommendations for improving performance in subsequent tests are made. The analysis of the resulting raw data is presented in tabular and graphic form in Appendix A.

Data Reduction Process

Figure 1 depicts a CTAS Trajectory/Radar data file. The horizontal and vertical coordinates assumed by the CTAS modeling process comprise the first two sets of data. As is readily apparent, this data is created in significant detail, including modeling the turn maneuvers as segments of an arc. The third set of data is the radar tracking data. This data has been converted to a local X-Y coordinate frame, the results of which are shown along with the (Mode C transponder) altitude and real time. The 'Real_Time' column is in seconds referenced to the base time-of-day stated in the title of the data file (and included in the title of the figure). Also presented are two columns showing the flight progress in terms of path distance along the horizontal trajectory, and cross-track distance relative to that path. (The provision of the CTAS horizontal and vertical trajectory data, conversion of radar to X-Y coordinates, and calculation of flight progress was performed by a post-flight analysis program and is not a normal part of the ARTCC radar data recovery process.)

Due to the scan rate of the ARTCC radar, data updates are available at approximately 12-second intervals. The slow scan rate is one of the fundamental problems in applying exacting wind detection and arrival time prediction calculations involving the radar data. The other two problems identified are the filter lag inherent in the radar data tracking algorithm, and problems identifying and correlating the time corresponding to each data point presented. These problems are explored later.

Figure 1. Example CTAS/Radar data file (UA_1154_9_13) Start Time 09:25:11

Horizontal Trajectory data

ET#	Path_dist (nmi)	Tru_Course (deg)	X-coord (nmi)	Y-coord (nmi)	Del_dist (nmi)	Radius (nmi)	Turn (deg)	X-center (nmi)	Y-center (nmi)
10	82.297	74.08	351.625	421.000	0.0000	0.0000	0	0.000	0.000
9	80.179	74.08	353.662	421.581	2.1180	0.0000	0	0.000	0.000
8	79.920	75.48	353.911	421.649	0.2586	10.5399	1	356.553	411.445
7	25.891	75.48	406.215	435.190	54.0286	0.0000	0	0.000	0.000
6	25.025	80.48	407.060	435.370	0.8657	9.9211	5	408.702	425.586
6	24.160	85.48	407.919	435.476	1.7314	9.9211	10	408.702	425.586
6	23.372	90.03	408.708	435.507	2.5191	9.9211	15	408.702	425.586
5	16.667	90.03	415.413	435.503	6.7056	0.0000	0	0.000	0.000
4	15.899	95.03	416.179	435.470	0.7682	8.8034	5	415.408	426.700
4	15.131	100.03	416.940	435.369	1.5364	8.8034	10	415.408	426.700
4	14.362	105.03	417.690	435.203	2.3046	8.8034	15	415.408	426.700
4	13.594	110.03	418.422	434.971	3.0727	8.8034	20	415.408	426.700
4	12.826	115.03	419.131	434.677	3.8409	8.8034	25	415.408	426.700
4	12.058	120.03	419.812	434.322	4.6091	8.8034	30	415.408	426.700
4	11.290	125.03	420.460	433.910	5.3773	8.8034	35	415.408	426.700
4	10.522	130.03	421.069	433.442	6.1455	8.8034	40	415.408	426.700
4	9.753	135.03	421.635	432.923	6.9137	8.8034	45	415.408	426.700
4	9.611	135.95	421.736	432.821	7.0554	8.8034	46	415.408	426.700
3	5.458	135.95	424.623	429.836	4.1530	0.0000	0	0.000	0.000
2	5.458	135.58	424.623	429.836	0.0000	0.0000	0	424.623	429.836
1	0.000	135.58	428.443	425.937	5.4583	0.0000	0	0.000	0.000

Vertical Trajectory data

Time (sec)	Path_dist (n.mi)	G_alt (ft)	Mach	Vtr (kts)	Vcal (kts)	InFPA (deg)	ENGC	Thrust (lbs)	Wf (lb/hr)	Fuel (lbs)	DAltdt (ft/m)	Vgnd (kt)	Tcour (deg)	WSpd (kt)	WDir (deg)	Temp (degR)	Pres (lb/ft2)
0	82.3	30381	0.817	491.6	317.8	0.00	0	0	0	0	0	508	74.1	19	281	428.8	657.3
18	79.8	30381	0.817	491.6	317.8	0.00	0	0	0	0	0	509	75.5	19	280	428.8	657.3
314	37.6	30381	0.817	491.7	317.8	0.00	0	0	0	0	0	513	75.5	22	273	428.8	657.1
320	36.8	30032	0.817	492.4	320.1	-4.19	-1	315	0	0	-3802	513	75.5	22	271	430.1	667.1
328	35.6	29654	0.812	489.6	320.0	-2.99	-1	294	0	0	-2691	510	75.5	22	272	431.6	678.2
388	27.3	26978	0.772	471.5	320.0	-3.09	-1	82	0	0	-2663	487	75.5	18	279	442.1	760.6
417	23.4	25692	0.754	463.1	320.0	-3.14	-1	-18	0	0	-2659	479	89.6	16	283	447.3	803.0
456	18.3	23946	0.730	452.1	320.0	-3.30	-1	-130	0	0	-2720	466	90.0	15	288	454.4	863.4
485	14.6	22635	0.713	444.1	320.0	-3.34	-1	-202	0	0	-2707	458	103.5	14	291	459.8	911.0
514	10.9	21318	0.696	436.1	320.0	-3.45	-1	-272	0	0	-2745	450	127.2	14	294	465.1	961.0
543	7.4	19988	0.680	428.3	320.0	-3.54	-1	-337	0	0	-2760	441	136.0	14	296	470.5	1013.7
551	6.4	19988	0.660	415.8	310.2	0.00	-1	-253	0	0	0	429	136.0	13	298	470.5	1013.7
580	3.1	19988	0.596	375.5	278.9	0.00	-1	12	0	0	0	388	135.6	13	297	470.5	1013.7
610	0	19988	0.536	338.0	250.0	0.00	-1	155	0	0	0	351	135.6	13	297	470.5	1013.8

X	Y	Alt	Vgnd	Heading	dAltdt	Real_time	Time	Path_dist	Cross_track_dist
351.625	421.000	29000	508	74	-100	7238.34	0.00	82.297	0.000
353.125	421.312	29000	505	77	0	7250.34	12.00	80.769	-0.111
354.750	421.688	29000	503	77	0	7262.34	24.00	79.097	-0.173
356.562	422.000	29000	500	79	0	7274.34	36.00	77.265	-0.325
358.188	422.438	29000	498	76	0	7286.34	48.00	75.581	-0.308
359.688	422.688	29000	496	79	0	7298.55	60.21	74.066	-0.442
361.312	423.125	29000	495	76	0	7310.35	72.01	72.385	-0.426
363.000	423.500	29000	494	77	0	7322.35	84.01	70.657	-0.486
364.562	423.938	29000	493	75	0	7334.35	96.01	69.035	-0.454
366.250	424.562	29000	492	71	0	7346.35	108.01	67.244	-0.272
367.875	425.125	29000	492	71	0	7358.36	120.02	65.530	-0.135
369.438	425.688	29000	492	70	0	7370.36	132.02	63.876	0.019
371.000	426.312	29000	492	69	0	7382.36	144.02	62.207	0.231
372.625	426.875	29000	492	70	0	7394.56	156.22	60.493	0.369
374.250	427.438	29000	492	71	0	7406.36	168.02	58.779	0.507
375.812	427.938	29000	493	72	0	7418.37	180.03	57.141	0.599
377.625	428.500	29000	494	72	0	7430.37	192.03	55.245	0.689
379.125	429.125	29000	495	69	0	7442.37	204.03	53.636	0.918
380.875	429.625	29000	496	73	0	7454.37	216.03	51.817	0.964
382.438	430.188	29000	498	71	0	7466.37	228.03	50.163	1.117
384.000	430.562	29000	498	75	0	7478.38	240.04	48.557	1.087
385.562	431.125	29000	499	72	0	7490.58	252.24	46.904	1.241
387.312	431.625	29000	500	73	0	7502.58	264.24	45.084	1.286
389.000	432.250	29000	501	71	0	7514.38	276.04	43.293	1.468
390.688	432.875	29000	502	70	0	7526.38	288.04	41.503	1.650
392.250	433.500	29000	504	69	0	7538.39	300.05	39.834	1.864
393.750	434.125	29000	504	68	0	7550.39	312.05	38.225	2.093
395.438	434.625	28700	505	72	-300	7562.39	324.05	36.466	2.154
397.062	435.188	28300	505	71	-700	7574.39	336.05	34.752	2.292
398.750	435.812	27800	506	70	-1200	7586.39	348.05	32.962	2.473
400.375	436.250	27300	506	73	-1700	7598.39	360.05	31.279	2.490
402.000	436.750	26900	507	73	-2100	7610.40	372.06	29.580	2.567
403.500	437.125	26400	507	75	-2300	7622.40	384.06	28.034	2.554
405.188	437.250	25800	506	83	-2500	7634.40	396.06	26.369	2.252
406.875	437.125	25100	505	91	-2700	7646.40	408.06	24.934	1.762
408.375	436.938	24500	503	95	-2800	7658.40	420.06	23.662	1.436
410.062	436.688	24000	501	97	-2900	7670.41	432.07	22.019	1.182
411.750	436.438	23600	499	98	-2800	7682.41	444.07	20.331	0.933
414.125	436.188	22900	496	97	-2900	7694.41	456.07	17.955	0.684
415.688	436.000	22500	493	97	-2600	7706.41	468.07	16.405	0.501
417.188	435.688	22100	490	100	-2400	7718.41	480.07	14.948	0.359
417.812	435.438	21500	486	108	-2500	7730.42	492.08	14.306	0.259
419.062	434.938	20800	482	111	-2800	7742.22	503.88	12.994	0.209
421.000	433.500	19600	477	122	-3300	7754.42	516.08	10.611	0.001
422.250	432.875	19300	473	118	-3200	7766.22	527.88	9.292	0.407
423.500	432.000	19100	469	123	-3000	7778.42	540.08	7.794	0.697
423.812	431.375	19000	465	137	-2500	7790.22	551.88	7.128	0.487
424.875	430.438	19100	460	133	-1700	7802.43	564.09	5.716	0.600
426.438	429.125	19000	456	131	-600	7814.23	575.89	3.680	0.799
427.375	428.312	19000	451	131	-300	7826.43	588.09	2.444	0.899
428.562	427.500	19000	446	126	-100	7838.23	599.89	1.033	1.179
429.269	426.746	19000	442	132	-25	7847.43	609.09	0.000	1.156

Figure 2. Recorded GPS Output Data File (UA_1154_9_13)

```
%10:28:59,1084.69,,,$GPGGA,172836,4029.975,N,10558.711,W,1,04,3.0,8556.8,M,19.5,M,$GPVTG,067.0,T,
056.0,M,452.7,N,838.4,K
%10:29:03,1088.53,,,$GPGGA,172840,4030.162,N,10558.130,W,1,04,3.0,8501.2,M,19.5,M,$GPVTG,067.1,T,
056.1,M,451.2,N,835.6,K
%10:29:06,1091.28,,,$GPGGA,172843,4030.323,N,10557.711,W,1,03,2.7,8502.2,M,19.,M,$GPVTG,063.4,T,0
52.4,M,458.8,N,849.8,K
%10:29:09,1094.8,,,$GPGGA,172846,4030.434,N,10557.302,W,1,04,3.0,8426.4,M,19.5,M,$GPVTG,067.1,T,0
56.0,M,450.0,N,833.4,K
%10:29:14,1099.96,,,$GPGGA,172852,4030.723,N,10556.407,W,1,04,3.0,8329.0,M,19.6,M,$GPVTG,067.0,T,
056.0,M,446.2,N,826.3,K
%10:29:17,1102.70,,,$GPGGA,172854,4030.890,N,10555.984,W,1,03,2.7,8330.0,M,19.6,M,$GPVTG,062.5,T,
051.5,M,455.5,N,843.6,K
%10:29:20,1105.45,,,$GPGGA,172857,4030.987,N,10555.596,W,1,04,3.0,8237.7,M,19.6,M,$GPVTG,066.8,T,
055.8,M,445.5,N,825.0,K
%10:29:22,1107.92,,,$GPGGA,172900,4031.116,N,10555.200,W,1,04,3.0,8193.2,M,19.6,M,$GPVTG,066.7,T,
055.6,M,44.5,N,25.1,
%10:29:30,1115.83,,,$GPGGA,17207,4031.488,N,10554.041,W,1,04,3.0,8070.5,M,19.6,M,$GPVTG,067.8,T,0
56.8,M,444.0,N,822.2,K
%10:29:34,1119.78,,,$GPGGA,172911,4031.655,N,10553.461,W,1,04,3.0,8013.3,M,19.6,M,$GPVTG,069.8,T,
058.8,M,443.7,N,821.7,K
%10:29:37,1122.53,,,$GPGGA,172914,4031.765,N,10553.039,W,1,04,3.0,7972.6,M,19.6,M,$GPVTG,071.5,T,
060.5,M,441.6,N,817.8,K
%10:29:40,1125.22,,,$GPGGA,172917,4031.862,N,10552.639,W,1,04,3.0,7937.4,M,19.6,M,$GPVTG,072.4,T,
061.4,M,440.0,N,814.9,K
%10:29:44,1129.29,,,$GPGGA,172921,4031.998,N,10552.012,W,1,04,3.0,7891.7,M,19.6,M,$GPVTG,074.5,T,
063.5,M,438.4,N,811.9,K
%10:29:50,1135.38,,,$GPGGA,172927,4032.170,N,10551.071,W,1,04,3.0,7834.5,M,19.7,M,$GPVTG,077.6,T,
066.6,M,432.5,N,801.0,K
```

Figure 2 presents an example partial set of GPS data recovered from the test. In each line of data, the first several columns are of primary importance. The first item is time-of-day in hh:mm:ss. It is apparent that, while the data rate is higher than the 12-second interval of the radar data, it is variable and unpredictable, running from as little as 2 seconds to as high as 8 seconds in the small example depicted. A second, and more serious, problem encountered is apparent from a closer examination of the data within each record. (Each record consists of two lines in the table shown.) The problem is that characters are dropped on a seemingly random basis, which distorts (sometimes radically) the information and sometimes renders it unreadable. For example, in the third line (10:29:06) a value on the right end just before the letter ‘M’ should be ’19.5’, but the ‘5’ has been dropped. In the eighth line (10:29:22), near the end of the continuation line, the value ’44.5’ should be ‘444.5’, the value ’25.1’ should be ‘825.1’, and a letter ‘K’ should appear at the very end. In the next line (10:29:30), the value ‘17207’ should be ‘172907’. In fact, this particular field is also a GPS time representation, and is keyed to the time tags on the observer data (discussed below). The values immediately to the right are, in order, latitude, (north), longitude, (west), an unknown field, the number of satellites in view, the GPS GDOP (geometric dilution of precision) figure and then the geometric altitude in meters.

The consequences of this data collection problem are more apparent if the original data files from which the Figure 2 data was extracted are viewed in their raw form (see Figure 3). Comparing this raw file to the processed file reveals that three entire records were skipped during reduction because sense could not be easily made of the lines of data. The record at 10:29:12 is missing two commas in the sequence ‘T056.0M’. The record at 10:29:25 is missing two commas in the sequence ‘$GPVTG066.T’. The next record is missing 22 characters in the sequence ‘ ,N’.

Figure 3. Recorded GPS Output Data File (UA_1154_9_13) in Raw Form

```
%10:28:59, 1084.69, , , $GPGGA,172836,4029.975,N,10558.711,W,1,04,3.0,8556.8,M,19.5,M,
$GPVTG,067.0,T,056.0,M,452.7,N,838.4,K
%10:29:03, 1088.53, , , $GPGGA,172840,4030.162,N,10558.130,W,1,04,3.0,8501.2,M,19.5,M,
$GPVTG,067.1,T,056.1,M,451.2,N,835.6,K
%10:29:06, 1091.28, , , $GPGGA,172843,4030.323,N,10557.711,W,1,03,2.7,8502.2,M,19.,M,
$GPVTG,063.4,T,052.4,M,458.8,N,849.8,K
%10:29:09, 1094.8, , , $GPGGA,172846,4030.434,N,10557.302,W,1,04,3.0,8426.4,M,19.5,M,
$GPVTG,067.1,T,056.0,M,450.0,N,833.4,K
%10:29:12, 1097.37, , , $GPGGA,172849,4030.594,,10556.805,W,1,,3.08371.,M,196,M,
TG,06.1,T056.0M,4470,N,27.8,
%10:29:14, 1099.96, , , $GPGGA,172852,4030.723,N,10556.407,W,1,04,3.0,8329.0,M,19.6,M,
$GPVTG,067.0,T,056.0,M,446.2,N,826.3,K
%10:29:17, 1102.70, , , $GPGGA,172854,4030.890,N,10555.984,W,1,03,2.7,8330.0,M,19.6,M,
$GPVTG,062.5,T,051.5,M,455.5,N,843.6,K
%10:29:20, 1105.45, , , $GPGGA,172857,4030.987,N,10555.596,W,1,04,3.0,8237.7,M,19.6,M,
$GPVTG,066.8,T,055.8,M,445.5,N,825.0,K
%10:29:22, 1107.92, , , $GPGGA,172900,4031.116,N,10555.200,W,1,04,3.0,8193.2,M,19.6,M,
$GPVTG,066.7,T,055.6,M,44.5,N,25.1,
%10:29:25, 1110.78, , , $GPGGA,172902,4031.246,N,10554.805,W,1,04,3.0,8152.0,M,19.6,M,
$GPVTG066.T,05.9,M,44.4,.1,K
%10:29:28, 1113.25, , , ,N,10554.424,W,1,04,3.0,8112.5,M,19.6,M,
067.1,T,056.0,M,444.0,N,822.2,K
%10:29:30, 1115.83, , , $GPGGA,17207,4031.488,N,10554.041,W,1,04,3.0,8070.5,M,19.6,M,
$GPVTG,067.8,T,056.8,M,444.0,N,822.2,K
%10:29:34, 1119.78, , , $GPGGA,172911,4031.655,N,10553.461,W,1,04,3.0,8013.3,M,19.6,M,
$GPVTG,069.8,T,058.8,M,443.7,N,821.7,K
%10:29:37, 1122.53, , , $GPGGA,172914,4031.765,N,10553.039,W,1,04,3.0,7972.6,M,19.6,M,
$GPVTG,071.5,T,060.5,M,441.6,N,817.8,K
%10:29:40, 1125.22, , , $GPGGA,172917,4031.862,N,10552.639,W,1,04,3.0,7937.4,M,19.6,M,
$GPVTG,072.4,T,061.4,M,440.0,N,814.9,K
%10:29:44, 1129.29, , , $GPGGA,172921,4031.998,N,10552.012,W,1,04,3.0,7891.7,M,19.6,M,
$GPVTG,074.5,T,063.5,M,438.4,N,811.9,K
```

It is suspected that the dropped characters are an artifice of the data collection computer (and it's software), not the GPS receiver. Extreme care must be exercised in designing for the data collection of serial data streams such as that emanating from the GPS receiver. Interrupt-driven, or DMA channel, techniques must be used in order to guarantee collection of such data with integrity. Otherwise, when the CPU is busy with other tasks, such as formatting a data record and writing to disk, data overruns will occur, resulting in dropped characters as observed herein.

In order to make sense of this data for the present analysis purposes, a two-step procedure was employed. First, the initial processing step of Figures 2 and 3 were performed, resulting in records which were consistent at least to the point where the same number of parameters (separated by commas) were present in each line. Then a second step was performed. A program was developed which converted the GPS latitude/longitude data to X-Y coordinates consistent with the coordinates of the radar data. To do this, the equations from the C-language source program listings provided in the EGADS folder, and the local Denver stereographic projection coordinates in the MAP2 file, were employed. At the same time, each of the raw GPS parameters of interest was tracked in a loop to identify ''outliers" which resulted from dropped or distorted characters. Where these outliers were found, the entire data record was dropped. The end result was a consistent, accurate set of data, although it was of course somewhat more sparse than the original data output by the receiver.

The final computational step in data processing was to merge the three data sources (radar, GPS, and observer) into one time-correlated data set, and to derive values for GPS ground speed and track angle at that time. To achieve a consistent time basis, the time references that were used to tag the radar data and the GPS information were examined. GPS of course provides its own highly accurate (potentially) time standard, which is a part of the data output stream that was acquired by the data acquisition computer. GPS time, however, differs by a known amount (several seconds) from UTC. The radar data files are annotated with local time; however, it is not known exactly how accurate that this time standard is in comparison to UTC. Furthermore, the output from the radar data-tracking algorithm is the data that is time-stamped. This may lag the raw radar return information by several seconds.

Furthermore, there is another apparent discrepancy between the time-stamp assigned by the data collection computer (which applies to the GPS data and observer data) and radar time. To assess the validity of the time stamp, the converted GPS X-Y data and the radar X-Y data were matched up manually. The time offset was noted. The value of that offset ranged from –120 seconds to +180 seconds, and seemed to group around multiples of 60 seconds. While the source of this even-minute clustering is not known, it is suspected that it is the result of errors in time initialization either of the data collection computer or in the annotation of the radar data. Regardless of cause, and because of the other sources of time uncertainty mentioned, and because assessment of the radar data (while of interest) was not the primary objective of this analysis, the offsets derived in the manual match-up process were used as the basis of the data merge.

In the merge process, the GPS data was interpolated to determine probable GPS information at each of the radar data points. The GPS data was averaged over a seven-point interval (roughly 20 seconds) in order to match the radar data point and to derive ground speed and track angle information. An important distinction should be made here in comparing the GPS with the radar data. The GPS data was available in raw form on a historical basis. The radar data available to us was the output of the tracking algorithm employed in real time in the ARTCC computer. Raw radar return data was not available for this analysis. A real-time tracking algorithm necessarily introduces lags in the resulting information. The processed GPS data outputs, being based on a historical data file using averaging over a time interval around the desired point in time, results in no such lag and exhibits a high degree of accuracy. The resulting differences, particularly in ground speed and track angle, are quite apparent, as will be addressed later.

A primary objective of this analysis is to determine the degree to which accurate, timely winds-aloft information can be derived. It is not possible to determine winds aloft from either the radar data or the GPS raw lat-lon output alone. Two sources of wind information do exist, but both are dependent on the ability of the observer to accurately notate information in real time. In some cases the observer annotated wind magnitude and direction as derived by the FMS and available directly from the FMS system outputs. In other cases, due to the absence of direct wind magnitude and direction data, the quantities altitude, OAT (outside air temperature), IAS (indicated air speed) and heading data were recorded. In some cases, all of the above were collected. In those cases where IAS, altitude and OAT information are available, TAS (true air speed) was calculated by the analysis program during the data merge process. In cases where OAT was not recorded, TAS was derived assuming an ISA atmosphere. In some cases, actual

TAS readings were recorded, avoiding the need for OAT, IAS and altitude. Based on TAS and heading (and local magnetic variation), airmass velocity was compared to GPS velocity to derive winds. The outputs presented here contain (where applicable) both the airmass-derived winds and the observer recorded (FMS) winds.

The process of automatically grouping observer data (since IAS, altitude, OAT and heading are all needed) in order to derive winds was found to be rather problematic. Sometimes, three of the items were available within a reasonable period of time, but not the fourth. This process could certainly be improved in the future. For example, the OAT data could be pre-processed to obtain a temperature profile that could be interpolated to match points where the other three items are available. Also, there are other good sources of altitude information that can be used to fill in the gaps in altitude data. Also, a degree of crosschecking of the manual data could be performed in order to correct or throw out misleading readings. The results that are presented here are based simply on logical groupings of the raw data.

Data Analysis and Tabular Results

After the merge was complete, the output was converted to Excel for presentation and plotting. The results are presented in Appendix A. Data is presented in tabular form, and graphically as a series of four plots. The tabular output is presented in three sections. Refer, for example, to table A.8 in the appendix. On the left, the GPS data is presented: latitude, longitude, altitude, X, Y, ground speed, track angle, # satellites in view and GDOP. The middle section presents the radar data: (transponder) altitude, X, Y, ground speed and track angle. The right-hand set of columns present the manually observed data, along with results calculated from that data. Observed data include altitude, OAT, IAS, heading, and (where collected) observed wind bearing and wind magnitude. Comments were also occasionally recorded. The next column is TAS, whether it was calculated or observed (observed values, where available, were used preferentially in the calculation of winds). The final two columns are the calculated values for wind bearing and magnitude. These are presented where possible regardless of whether observed wind information was recorded.

Four data plots are presented for each case. Refer, for example, to figure A.8 in the Appendix. The first plot (upper left corner) is simply an X-Y plot including both the radar and GPS data. In most cases, these curves directly overly each other (there are some exceptions). The second plot (upper right) presents altitude information. The radar (dots) and GPS (squares) altitudes are presented, and where recorded, the observed data is shown as small triangles. The altitude plot was chosen to be the place to plot GPS GDOP, since anomalies in GPS altitude often correlated with occurrences of high GDOP. GDOP is scaled on the right-hand axis. The third plot (lower left) presents bearings and other angular data. The radar track angle (dots) and the GPS-derived track angle (squares) are shown. The observer-recorded heading is shown as triangles (note that heading is magnetic, while the other angles are true). Where available, observer-recorded wind bearing is shown as ‘x’ symbols. Calculated (based on other observer data and the GPS data) wind bearings are shown as ‘crossed-x’ symbols. The final plot (lower right) presents velocities. The radar ground speed (dots) and GPS-derived ground speed (squares) are depicted. Where available, calculated or directly observed values for TAS are presented as triangles. Observed wind speed (‘x’) and calculated wind speed (‘crossed-x’) are shown.

A casual examination of the tabular data quickly reveals cases where considerable effort was exerted by the observer to record needed data throughout the flight case (such as table A.6) as opposed to cases where relatively little was collected (see table A.11). Note that it may not be fair to judge the efforts of case 11, since apparently other problems prevented collection of the other requisite data, resulting in a very short case where only the lower portion of the descent is presented.

To get a closer look at problems such as sparse data, and to get a picture of the character of the observer data collected, the summary chart in table 1 was prepared. Two cases where only abbreviated data was available are cases 11 and 15. In case 11, only the latter portion of the descent is available due to an abrupt, significant GPS time and altitude shift (accompanied by a large drop in GDOP) that occurred midway through the descent. In case 15, only the very early portion of the flight, still at cruise altitude, was available because the GPS data set terminated early. An example of a poorly conducted task of observation is case 20. In this case, altitude and OAT were collected, not heading. TAS was collected but mislabeled; the actual data was IAS, not TAS. Since heading was not recorded, winds aloft could not be calculated. Data collection procedures in most of the other cases were quite good, however.

The data collection parameters recorded fall into a few basic groups. First are the cases where altitude, IAS and heading (with and without OAT) were collected (cases 1-5, 11, 12, 13, 15, 21-25 and 30). In these cases, TAS could be calculated from the IAS information, and winds aloft could be calculated from the TAS, heading and GPS velocity data. Supplementing these cases were those where TAS was directly observed (cases 6, 7, 9, 10, 14, 20 and 31). The calculation of winds aloft in this analysis used TAS if available, ignoring IAS data in those cases. This produced one anomalous analysis in case 9 where the recording of TAS was present, but rather sparse. More wind data could have been calculated had the TAS been ignored and the IAS data utilized in that case.

In one case (27) direct observations of wind bearing and magnitude data from the FMS were recorded, but insufficient altitude/IAS/heading data were noted to perform independent wind calculations (the heading data was quite sparse). In the remaining cases where FMS wind data were observed (8, 16-19, 26, 28 and 29), sufficient altitude, heading and IAS or TAS data was collected to achieve very valid comparisons of the air-derived, real-time wind estimates to the post-flight calculation results. The resulting plots for these last cases are perhaps the most interesting.

Table 1. Observer Data Collection Characteristics

Figure	Case	Alt	IAS	OAT	Hdg	W_Brng/Mag	TAS	Calc Winds
A.1	ASH_7491_9_14	Y	Y	Y	Y			
A.2	ASH_7491_9_15	Y	Y	Y	Y			
A.3	ASH_7491_9_19	Y	Y	Y	Y			
A.4	ASH_7725_9_13	Y	Y	Y	Y			
A.5	ASH_7725_9_14	Y	Y	Y	Y			
A.6	UA_132_9_19	Y	Y		Y		Y	
A.7	UA_132_9_26	Y			Y		Y	
A.8	UA_286_9_21	Y	Y		Y	Y		
A.9	UA_296_9_20	Y	Y		Y		Y	Sparse TAS
A.10	UA_296_9_22	Y			Y		Y	
A.11	UA_470_9_27	Y	Y	Y				Sparse data
A.12	UA_470_9_28	Y	Y	Y	Y			
A.13	UA_470_9_29	Y	Y	Y	Y			
A.14	UA_724_9_13	Y			Y		Y	
A.15	UA_724_9_28	Y	Y	Y	Y			Sparse data
A.16	UA_746_9_26	Y			Y	Y	Y	
A.17	UA_746_9_27	Y			Y	Y	Y	
A.18	UA_746_9_29	Y	Y		Y	Y	Y	
A.19	UA_760_9_21	Y			Y	Y	Y	
A.20	UA_796_9_21	Y		Y			Y	N-no heading
A.21	UA_796_9_29	Y	Y	Y	Y			
A.22	UA_1103_9_12	Y	Y	Y	Y			
A.23	UA_1154_9_13	Y	Y		Y			
A.24	UA_1154_9_15	Y	Y		Y			
A.25	UA_1154_9_25	Y	Y	Y	Y			
A.26	UA_1180_9_20	Y			Y	Y	Y	
A.27	UA_1180_9_21	Y	Y		Y	Y		N (heading sparse)
A.28	UA_1618_9_13	Y			Y	Y	Y	
A.29	UA_1618_9_15	Y	Y		Y	Y		

A.30	UA_1790_9_19	Y	Y	Y		
A.31	UA_1790_9_27	Y		Y		Y

Graphic Results

In the majority of the cases, the radar and GPS X-Y data overlaid so closely at the scale presented that they are virtually indistinguishable. There is one very notable exception (case 6) and four cases where a minor departure is depicted (4, 14, 22 and 23). In case 6 the points depart by several miles. Looking ahead to the Altitude plot where GDOP is shown, it can be seen that GDOP starts at a high value (>4.0) and gets higher as the flight progresses. As shown in the accompanying table, only 3 satellites are in view throughout the flight. The conclusion is that the GPS data is in this case relatively useless; therefore, any conclusions regarding wind estimates are suspect. In case 4, 22 and 23 the GDOP values remain quite nominal. In case 14 GDOP is quite high through most of the flight.

The altitude plots also tell a story relative to GDOP. In a few cases, the GPS was unable to estimate altitude, or terminated that estimation at some point, or interrupted altitude updates for brief periods of time due to lack of confidence (within the GPS receiver) in the data available to it. For example in case 6, which was addressed above, the GPS altitude never deviated from its estimate near 39000 ft. In case 14, the GPS froze altitude data after reaching 24000 ft. In most of the cases, the GPS data tracked the radar (mode-C transponder) data quite well. For example, in case 8, where GDOP is low, the altitude plots track closely. There is a significant difference between the two values for altitude at any point due to the fact that the GPS number is a geometric altitude above the GPS datum, while the radar number is the flight level reported by the transponder (uncorrected, of course). The observer data seems to track well also, although it should, logically, track the radar plot more closely since it is also a flight level value. The next case (9) is an example where this is true.

There are a number of cases where the sensitivity of the GPS receiver's estimate of altitude to GDOP is quite apparent. For example, in case 4 at roughly 10:40:30 the GDOP figure spikes briefly, accompanied by a dip in the GPS altitude figure. Later, at roughly 10:45 GDOP jumps up, accompanied by a temporary 'level off' in GPS altitude even though the radar track demonstrates a relatively constant descent. In case 9 at roughly 10:01:30 the GDOP figure is unsteady, along with a commensurate fluctuation in GPS altitude, even though the aircraft is at level cruise. In case 12 unsteadiness in the GDOP figure at 13:02 is accompanied by an upward 'bulge' in the GPS altitude plot while the aircraft is at level cruise. Case 17 demonstrates a situation where the two altitude values track very closely during a rather unsteady descent. However, late in the descent, at roughly 13:01, GDOP increases and the GPS ceases updating altitude altogether.

The last two plots for each case should be discussed together, since they represent two aspects of the velocity vector, bearing and magnitude. Two basic quantities are depicted: aircraft velocity, and wind velocity. Looking at the 'Bearings and Winds' plot for case 3, it can be seen that the radar tracker estimate for aircraft track angle, and the post-flight derived value for GPS track

angle closely agree. Similarly, the 'Speeds and Winds' plot shows relatively close agreement for aircraft ground speed, although the smoothing and lag of the radar tracker algorithm is quite apparent relative to the noisier, but more accurate, GPS estimate. There are several observer-recorded heading points shown on the 'Bearings' plot that agree closely with the track angle also. However, this will not be generally true because, first of all, heading is influenced by winds, and, second, heading is magnetic while the track angle measures are true bearings. The local magnetic variation is 11° east. On the corresponding 'Speeds' plot the 'observer' TAS points, which were calculated from the observed IAS, altitude and OAT values, are in the neighborhood of the ground speed curves, differing by winds.

These plots also depict wind bearings and magnitudes. Where the observer noted FMS winds, they are plotted along with the observed-data (post flight) derived winds. In this case only the derived winds are available. It should be mentioned at this point that the estimation of wind speed and bearing from the data that we have available is potentially tenuous. The fact that calculated wind is the (relatively small) vector difference between two large vector quantities means that small errors in the original quantities lead to large errors in the result. However, the estimation of winds is critical to the objective of assessing CTAS arrival time prediction impacts. Errors in the GPS-based estimate of velocity, errors in the notation of the observed data, and errors in time correlation of the two can all be amplified in the wind estimation process. The GDOP measure is therefore of significant interest, as is a manual review of the observer data prior to performing the calculation. Such a review was not conducted here, and there are examples where the wind estimates fluctuate considerably. However, the varying time interval required for collecting the four necessary parameters (altitude, OAT, IAS and heading) is an error source. It is significant that we have cases where both the FMS-derived wind estimates and observer data-derived estimates exist to serve as a cross check.

There are several examples where the two wind measurement techniques are shown to correlate closely. For example, in case 8 both wind bearing measures hover around a value of 285°, while the wind magnitudes track so closely that they almost overlay each other. This is certainly a validation of the observation technique that was used. This case, however, involves a straight aircraft course. Case 27 involves a turn initiated at 13:12. The source data for calculating winds is sparse in this case, so it is difficult to draw firm conclusions. However, prior to the turn, the derived wind bearing and speed values track the FMS values well, while during the turn they are significantly different. The bearing values differ by 70 to 90 degrees, while the magnitudes differ by roughly 100 knots. Unfortunately, this is the only comparative case we have where observer TAS must be calculated from altitude, IAS and OAT, and that also involves turning maneuvers. The only other such case is 29, which again involves a straight course (and closely agreeing values for FMS winds and derived winds similar to case 8).

There are some cases where TAS must be calculated where self-consistency of the resulting wind estimation can be used as the basis for evaluating this method during a turning maneuver. For example, in case 12 a significant turn starts at 13:10:30. With the exception of one "wild" point at 13:11:01, the wind bearings remain relatively constant, and speed is steadily (and consistently) diminishing. The 'wild' point relates directly to the time-correlation issue mentioned earlier. The wind was calculated based on a stale heading value of 90° although the actual heading had changed (at the point in time where the calculation was made) to 120°. Improved processing

algorithms could probably avoid many such situations. A similar result occurs in case 13. Here, stale measurement data results in three 'wild' points starting at 13:14:18. The first two result in erroneous wind bearings, and the third results in an erroneous speed value. The data then settles back to its original consistency.

There are several cases that involved turning maneuvers where TAS was observed directly (avoiding the calculation of TAS from IAS). In some of these cases FMS wind data was also recorded, enabling a direct comparison to be made. Case 16 is interesting because there are 'wild' data points during the straight portion of the route as well as during the turn. The wind magnitude calculation remains relatively smooth (and in agreement with the FMS data) during the time period from 13:00:00 to 13:01:59, but two erroneous wind bearing values occur. The first is a shift of 140° at 13:00:47 and a shift of 100° in the other direction at 13:01:47. The underlying data (TAS, heading) appear smoothly changing, indicating that the cause is rather subtle. Indeed, through that period of time the heading numbers and GPS track bearings are almost perfectly constant. The cause is related to the fact that TAS (during the descent) is rapidly diminishing, and thus it is the staleness of the TAS information that is causing the problem during the straight segment. The turn starts at 13:03:11. From that point, the remaining calculations disagree sharply from the FMS winds. This is due primarily to staleness in the heading data.

Case 17, which involves a similar route, is very similar to case 16 except that there are no wild data points prior to the initiation of the turn. Once the turn point is reached, some wild points crop up. Case 18 also involves the same route, but with considerably different results. In this case the calculated wind information is basically in error throughout the descent. This seems to arise for several reasons. The initial part of the descent (from 12:54:00 until roughly 12:56:00) is conducted at a high descent rate (3800 ft/min) in comparison to the other two flights (2400 ft/min typical). This aggravates the data latency problem involving the TAS information. The FMS detected consistently high winds (averaging 60 knots) that were almost entirely in the cross-track direction. This by all rights should have resulted in a significant deviation of observed heading from track angle (crab angle). However, during the descent the heading was a constant 95° (magnetic, equals 106° true), while the GPS track angle remained at 108°. Inevitably, the result of the calculation would be a small wind magnitude (it averaged about 20 knots throughout that period). Obviously, when the wind is in the cross track direction, calculation of its magnitude and direction are extremely sensitive to errors in measuring or reading heading.

Case 19 involves flight along a route similar to cases 16 through 18. In this case the wind detected by the FMS is almost a perfect tailwind, and the results of the wind calculation agree reasonably well in both bearing and magnitude. During the turn portion, an erroneous bearing value is determined, most likely due to a stale value for heading. Case 26 is similar (also involving a tailwind). There is good agreement between the FMS and calculated wind data, even during the turning maneuver.

Findings and Recommendations

Flaws in the methods used for acquiring and processing this data have been found in all three aspects of test instrumentation: the technical, procedural and data analysis aspects. These have had serious consequences, but virtually all are amenable to corrective action.

Technical Aspects

The two primary technical problems found lie in the functioning of the GPS system and the data collection system. The GPS was found to experience significant periods where high GDOP resulted in erroneous and inconsistent results. This is partially due to the nature of the temporary antenna installation that was used, and so may be unavoidable in future tests. This is not necessarily a major obstacle. GPS coverage analysis can be used (considering the geographic region of interest, the aircraft headings involved and date and time of flight) to minimize this problem by avoiding flights at times when poor satellite coverage is anticipated. Another factor that will result in improved performance in future tests is the fact that the GPS Selective Availability function, where random errors were intentionally introduced in the unsecure channel, has been discontinued, and resulting GPS performance is greatly improved.

The software design of the data collection computer needs to be improved to avoid data overrun errors (and resulting loss of characters). This is really not difficult to do if an interrupt-driven data channel design approach is used. It is of course possible to utilize the data in the form in which it was collected; the consequence is that some data records are lost, and there is always a chance that an erroneous data character is mistakenly interpreted as valid. Methods to minimize the number of keystrokes required of the observer in recording the data observations should be looked into as well. The more easily the data can be entered, the more often data points can be taken, reducing the possibility and severity of the latency (or staleness) problems that were experienced.

Procedural Aspects

Two major procedural issues were uncovered in this analysis. The first regards time correlation between the radar data and the airborne data, and the second regards the procedures used for collection of manual observations. In flight testing, time correlation between disparate data sources is a perennial problem. In theory, GPS time can be related directly to Universal Coordinated Time (UTC). GPS time differs by a fixed number of seconds based on the number of leap seconds that have occurred since January 1, 1970. This information is available on the Internet from the United States Naval Observatory. The time value contained in this data was examined for several cases, and very little sense could be made of it. Differences (between GPS time and local time) on the order of ten minutes or so were commonly found. Furthermore, shifts of multiple seconds were observed at points where GDOP shifts. The solution to this problem hopefully lies in the use of a more modern GPS receiver that provides a reliable time value. It was not possible to judge the quality of the time stamp on the radar data. Two sources of error are likely. First, it is not known how closely the ARTCC clock is calibrated to UTC. Even if it is not, UTC-slaved clocks can be utilized by a ground observer to calibrate the radar time stamp. The other issue regards latency of any given radar point relative to its time stamp.

The time stamp probably relates to the time of filter processing output (the time that a radar display would be updated) rather than the specific instant corresponding to the radar hit on the target. In an ideal world, both the tracker output (and its time stamp) and the raw range/bearing/altitude hit information, with its time stamp, would be available (they would not need to be provided in a single database; they could be merged later). This would allow evaluation of the tracker algorithm as it influences the CTAS arrival time prediction process.

The second procedural issue regards the manual collection of airborne data by the observer. The first issue regards the parameters collected. It is quite apparent from the graphical results that the FMS wind estimates are more accurate and reliable than the post-flight estimates that are based on observed parameters. They are also not very sensitive to latency problems; a wind reading that is merged a few seconds late is still an accurate reading. However, the result of calculations based on non-simultaneous readings of heading, TAS, etc. can be wildly inaccurate. Furthermore, the calculation of winds based on manually noted heading information is fraught with difficulty. Particularly in crosswind situations, for example, a one-degree error in heading information can have a sizeable impact on the resulting wind estimate.

Where FMS winds are not available, the manual reading of altitude, OAT, IAS (and/or TAS) and heading can, within limits, result in good information. It was not obvious from the results examined here that the direct availability of TAS information proves superior to deriving TAS from IAS, altitude and OAT. However, eliminating the need to record all three of those parameters greatly reduces the manual workload level, meaning that data can be recorded more often during critical phases of flight (particularly during turning maneuvers). Of that list of parameters, altitude is least important since both radar and GPS altitude are available. In the absence of radar altitude, a few scattered altimeter readings could be used within the data reduction program to model the altitude profile accurately based on the GPS information. Likewise, OAT does not usually change radically. Relatively sparse OAT data could be used to define a temperature profile during the descent. The time-critical items are airspeed (whether IAS or TAS) and heading. These must be recorded often, and each pair should be recorded in quick succession (particularly during turns).

Data Analysis Aspects

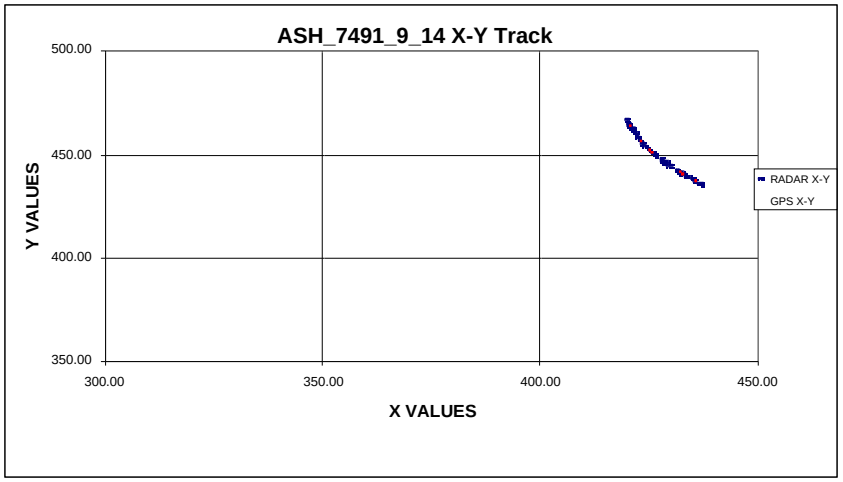
Steps could be implemented to improve the quality of the wind information derivable from such data (indeed, even from a reanalysis of the present data). For example, the basic approach used here was to average and interpolate and merge the GPS data at each radar time point, and then to let the observed data slip into the nearest appropriate time slot. This resulted in output data records every twelve seconds (roughly). A considerable improvement would result if the altitude and OAT data were used to establish profiles of altitude versus time and OAT versus time, such that an appropriate value for altitude and OAT could be synthesized at the point in time when each IAS reading was taken. The IAS/TAS and heading information should then be processed relative to the GPS averaging/interpolation process to derive winds at the instant that each heading observation was taken. In other words, the GPS data should first be merged with the observer data. Only after this is accomplished should the radar data be merged in as well. Wind estimates derived from the merged data set should exhibit little or no latency since they will be matched in time to the GPS information.

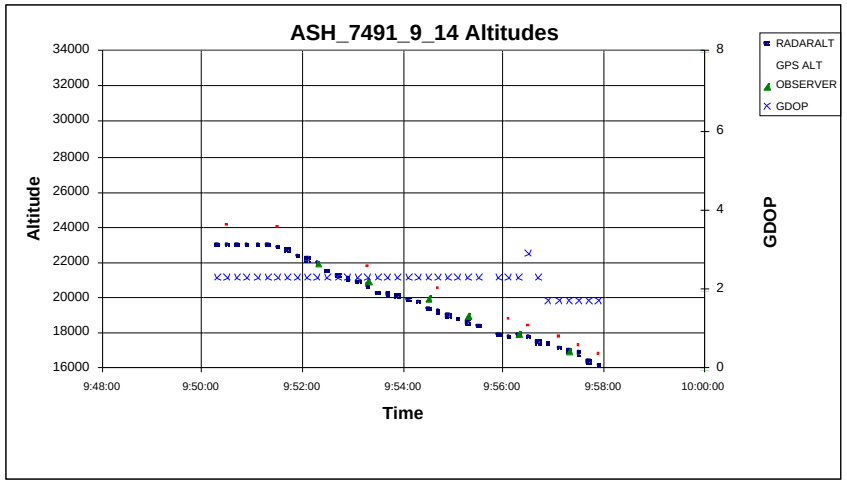
Appendix A

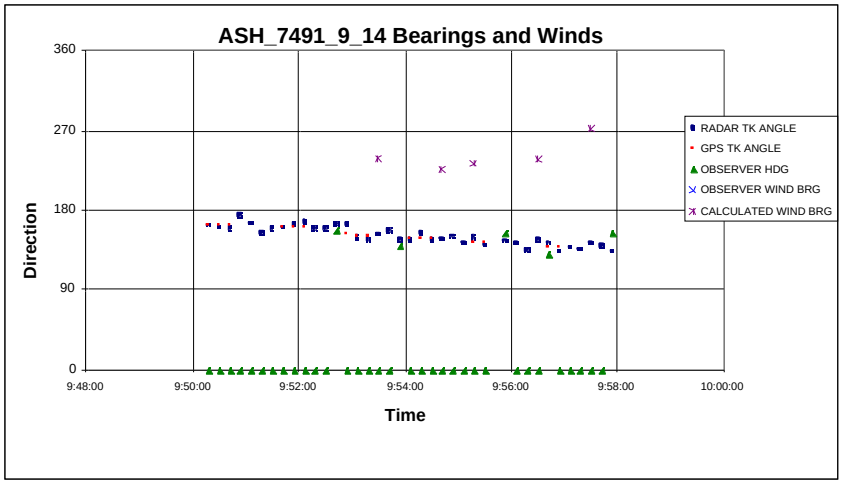
Tabular and Graphic Results for the Portable Data Collector Tests

Table A.1 Tabular Results for Case ASH_7491_9_14

ASH_7491_9_14	|<---			GPS	DATA				---\>|	<---	RADAR	DATA		---\>|	<---					OBSERVER	DATA					---\>|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
9:50:18	41.01786	105.6247	24154	420.05	466.29	281	163	4	2.3	23000	419.94	466.56	284	163			205							
9:50:30	41.00234	105.6185	24161	420.34	465.36	287	163	4	2.3	23000	420.38	465.38	284	161							210 kts req and got			
9:50:42	40.98709	105.6126	24180	420.62	464.45	291	163	4	2.3	23000	420.69	464.50	284	160										
9:50:54	40.97213	105.6068	24176	420.89	463.55	281	163	4	2.3	23000	420.56	463.94	284	174										
9:51:06	40.95709	105.6008	24184	421.17	462.65	293	162	4	2.3	23000	420.88	462.94	286	166										
9:51:18	40.94207	105.5947	24161	421.46	461.75	286	162	4	2.3	23000	421.56	461.75	287	155										
9:51:30	40.92660	105.5883	23995	421.76	460.83	281	162	4	2.3	22900	421.88	460.81	288	160										
9:51:42	40.91153	105.5821	23751	422.05	459.93	284	161	4	2.3	22700	422.19	459.88	289	161										
9:51:54	40.89647	105.5755	23471	422.36	459.03	279	161	4	2.3	22400	422.38	459.06	290	165										
9:52:06	40.88100	105.5688	23189	422.68	458.11	296	161	4	2.3	22200	422.50	458.50	291	167										
9:52:18	40.86556	105.5619	22926	423.00	457.18	295	161	4	2.3	22000	422.88	457.69	292	159	220	-9	210					287		
9:52:30	40.84997	105.5550	22669	423.32	456.25	296	160	4	2.3	21500	423.38	456.31	293	160							vsi 1100			
9:52:42	40.83455	105.5481	22419	423.65	455.33	297	159	4	2.3	21300	423.63	455.25	293	165				157						
9:52:54	40.81936	105.5412	22192	423.97	454.42	293	153	4	2.3	21100	423.88	454.38	293	164										
9:53:06	40.80505	105.5321	21984	424.39	453.57	290	151	4	2.3	20900	424.31	454.00	293	150										
9:53:18	40.79066	105.5221	21789	424.86	452.71	291	151	4	2.3	20700	424.88	453.19	292	147	210									
9:53:30	40.77670	105.5122	21617	425.32	451.88	276	151	4	2.3	20300	425.44	451.94	292	153		-6	215					291	239	87
9:53:42	40.76284	105.5021	21472	425.79	451.05	267	150	4	2.3	20200	425.81	451.00	291	157							si 900			
9:53:54	40.74937	105.4920	21334	426.26	450.25	278	149	4	2.3	20100	426.38	450.25	290	147				140						
9:54:06	40.73640	105.4820	21169	426.72	449.48	272	149	4	2.3	19900	426.63	449.88	289	147										
9:54:18	40.72355	105.4720	20981	427.19	448.71	268	149	4	2.3	19800	426.94	449.06	289	155										
9:54:30	40.71089	105.4621	20778	427.65	447.96	272	148	4	2.3	19400	427.75	447.94	287	147	200									
9:54:42	40.69812	105.4520	20512	428.12	447.20	276	148	4	2.3	19200	428.19	447.19	286	149		-6	210					280	226	16
9:54:54	40.68496	105.4418	20234	428.59	446.42	276	146	4	2.3	19000	428.63	446.38	284	151							1500			
9:55:06	40.67205	105.4310	19971	429.10	445.65	275	145	4	2.3	18800	429.00	445.94	283	143										
9:55:18	40.65907	105.4197	19713	429.62	444.87	274	144	4	2.3	18600	429.38	445.19	281	150	190	-4	210					277	232	33
9:55:30	40.64625	105.4081	19467	430.16	444.11	275	144	4	2.3	18400	430.00	444.50	280	141							1400			
9:55:54	40.62138	105.3849	19039	431.24	442.63	280	142	4	2.3	17900	431.25	442.63	277	146				155						
9:56:06	40.60911	105.3726	18812	431.81	441.91	279	141	4	2.3	17800	431.81	441.88	276	144										
9:56:18	40.59700	105.3602	18613	432.39	441.18	270	140	4	2.3	17900	432.25	441.50	276	135	180									
9:56:30	40.58527	105.3478	18427	432.96	440.49	264	139	4	2.9	17800	432.69	440.69	276	147		-2	210				800	273	238	124
9:56:42	40.57341	105.3349	18207	433.56	439.79	274	139	4	2.3	17500	433.50	439.69	276	143				130						
9:56:54	40.56216	105.3222	17983	434.15	439.12	276	138	4	1.7	17400	434.25	439.06	276	134										
9:57:06	40.55047	105.3091	17802	434.76	438.43	269	137	4	1.7	17200	434.81	438.38	276	139										
9:57:18	40.53892	105.2956	17537	435.38	437.74	282	138	4	1.7	17000	435.19	438.00	276	136	170									
9:57:30	40.52752	105.2822	17289	436.00	437.07	286	138	4	1.7	16900	435.69	437.25	276	143		0	210					270	272	22
9:57:42	40.51577	105.2686	17043	436.64	436.37	289	138	4	1.7	16400	436.63	436.19	277	140							1200			
9:57:54	40.50390	105.2548	16794	437.28	435.67	296	137	4	1.7	16200	437.38	435.56	277	133				155						







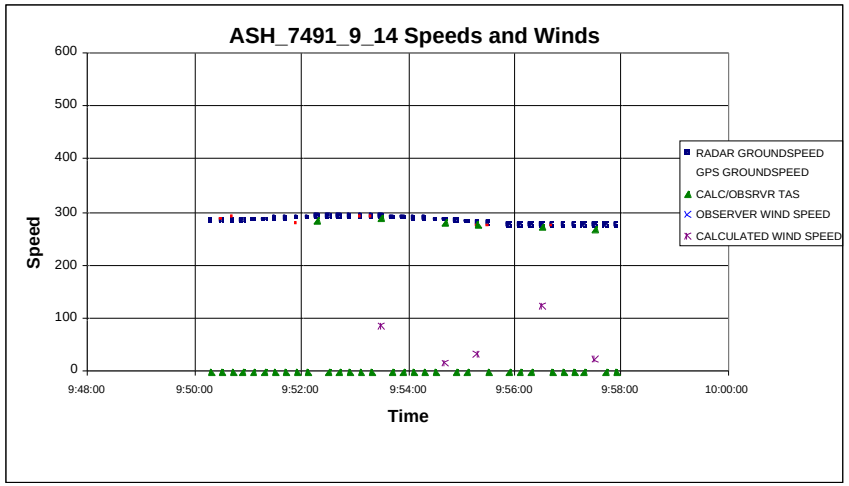
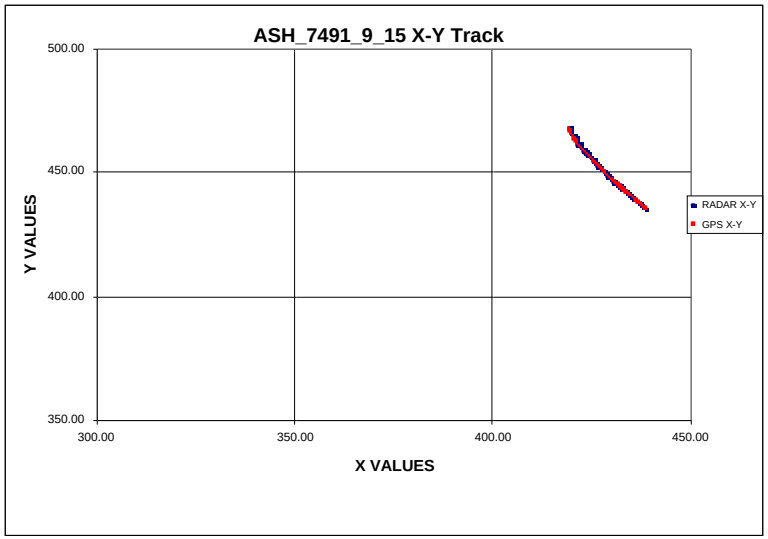
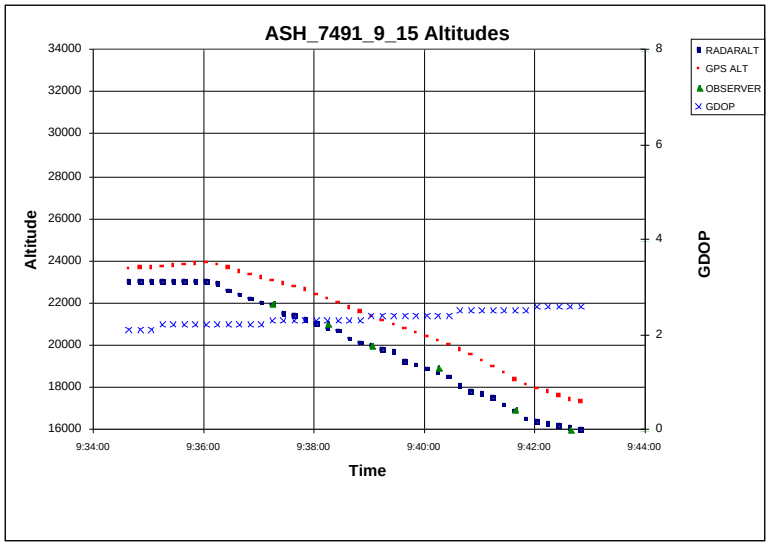


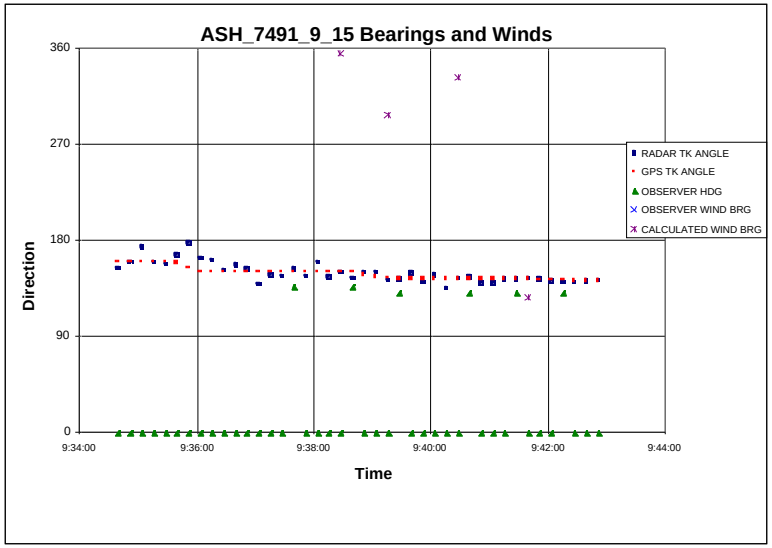
Figure A.1 Graphic Results for Case ASH_7491_9_14

Table A.1 Tabular Results for Case ASH_7491_9_15

ASH_7491_9_15	|<---			GPS	DATA				--->|	<---	RADAR	DATA		--->|	<---					OBSERVER	DATA				---> |
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
9:34:39	41.04437	105.6431	23640	419.20	467.87	320	160	4	2.1	23000	419.56	467.63	306	154										
9:34:51	41.02819	105.6356	23665	419.55	466.90	306	160	4	2.1	23000	419.88	466.63	306	160			205							
9:35:03	41.01194	105.6281	23696	419.90	465.93	314	160	4	2.1	23000	419.88	466.06	306	174										
9:35:15	40.99538	105.6204	23729	420.26	464.94	316	160	4	2.2	23000	420.50	465.19	307	160										
9:35:27	40.97922	105.6129	23760	420.61	463.97	322	160	4	2.2	23000	421.13	463.69	307	158										
9:35:39	40.96282	105.6052	23808	420.97	462.99	306	159	4	2.2	23000	421.31	462.63	308	166										
9:35:51	40.94703	105.5971	23878	421.35	462.05	322	154	4	2.2	23000	421.25	461.56	308	178										
9:36:03	40.93143	105.5869	23931	421.82	461.12	315	150	4	2.2	23000	422.00	461.38	308	164										
9:36:15	40.91603	105.5755	23838	422.35	460.20	305	150	4	2.2	22900	422.31	460.50	307	162										
9:36:27	40.90155	105.5648	23668	422.85	459.34	290	150	4	2.2	22600	423.19	459.13	307	152										
9:36:39	40.88742	105.5542	23503	423.33	458.50	294	150	4	2.2	22400	423.56	458.13	306	157										
9:36:51	40.87350	105.5439	23352	423.82	457.67	276	150	4	2.2	22200	424.00	457.31	306	153										
9:37:03	40.86055	105.5342	23218	424.26	456.89	276	150	4	2.2	22000	424.31	457.06	305	139										
9:37:15	40.84649	105.5237	23059	424.75	456.06	284	150	4	2.3	21900	424.81	456.13	304	148	220		190					265		
9:37:27	40.83305	105.5137	22910	425.22	455.26	282	150	4	2.3	21500	425.56	455.00	303	147		-10					1200			
9:37:39	40.81980	105.5038	22785	425.67	454.47	277	150	4	2.3	21400	425.94	454.19	301	153				137						
9:37:51	40.80684	105.4941	22637	426.12	453.70	273	150	4	2.3	21200	426.44	453.50	299	147										
9:38:03	40.79316	105.4840	22386	426.59	452.88	268	150	4	2.3	21000	426.69	452.50	297	160										
9:38:15	40.78001	105.4741	22203	427.05	452.10	274	150	4	2.3	20800	427.00	452.13	295	146	210		190							
9:38:27	40.76651	105.4641	22002	427.52	451.29	275	150	4	2.3	20700	427.44	451.31	293	150		-9					1200	256	355	21
9:38:39	40.75302	105.4542	21794	427.98	450.49	277	150	4	2.3	20300	428.25	450.25	291	145				137						
9:38:51	40.73964	105.4442	21584	428.44	449.69	284	148	4	2.3	20100	428.75	449.31	289	150										
9:39:03	40.72650	105.4336	21369	428.94	448.91	283	146	4	2.4	20000	429.19	448.56	287	150	200									
9:39:15	40.71366	105.4223	21160	429.46	448.14	281	145	4	2.4	19800	429.50	448.19	286	143		-6	190					254	298	30
9:39:27	40.70092	105.4108	20972	430.00	447.39	281	144	4	2.4	19700	429.94	447.56	285	144				132						
9:39:39	40.68809	105.3990	20770	430.54	446.62	274	144	4	2.4	19200	430.69	446.25	284	149										
9:39:51	40.67553	105.3875	20583	431.08	445.88	274	144	4	2.4	19100	431.31	445.56	283	141										
9:40:03	40.66320	105.3762	20400	431.60	445.14	284	144	4	2.4	18900	431.75	444.75	282	148										
9:40:15	40.65091	105.3649	20212	432.13	444.42	269	144	4	2.4	18700	432.13	444.44	282	135	190		190							
9:40:27	40.63847	105.3533	20007	432.67	443.67	268	144	4	2.4	18500	432.56	443.69	281	145		-4					1100	251	333	17
9:40:39	40.62566	105.3413	19787	433.23	442.91	268	144	4	2.5	18100	433.31	442.56	280	146				132						
9:40:51	40.61338	105.3298	19544	433.76	442.18	266	144	4	2.5	17800	433.88	441.94	279	140										
9:41:03	40.60134	105.3186	19283	434.28	441.47	257	144	4	2.5	17700	434.50	441.19	278	140										
9:41:15	40.58976	105.3078	18999	434.79	440.78	257	144	4	2.5	17500	435.00	440.44	277	144		-3	197							
9:41:27	40.57801	105.2968	18698	435.30	440.08	251	144	4	2.5	17200	435.19	440.19	276	144				132			1600			
9:41:39	40.56641	105.2860	18383	435.80	439.39	243	144	4	2.5	16900	435.69	439.44	274	145	170							252	126	9
9:41:51	40.55550	105.2758	18116	436.27	438.75	243	143	4	2.5	16500	436.44	438.44	272	144		-1	190							
9:42:03	40.54459	105.2653	17947	436.76	438.10	240	143	4	2.6	16400	436.94	437.81	270	142							1300			
9:42:15	40.53400	105.2551	17789	437.24	437.47	244	143	4	2.6	16300	437.50	437.13	269	141				132						
9:42:27	40.52327	105.2447	17620	437.72	436.84	238	142	4	2.6	16200	437.63	436.88	266	141										
9:42:39	40.51242	105.2340	17440	438.22	436.19	236	142	4	2.6	16100	438.19	436.25	264	142	160									
9:42:51	40.50209	105.2237	17307	438.70	435.58	247	142	4	2.6	16004	438.91	435.29	262	143										







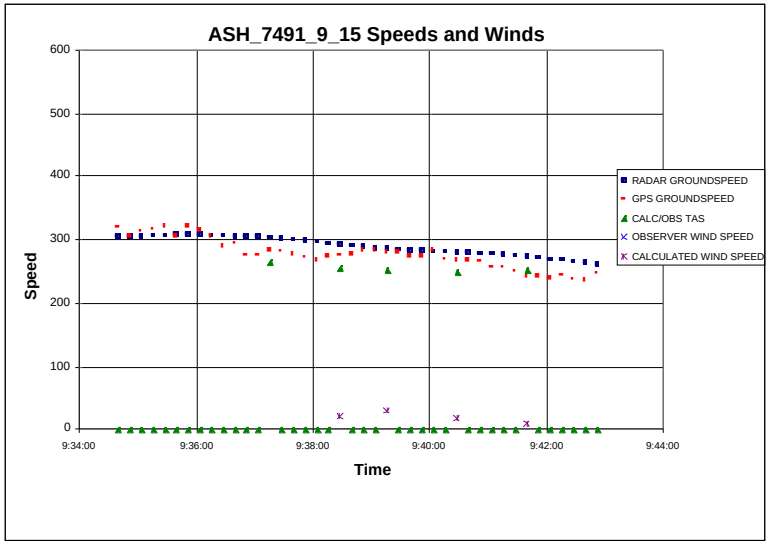
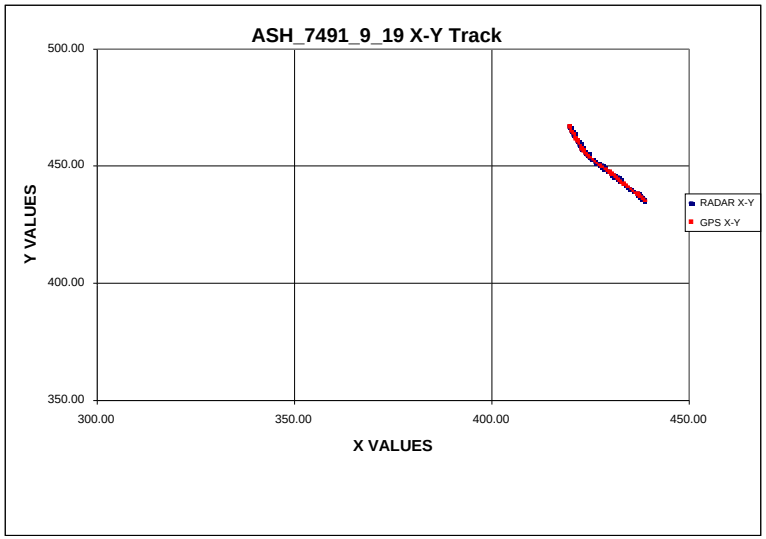
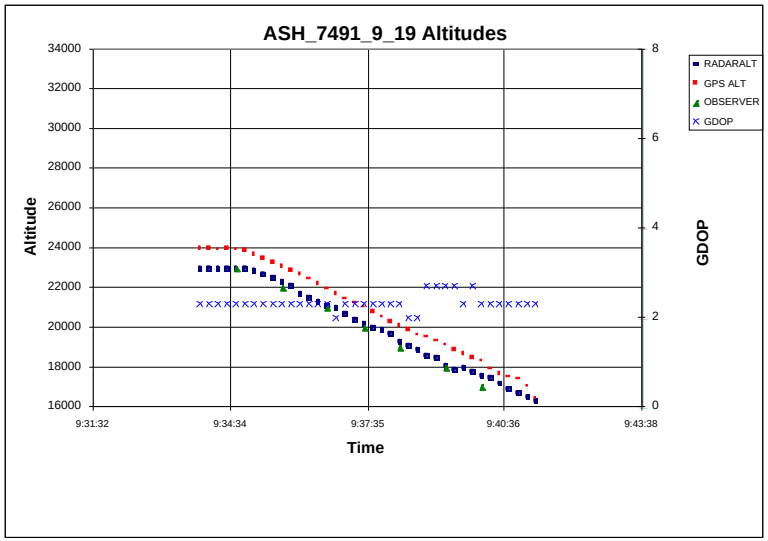


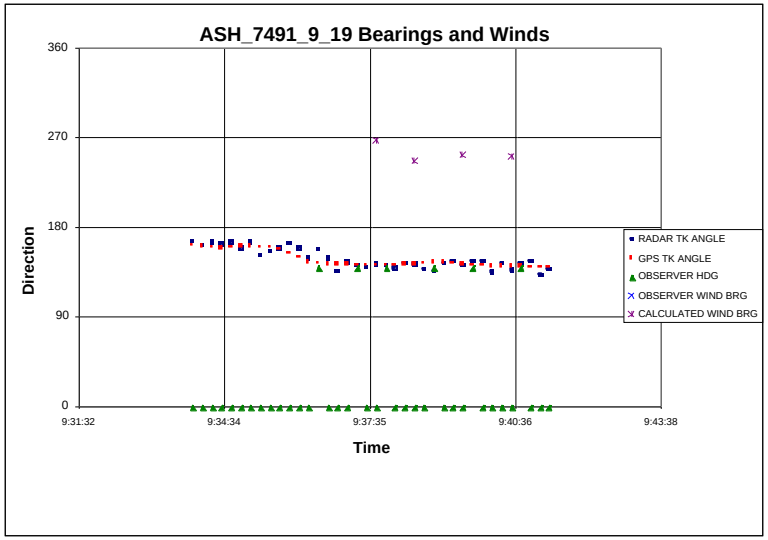
Figure A.2 Graphic Results for Case ASH_7491_9_15

Table A.3 Tabular Results for Case ASH_7491_9_19

ASH_7491_9_19	|<---			GPS	DATA				--->|	<---	RADAR	DATA		--->|	<---				OBSERVER	DATA				--->
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
9:33:54	41.02023	105.6295	23979	419.84	466.43	322	162	4	2.3	23000	419.81	466.81	312	166										
9:34:06	41.00378	105.6225	23967	420.16	465.44	307	161	4	2.3	23000	420.19	465.75	311	162										
9:34:18	40.98747	105.6155	23952	420.49	464.47	317	160	4	2.3	23000	420.44	464.69	311	165		-10								
9:34:30	40.97095	105.6080	23963	420.84	463.48	315	159	4	2.3	23000	420.75	463.69	312	163										
9:34:42	40.95415	105.5999	23942	421.22	462.48	309	160	4	2.3	23000	420.88	463.19	312	165	230									
9:34:54	40.93794	105.5923	23891	421.57	461.51	320	161	4	2.3	23000	421.25	462.31	312	159										
9:35:06	40.92102	105.5847	23702	421.93	460.50	328	161	4	2.3	22900	421.63	460.69	313	165										
9:35:18	40.90362	105.5769	23490	422.29	459.46	336	160	4	2.3	22700	422.19	459.81	314	152										
9:35:30	40.88569	105.5689	23265	422.67	458.39	340	160	4	2.3	22500	422.56	458.88	315	156										
9:35:42	40.86826	105.5607	23056	423.05	457.35	345	158	4	2.3	22300	422.81	458.19	316	159	220									
9:35:54	40.85097	105.5517	22858	423.47	456.31	326	154	4	2.3	22100	423.06	457.19	316	164		-8	210					288		
9:36:06	40.83434	105.5416	22668	423.94	455.32	324	150	4	2.3	21700	423.75	455.63	318	159							1300			
9:36:18	40.81817	105.5302	22426	424.47	454.36	305	145	4	2.3	21500	424.44	454.63	319	149										
9:36:30	40.80373	105.5174	22168	425.06	453.50	313	144	4	2.3	21300	424.75	453.69	321	158				140						
9:36:42	40.79004	105.5046	21914	425.66	452.68	308	143	4	2.3	21100	425.31	452.88	322	149	210									
9:36:54	40.77634	105.4914	21670	426.27	451.87	310	143	3	2.0	21000	425.75	452.50	323	136		-7								
9:37:06	40.76262	105.4780	21456	426.89	451.05	303	143	4	2.3	20700	426.31	451.56	324	145							1400			
9:37:18	40.74891	105.4646	21246	427.51	450.24	298	142	4	2.3	20400	427.25	450.44	324	142				140						
9:37:30	40.73553	105.4513	21032	428.12	449.44	304	142	4	2.3	20200	427.94	449.63	324	140	200									
9:37:42	40.72208	105.4379	20768	428.75	448.64	307	142	4	2.3	20000	428.56	448.75	324	143		-5	210					280	267	52
9:37:54	40.70864	105.4245	20530	429.37	447.84	302	142	4	2.3	19900	428.81	448.44	323	142				140			1200			
9:38:06	40.69492	105.4109	20303	430.00	447.03	298	142	4	2.3	19700	429.50	447.69	321	139										
9:38:18	40.68166	105.3978	20080	430.60	446.24	298	143	4	2.3	19300	430.38	446.38	319	144	190									
9:38:30	40.66830	105.3847	19869	431.21	445.45	296	143	3	2.0	19100	430.94	445.63	317	143		-3	219					289	246	42
9:38:42	40.65510	105.3719	19661	431.80	444.66	285	144	3	2.0	18900	431.69	444.88	315	138							1400			
9:38:54	40.64139	105.3593	19541	432.39	443.85	286	145	4	2.7	18600	432.00	444.56	312	136				140						
9:39:06	40.62804	105.3472	19324	432.95	443.06	291	145	4	2.7	18500	432.56	443.69	310	144										
9:39:18	40.61530	105.3357	19162	433.49	442.30	286	144	4	2.7	18100	433.31	442.56	308	146	180						oops above			
9:39:30	40.60227	105.3237	18913	434.05	441.52	284	143	4	2.7	17900	433.94	441.81	306	142		-2	210					273	252	41
9:39:42	40.58889	105.3106	18681	434.65	440.73	297	142	3	2.3	18000	434.44	441.00	303	146				140						
9:39:54	40.57579	105.2976	18495	435.26	439.95	299	142	4	2.7	17800	435.00	440.19	301	146							1200			
9:40:06	40.56293	105.2848	18352	435.86	439.19	288	141	3	2.3	17600	435.38	439.88	299	135	170									
9:40:18	40.55068	105.2721	17930	436.45	438.46	297	141	3	2.3	17500	435.88	439.06	297	144			220							
9:40:30	40.53744	105.2585	17719	437.08	437.68	296	141	3	2.3	17200	437.00	438.00	296	137		0						283	251	50
9:40:42	40.52500	105.2458	17528	437.67	436.94	296	141	3	2.3	16900	437.56	437.13	294	144				140			1400			
9:40:54	40.51182	105.2324	17422	438.30	436.15	279	140	3	2.3	16700	438.06	436.38	293	146										
9:41:06	40.49936	105.2197	17028	438.88	435.42	277	140	3	2.3	16500	438.44	436.13	292	132										
9:41:17	40.48818	105.2083	16424	439.42	434.75	275	140	3	2.3	16316	439.01	435.38	291	138										







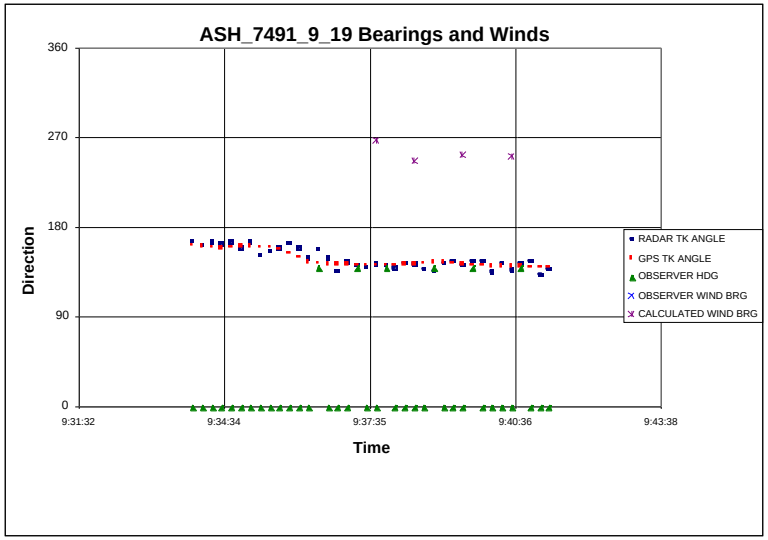
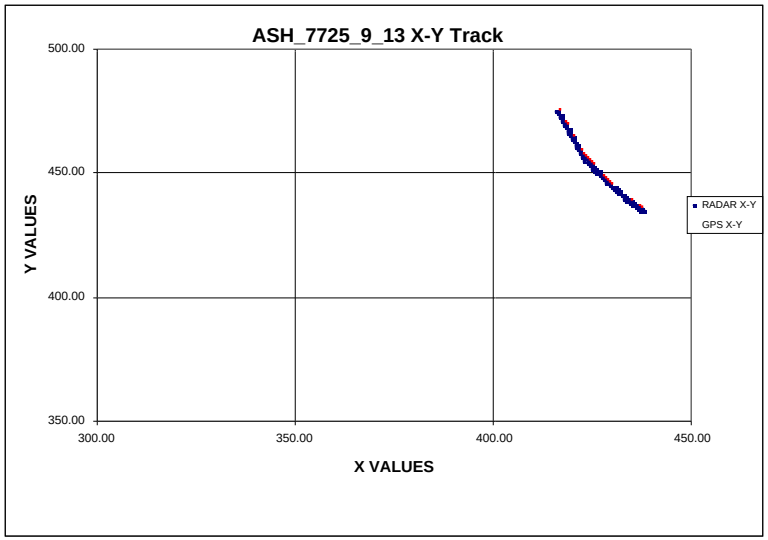
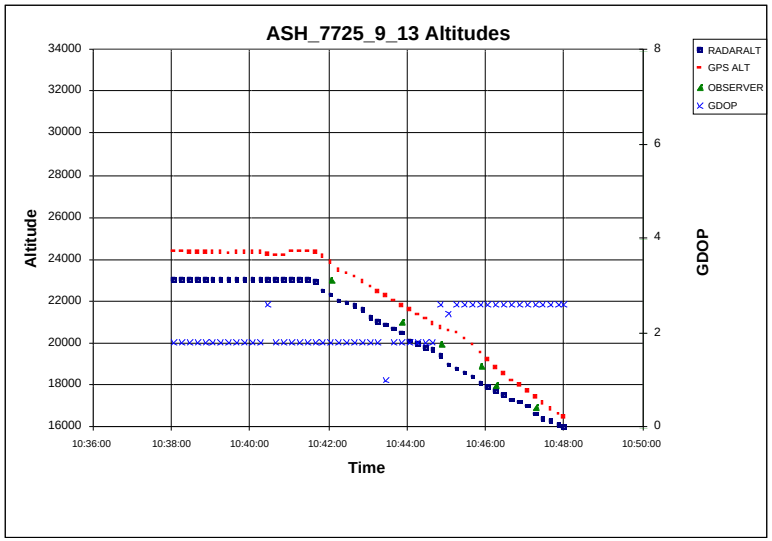


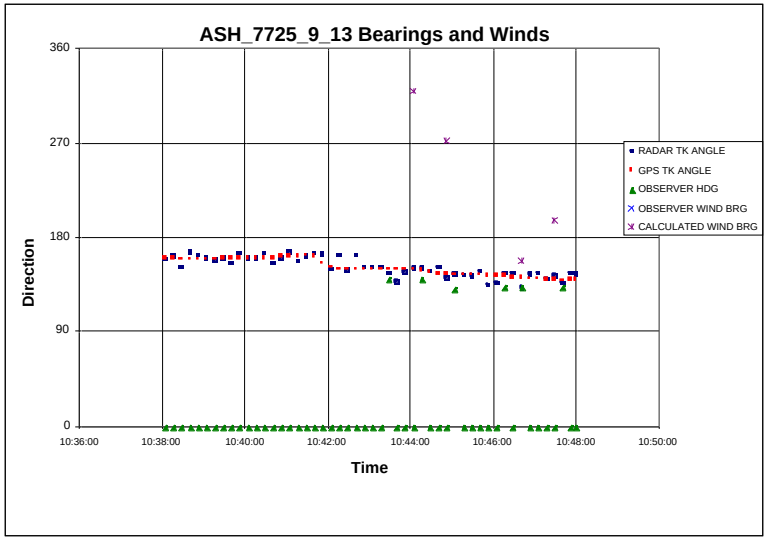
Figure A.3 Graphic Results for Case ASH_7491_9_19

Table A.4 Tabular Results for Case ASH_7725_9_13

ASH_7725_9_13	|<---			GPS	DATA				--->|	<---	RADAR	DATA		--->|	<---					OBSERVER	DATA				--->|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
10:38:04	41.18626	105.6987	24373	416.60	476.35	295	161	4	1.8	23000	416.31	474.63	304	160										
10:38:16	41.17052	105.6915	24362	416.94	475.41	298	161	4	1.8	23000	416.56	473.81	304	162										
10:38:28	41.15526	105.6844	24344	417.26	474.50	295	160	4	1.8	23000	417.19	472.81	303	152										
10:38:40	41.13991	105.6774	24334	417.59	473.58	292	160	4	1.8	23000	417.06	472.31	302	166										
10:38:52	41.12429	105.6702	24328	417.92	472.65	300	160	4	1.8	23000	417.50	471.00	300	163										
10:39:04	41.10870	105.6631	24323	418.26	471.72	302	160	4	1.8	23000	417.88	470.00	299	161										
10:39:16	41.09308	105.6560	24314	418.59	470.78	299	160	4	1.8	23000	418.25	469.06	298	159										
10:39:28	41.07784	105.6491	24313	418.91	469.87	297	161	4	1.8	23000	418.38	468.69	296	161										
10:39:40	41.06223	105.6420	24324	419.25	468.94	302	161	4	1.8	23000	419.13	467.13	295	156										
10:39:52	41.04634	105.6347	24338	419.58	467.99	292	161	4	1.8	23000	419.31	466.19	295	165										
10:40:04	41.03062	105.6276	24350	419.91	467.05	296	161	4	1.8	23000	419.69	465.19	295	161										
10:40:16	41.01510	105.6206	24339	420.24	466.12	305	161	4	1.8	23000	420.00	464.25	296	161										
10:40:28	40.99983	105.6138	24264	420.56	465.21	291	161	4	2.6	23000	420.13	463.75	296	165										
10:40:40	40.98422	105.6069	24180	420.88	464.28	300	161	4	1.8	23000	420.56	462.94	297	156										
10:40:52	40.96848	105.6001	24185	421.20	463.34	299	162	4	1.8	23000	421.00	461.50	298	161										
10:41:04	40.95260	105.5933	24391	421.52	462.39	294	162	4	1.8	23000	421.19	460.56	298	166										
10:41:16	40.93679	105.5868	24400	421.82	461.44	299	162	4	1.8	23000	421.63	459.63	299	158										
10:41:28	40.92116	105.5804	24400	422.12	460.51	284	163	4	1.8	23000	421.75	459.19	300	162										
10:41:40	40.90548	105.5744	24351	422.41	459.57	294	162	4	1.8	22900	422.00	458.19	300	165										
10:41:52	40.88944	105.5679	24143	422.71	458.61	294	156	4	1.8	22500	422.44	456.75	301	164										
10:42:04	40.87415	105.5596	23848	423.10	457.70	292	152	4	1.8	22300	423.13	456.00	301	150	230									
10:42:16	40.85978	105.5498	23488	423.55	456.84	280	150	4	1.8	22000	423.31	455.06	301	163			200					284		
10:42:28	40.84585	105.5393	23336	424.04	456.01	275	150	4	1.8	21900	424.19	454.50	300	149		-6								
10:42:40	40.83256	105.5293	23137	424.50	455.22	276	150	4	1.8	21800	424.13	454.00	299	163										
10:42:52	40.81921	105.5194	22937	424.97	454.42	281	150	4	1.8	21600	424.69	453.13	298	152										
10:43:04	40.80565	105.5094	22683	425.43	453.61	277	150	4	1.8	21200	425.31	451.94	297	152			195							
10:43:16	40.79257	105.4998	22448	425.88	452.83	276	150	4	1.8	21000	425.81	451.00	296	152		-5								
10:43:28	40.77918	105.4900	22241	426.33	452.04	275	150	4	1.0	20900	426.31	450.31	294	146				140						
10:43:40	40.76552	105.4800	22025	426.80	451.22	277	150	4	1.8	20700	426.69	449.94	293	138										
10:43:52	40.75209	105.4702	21801	427.25	450.42	271	150	4	1.8	20500	427.06	449.25	291	147	210									
10:44:04	40.73861	105.4603	21577	427.71	449.62	278	150	4	1.8	20100	427.75	447.94	290	151		-3	190					260	319	18
10:44:16	40.72515	105.4505	21361	428.16	448.82	274	149	4	1.8	20000	428.19	447.13	288	151				140						
10:44:28	40.71183	105.4402	21148	428.64	448.02	276	147	4	1.8	19800	428.69	446.38	287	148										
10:44:40	40.69894	105.4298	20937	429.13	447.26	272	145	4	1.8	19700	428.88	446.00	286	152										
10:44:52	40.68614	105.4185	20751	429.65	446.49	283	145	4	2.6	19400	429.50	445.31	285	142	200	-2	195					262	272	36
10:45:04	40.67353	105.4070	20612	430.19	445.75	276	144	3	2.4	19000	430.25	444.19	284	145				130						
10:45:16	40.66085	105.3954	20501	430.73	444.99	275	144	4	2.6	18800	430.75	443.50	283	144										
10:45:28	40.64803	105.3835	20199	431.28	444.23	271	144	4	2.6	18600	431.31	442.75	282	143										
10:45:40	40.63611	105.3725	19920	431.79	443.52	271	144	4	2.6	18400	431.75	442.00	280	148										
10:45:52	40.62400	105.3611	19571	432.32	442.80	270	143	4	2.6	18100	432.13	441.69	279	135	190		200							
10:46:04	40.61202	105.3496	19216	432.86	442.09	265	143	4	2.6	17900	432.75	441.00	278	137										
10:46:16	40.60028	105.3381	18864	433.39	441.39	263	143	4	2.6	17700	433.44	439.81	277	146	180			132						
10:46:28	40.58848	105.3267	18536	433.92	440.69	265	142	4	2.6	17500	433.94	439.06	275	146			210							
10:46:40	40.57697	105.3151	18241	434.46	440.01	254	142	4	2.6	17300	434.56	438.63	274	132		0		132				274	158	21
10:46:52	40.56553	105.3034	17972	435.00	439.33	249	141	4	2.6	17200	434.81	438.19	273	145										
10:47:04	40.55449	105.2921	17711	435.53	438.68	259	141	4	2.6	17000	435.31	437.44	271	146										
10:47:16	40.54346	105.2807	17426	436.06	438.02	262	140	4	2.6	16600	436.13	436.50	270	141	170									
10:47:28	40.53221	105.2687	17132	436.62	437.35	262	140	4	2.6	16400	436.69	435.75	269	143		2	210					271	197	16
10:47:40	40.52102	105.2567	16867	437.17	436.69	257	139	4	2.6	16300	437.31	435.13	268	137				132						
10:47:52	40.50996	105.2446	16615	437.74	436.03	259	140	4	2.6	16100	437.50	434.81	268	146										
10:47:59	40.50320	105.2373	16465	438.08	435.63	255	140	4	2.6	15982	437.83	434.37	267	145										







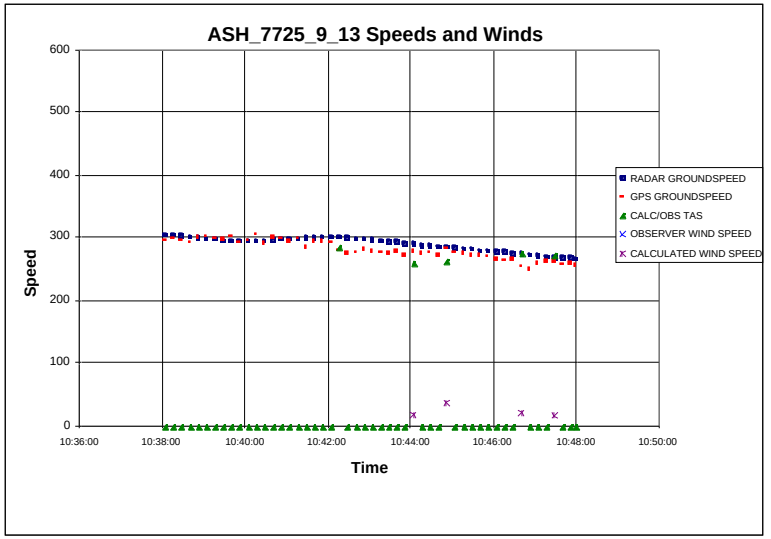
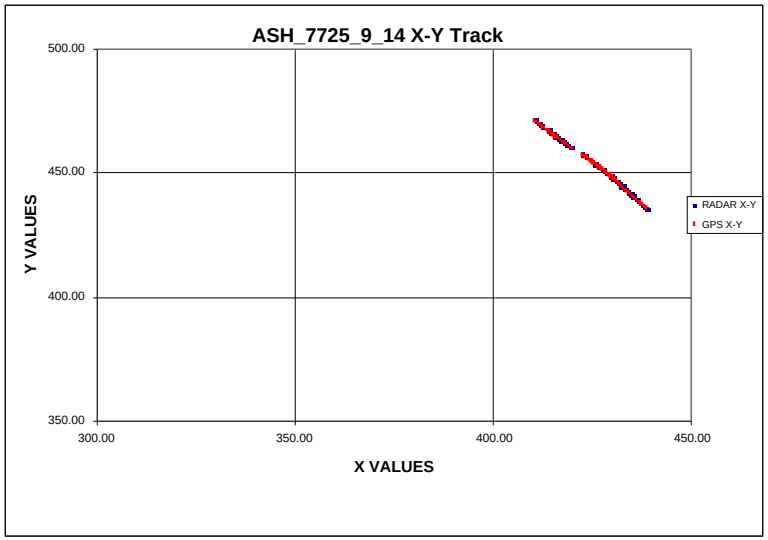
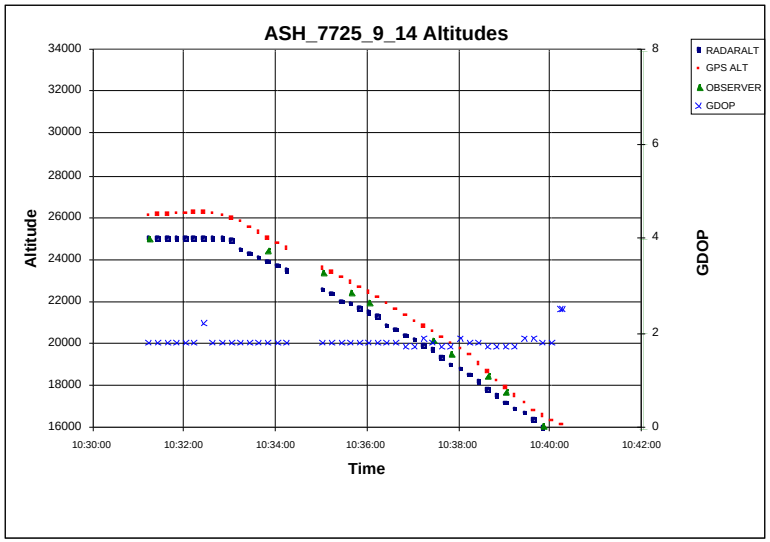


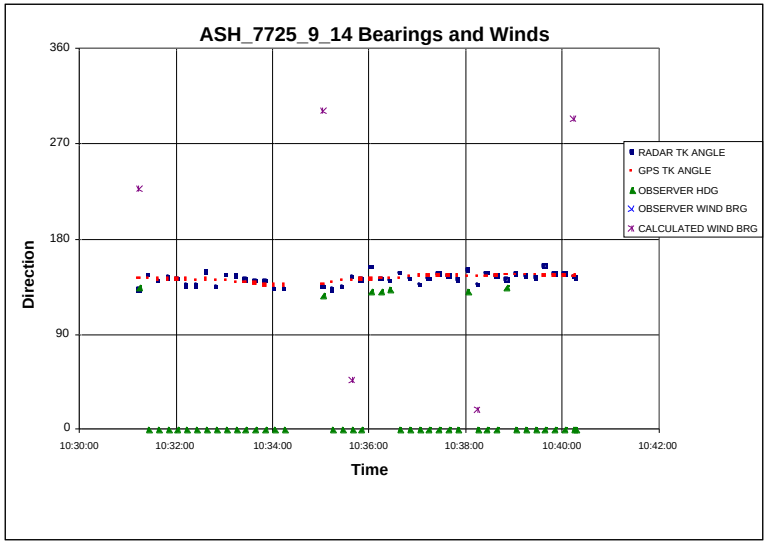
Figure A.4 Graphic Results for Case ASH_7725_9_13

Table A.5 Tabular Results for Case ASH_7725_9_14

ASH_7725_9_14	|<---			GPS	DATA				--->|	<---	RADAR	DATA		--->|	<---				OBSERVER	DATA				---> |
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
10:31:14	41.10185	105.8347	26082	410.48	471.24	271	142	4	1.8	25000	410.69	471.25	288	132	250	-14	192	134			wx qs from atc	273	227	16
10:31:25	41.08980	105.8223	26119	411.05	470.52	288	142	4	1.8	25000	410.94	470.56	289	146										
10:31:38	41.07738	105.8095	26146	411.63	469.78	279	141	4	1.8	25000	411.75	469.69	289	140										
10:31:50	41.06528	105.7969	26163	412.21	469.06	279	141	4	1.8	25000	412.19	469.06	289	143							desc by 9 mile			
10:32:02	41.05303	105.7838	26177	412.81	468.33	269	141	4	1.8	25000	412.44	468.75	288	142										
10:32:13	41.04113	105.7713	26221	413.38	467.62	278	141	4	1.8	25000	414.13	467.13	290	136										
10:32:25	41.02944	105.7589	26225	413.95	466.92	277	140	4	2.2	25000	413.94	466.94	290	136										
10:32:38	41.01753	105.7461	26188	414.54	466.22	289	141	4	1.8	25000	414.56	466.19	290	149										
10:32:50	41.00532	105.7330	26088	415.14	465.49	290	140	4	1.8	25000	415.31	465.69	291	135							ramm 160 230			
10:33:02	40.99318	105.7200	25969	415.74	464.77	291	140	4	1.8	24900	415.81	464.81	292	146							alt 3031.			
10:33:14	40.98083	105.7067	25809	416.35	464.03	304	139	4	1.8	24500	416.56	463.75	291	145										
10:33:26	40.96777	105.6926	25538	417.00	463.25	306	139	4	1.8	24300	417.25	462.94	291	141										
10:33:38	40.95512	105.6788	25262	417.63	462.50	314	138	4	1.8	24100	417.94	462.13	292	140							dme 80			
10:33:50	40.94162	105.6639	24977	418.31	461.70	313	136	4	1.8	23900	418.56	461.38	294	140	245									
10:34:02	40.92912	105.6484	24746	419.02	460.96	313	136	4	1.8	23700	419.00	461.00	296	133			230							
10:34:14	40.91636	105.6325	24515	419.76	460.20	307	136	4	1.8	23500	419.69	460.38	296	133							1100 fpm			
10:35:02	40.86711	105.5698	23589	422.64	457.27	320	137	4	1.8	22600	422.63	457.31	296	135	234	-10	220	127			76/307 gs	306	301	14
10:35:14	40.85447	105.5541	23378	423.36	456.52	318	139	4	1.8	22400	423.50	456.56	298	132							72 308 dvv			
10:35:26	40.84134	105.5389	23165	424.06	455.74	315	140	4	1.8	22000	424.44	455.56	300	135							1000fpm			
10:35:38	40.82793	105.5246	22932	424.72	454.94	317	140	4	1.8	21900	425.00	454.69	302	144	225	-9	230					316	46	12
10:35:50	40.81453	105.5103	22701	425.38	454.15	308	141	4	1.8	21700	425.69	453.88	304	141							69 309 knot dvv			
10:36:02	40.80111	105.4961	22461	426.04	453.35	312	141	4	1.8	21500	425.88	453.38	306	154	220			130						
10:36:14	40.78728	105.4819	22199	426.70	452.53	309	142	4	1.8	21300	426.63	452.56	308	142			230	130						
10:36:26	40.77365	105.4680	21925	427.34	451.72	316	142	4	1.8	20900	427.69	451.31	310	140				132			66 310			
10:36:38	40.75969	105.4538	21645	428.00	450.89	314	142	4	1.8	20700	428.13	450.50	311	148										
10:36:50	40.74563	105.4397	21358	428.65	450.05	305	144	4	1.7	20400	428.81	449.69	313	142										
10:37:02	40.73164	105.4267	21066	429.25	449.22	302	145	4	1.7	20200	429.50	449.00	314	137										
10:37:14	40.71789	105.4142	20815	429.83	448.40	299	145	4	1.9	19900	429.81	448.56	314	142							there was a confusion			
10:37:26	40.70429	105.4021	20588	430.39	447.60	305	145	4	1.8	19700	430.38	447.63	313	147	202		230							
10:37:38	40.69046	105.3897	20319	430.97	446.77	307	145	4	1.7	19300	431.25	446.44	313	145							60 309			
10:37:50	40.67650	105.3772	20030	431.55	445.94	303	145	4	1.7	19000	431.94	445.63	312	141	195						1500fpm			
10:38:02	40.66264	105.3648	19732	432.13	445.12	309	144	4	1.9	18800	432.38	444.69	311	151			230	130						
10:38:14	40.64863	105.3521	19462	432.71	444.28	317	144	4	1.8	18500	432.81	444.31	310	137		-4						305	19	21
10:38:26	40.63442	105.3392	19047	433.32	443.44	317	144	4	1.8	18200	433.25	443.44	309	148							56.6 306 dvv			
10:38:38	40.61995	105.3261	18637	433.92	442.58	319	145	4	1.7	17800	434.19	442.19	308	145	185		240							
10:38:50	40.60549	105.3133	18241	434.52	441.72	312	146	4	1.7	17500	434.88	441.38	307	141				134			53.6 310			
10:39:02	40.59099	105.3007	17885	435.11	440.86	305	146	4	1.7	17200	435.44	440.44	306	147	177		240							
10:39:14	40.57676	105.2885	17507	435.68	440.02	310	146	4	1.7	16900	435.75	440.00	306	145										
10:39:26	40.56209	105.2760	17162	436.26	439.14	310	146	4	1.9	16700	436.38	439.19	306	143							doing good			
10:39:38	40.54770	105.2634	16808	436.85	438.29	309	145	4	1.9	16400	436.69	438.31	306	155										
10:39:50	40.53329	105.2508	16570	437.44	437.43	319	145	4	1.8	16000	437.63	437.06	306	147	161		240				46 160			
10:40:02	40.51887	105.2380	16335	438.04	436.58	314	145	4	1.8	15800	438.19	436.19	306	147										
10:40:14	40.50433	105.2251	16152	438.64	435.71	310	144	4	2.5	15600	438.81	435.38	306	144		2					47.7 311 dvv	305	293	5
10:40:16	40.50109	105.2221	16128	438.78	435.52	308	145	4	2.5	15577	438.90	435.28	306	143										







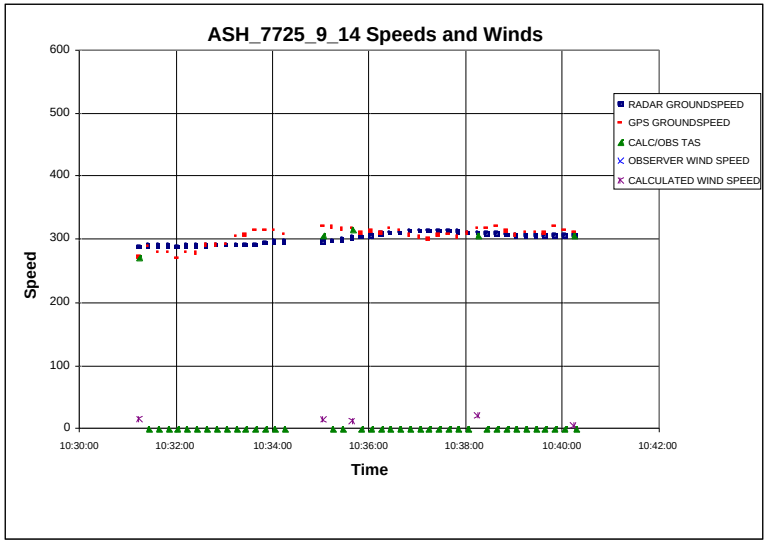
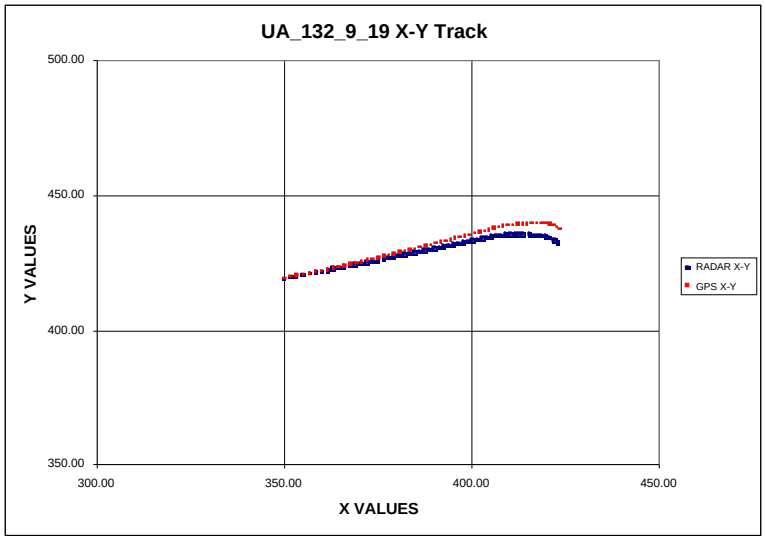
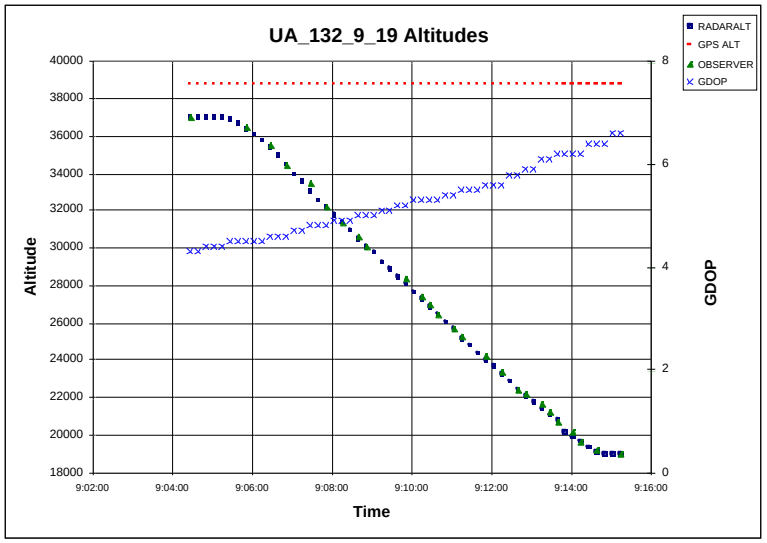


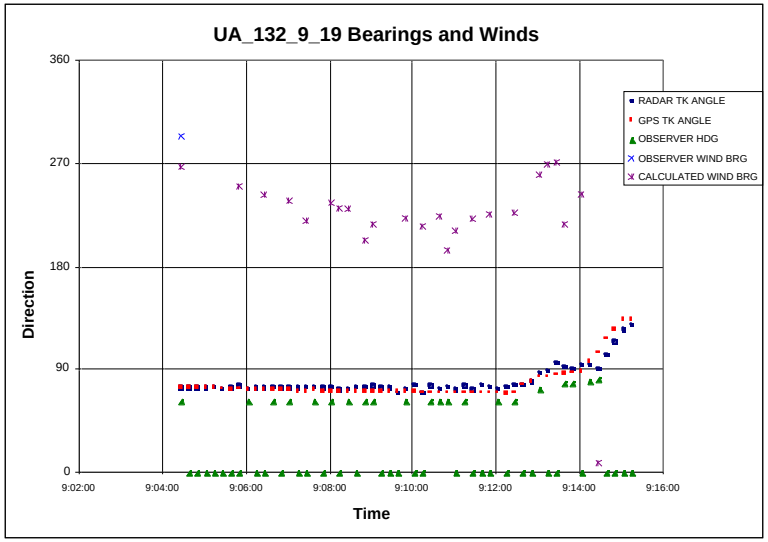
Figure A.5 Graphic Results for Case ASH_7715_9_14

Table A.6 Tabular Results for Case UA_132_9_19

UA_132_9_19	|<---			GPS	DATA				---\>|	<---	RADAR	DATA		---\>|	<---	OBSERVER DATA								---\>|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
9:04:26	40.23337	107.1559	38791	350.14	419.19	542	74	3	4.3	37000	350.06	419.25	520	74	370		270	62	294	52		490	267	53
9:04:38	40.24151	107.1194	38791	351.82	419.66	522	74	3	4.3	37000	351.81	419.75	520	74										
9:04:50	40.24994	107.0816	38791	353.56	420.16	520	74	3	4.4	37000	353.31	420.19	520	74										
9:05:02	40.25809	107.0449	38792	355.25	420.63	521	74	3	4.4	37000	355.06	420.69	519	74										
9:05:14	40.26594	107.0088	38791	356.91	421.09	510	74	3	4.4	37000	356.94	421.19	519	75										
9:05:26	40.27406	106.9738	38791	358.52	421.57	519	73	3	4.5	36900	358.50	421.69	519	73										
9:05:38	40.28264	106.9382	38791	360.16	422.07	484	72	3	4.5	36700	360.00	422.13	518	74										
9:05:50	40.29095	106.9043	38791	361.71	422.56	512	73	3	4.5	36400	361.63	422.50	517	76	365							455	250	56
9:06:02	40.29901	106.8710	38791	363.25	423.04	484	72	3	4.5	36100	363.13	423.00	515	73				62						
9:06:14	40.30711	106.8381	38791	364.76	423.52	465	72	3	4.5	35800	364.75	423.44	514	74			250							
9:06:26	40.31534	106.8048	38791	366.29	424.01	482	72	3	4.6	35400	366.06	423.81	512	74	355							431	242	51
9:06:38	40.32368	106.7719	38791	367.80	424.50	471	72	3	4.6	35000	367.56	424.19	509	75				62						
9:06:50	40.33210	106.7390	38791	369.32	425.00	474	72	3	4.6	34500	369.00	424.63	506	74	345									
9:07:02	40.34035	106.7068	38791	370.79	425.49	474	72	3	4.7	34000	370.56	425.06	503	74				62				434	237	41
9:07:14	40.34848	106.6750	38791	372.25	425.98	475	71	3	4.7	33600	372.13	425.50	499	74										
9:07:26	40.35688	106.6428	38791	373.73	426.48	447	71	3	4.8	33100	373.56	425.88	495	75	335							427	220	23
9:07:38	40.36553	106.6097	38791	375.25	426.99	469	72	3	4.8	32600	375.00	426.25	490	75				62						
9:07:50	40.37386	106.5773	38791	376.74	427.49	450	71	3	4.8	32200	376.50	426.69	486	74	323									
9:08:02	40.38183	106.5462	38791	378.16	427.97	460	71	3	4.9	31800	377.88	427.06	481	75				62				421	235	40
9:08:14	40.38982	106.5150	38791	379.60	428.44	446	71	3	4.9	31400	379.31	427.56	476	72	314		255					410	231	38
9:08:26	40.39773	106.4845	38791	380.99	428.92	449	71	3	4.9	31000	380.56	427.94	472	73				62				413	230	39
9:08:38	40.40569	106.4541	38791	382.39	429.40	434	71	3	5.0	30500	382.06	428.31	467	75	306									
9:08:50	40.41369	106.4234	38791	383.79	429.87	422	71	3	5.0	30100	383.50	428.69	463	75	301			62				410	203	18
9:09:02	40.42144	106.3937	38791	385.15	430.34	431	71	3	5.0	29800	384.81	429.00	459	76				62				407	217	29
9:09:14	40.42936	106.3638	38791	386.52	430.82	439	71	3	5.1	29300	386.25	429.44	454	74			255							
9:09:26	40.43736	106.3337	38791	387.90	431.30	433	71	3	5.1	28900	387.50	429.81	450	74										
9:09:38	40.44494	106.3048	38791	389.23	431.76	425	71	3	5.2	28500	388.81	430.31	446	70										
9:09:50	40.45259	106.2753	38791	390.58	432.22	420	71	3	5.2	28100	390.19	430.69	442	73	284			62				398	222	24
9:10:02	40.46012	106.2462	38791	391.91	432.67	424	71	3	5.3	27700	391.44	430.94	438	77										
9:10:14	40.46778	106.2171	38791	393.24	433.13	417	70	3	5.3	27300	392.63	431.44	434	70	275							392	215	30
9:10:26	40.47541	106.1883	38791	394.55	433.60	418	70	3	5.3	26900	393.94	431.69	430	76	270			62						
9:10:38	40.48316	106.1598	38791	395.86	434.06	422	70	3	5.3	26500	395.25	432.13	426	73	265			62				388	224	38
9:10:50	40.49085	106.1313	38791	397.16	434.53	400	70	3	5.4	26100	396.50	432.44	422	75				62				387	194	24
9:11:02	40.49856	106.1028	38791	398.46	435.00	403	70	3	5.4	25700	397.75	432.88	419	72	258							381	211	29
9:11:14	40.50636	106.0742	38791	399.77	435.47	416	70	3	5.5	25200	399.13	433.19	415	76	253			62						
9:11:26	40.51383	106.0465	38791	401.04	435.92	409	70	3	5.5	24800	400.31	433.63	412	72								378	221	36
9:11:38	40.52123	106.0186	38791	402.31	436.38	402	70	3	5.5	24400	401.56	433.88	409	77										
9:11:50	40.52881	105.9902	38792	403.61	436.84	412	70	3	5.6	24000	402.88	434.25	406	75	243							373	226	43
9:12:02	40.53636	105.9623	38791	404.88	437.29	428	70	3	5.6	23700	404.06	434.63	403	73				62						
9:12:14	40.54381	105.9356	38791	406.11	437.75	389	69	3	5.6	23300	405.31	434.94	401	75	234									
9:12:26	40.55179	105.9074	38791	407.39	438.23	410	70	3	5.8	22900	406.69	435.25	399	77				62				368	227	46
9:12:38	40.55877	105.8805	38791	408.62	438.66	389	77	3	5.8	22500	407.75	435.50	397	77	224									
9:12:50	40.56354	105.8529	38790	409.88	438.96	383	79	3	5.9	22100	409.13	435.75	396	79	222									
9:13:02	40.56717	105.8252	38790	411.14	439.19	388	84	3	5.9	21800	410.38	435.75	394	87				73				361	260	26
9:13:14	40.56946	105.7969	38790	412.44	439.33	389	84	3	6.1	21400	411.63	435.75	392	89	217							358	269	30
9:13:26	40.57140	105.7691	38790	413.71	439.46	391	85	3	6.1	21100	412.38	435.63	391	96	213							356	271	35
9:13:38	40.57316	105.7412	38790	414.98	439.57	373	86	3	6.2	20800	413.56	435.63	389	92	207			78				354	217	29
9:13:50	40.57474	105.7135	38790	416.25	439.68	373	87	3	6.2	20200	415.50	435.63	388	91			255	78						
9:14:02	40.57599	105.6863	38790	417.49	439.76	370	88	3	6.2	19900	416.69	435.50	387	94	202							352	243	20
9:14:14	40.57758	105.6586	38790	418.76	439.87	367	97	3	6.2	19700	417.81	435.44	385	94	197			80						
9:14:26	40.57576	105.6327	38789	419.94	439.77	346	105	3	6.4	19400	418.56	435.44	384	91				82				346	8	71
9:14:38	40.57035	105.6086	38787	421.04	439.46	353	117	3	6.4	19100	419.69	435.06	382	103	192									
9:14:50	40.56062	105.5869	38787	422.04	438.88	353	125	3	6.4	19000	420.63	434.56	381	114				0						
9:15:02	40.54884	105.5675	38786	422.94	438.19	334	133	3	6.6	19000	422.06	433.38	378	125										
9:15:14	40.53609	105.5500	38786	423.74	437.43	341	133	3	6.6	19000	422.94	432.63	375	129	190									







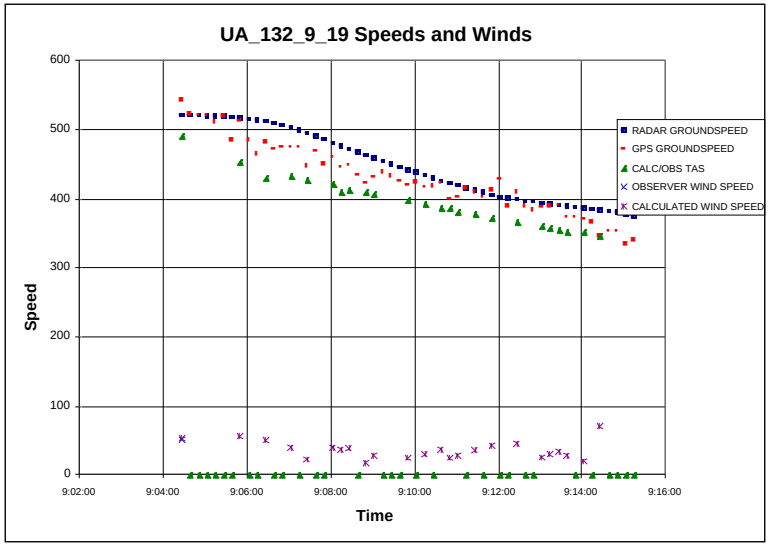
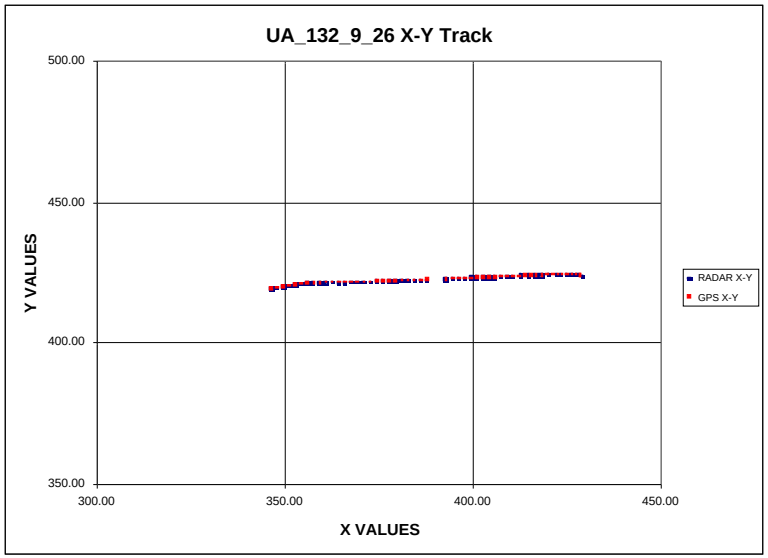
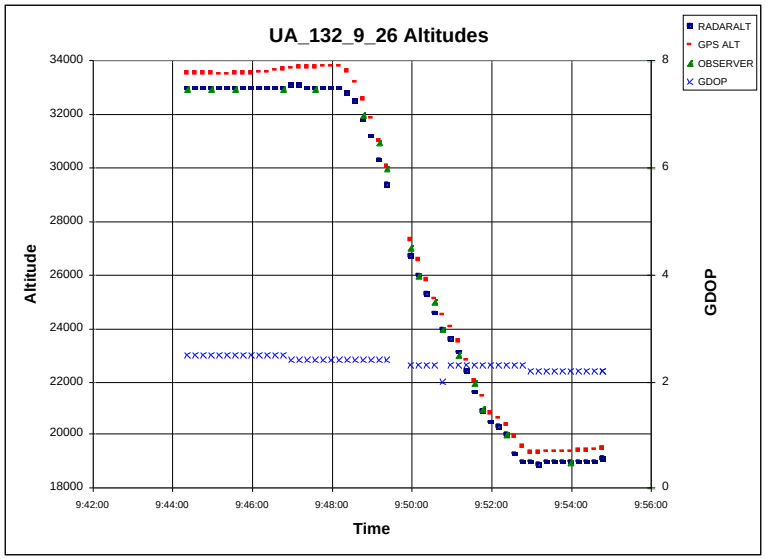


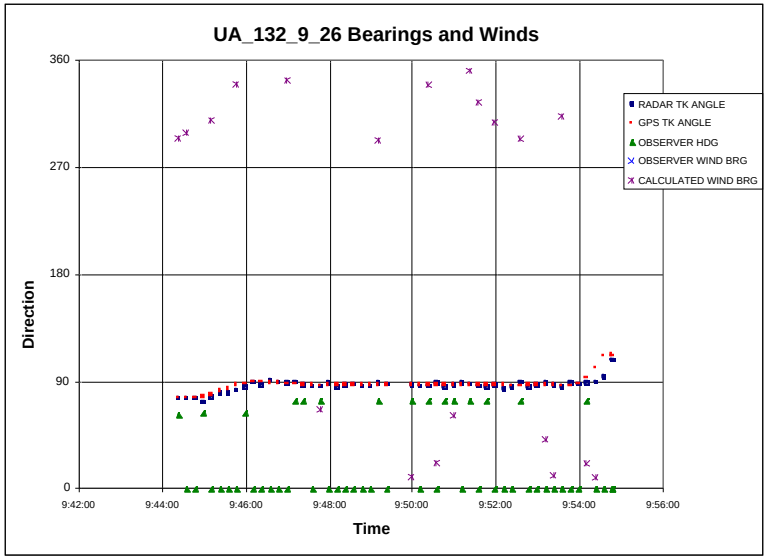
Figure A.6 Graphic Results for Case UA_132_9_19

Table A.7 Tabular Results for Case ua_132_9_26

UA_132_9_26	|<---			GPS	DATA				--->|	<---	RADAR	DATA		--->|	<---				OBSERVER DATA					--->|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
9:44:22	40.23127	107.2333	33546	346.58	419.09	491	76	4	2.5	33000	346.44	419.00	502	76	330			63			gwt 319200		473	295	23
9:44:34	40.23819	107.1987	33546	348.17	419.49	495	76	4	2.5	33000	348.00	419.38	501	76									479	299	21
9:44:46	40.24516	107.1639	33547	349.78	419.90	501	76	4	2.5	33000	349.69	419.81	501	76											
9:44:58	40.25192	107.1292	33542	351.37	420.29	504	77	4	2.5	33000	351.25	420.31	500	73	330			64							
9:45:10	40.25820	107.0950	33530	352.95	420.66	506	79	4	2.5	33000	352.88	420.63	500	77									478	310	47
9:45:22	40.26348	107.0584	33527	354.63	420.96	509	82	4	2.5	33000	354.44	420.88	499	80											
9:45:34	40.26733	107.0236	33537	356.23	421.18	477	84	4	2.5	33000	356.13	421.19	498	80	330										
9:45:46	40.27021	106.9877	33552	357.88	421.34	493	87	4	2.5	33000	357.56	421.31	497	83									473	340	104
9:45:58	40.27182	106.9512	33565	359.56	421.43	499	88	4	2.5	33000	359.31	421.44	496	85				64							
9:46:10	40.27262	106.9149	33577	361.22	421.47	497	90	4	2.5	33000	360.94	421.38	494	90							ctas clf				
9:46:22	40.27279	106.8789	33605	362.88	421.47	486	90	4	2.5	33000	362.69	421.50	493	87											
9:46:34	40.27299	106.8430	33649	364.53	421.48	503	89	4	2.5	33000	364.31	421.44	491	91											
9:46:46	40.27347	106.8062	33701	366.22	421.50	508	89	4	2.5	33000	366.00	421.44	490	90	330										
9:46:58	40.27413	106.7700	33745	367.88	421.53	495	88	4	2.4	33100	367.69	421.50	488	89									479	343	112
9:47:10	40.27511	106.7339	33765	369.54	421.58	497	88	4	2.4	33100	369.31	421.50	487	90				74							
9:47:22	40.27637	106.6971	33780	371.23	421.66	487	87	4	2.4	33000	371.06	421.63	486	87				74							
9:47:34	40.27778	106.6603	33792	372.92	421.74	505	87	4	2.4	33000	372.75	421.75	486	86	330										
9:47:46	40.27936	106.6229	33799	374.64	421.83	455	86	4	2.4	33000	374.44	421.88	486	86				74					481	66	27
9:47:58	40.28100	106.5877	33800	376.25	421.93	507	87	4	2.4	33000	376.19	421.88	487	89											
9:48:10	40.28267	106.5505	33798	377.96	422.02	503	87	4	2.4	33000	377.81	422.06	488	85											
9:48:22	40.28427	106.5145	33628	379.61	422.11	488	87	4	2.4	32800	379.50	422.13	489	87											
9:48:34	40.28588	106.4776	33231	381.31	422.21	512	87	4	2.4	32500	381.13	422.19	491	88											
9:48:46	40.28741	106.4412	32582	382.98	422.31	517	87	4	2.4	31800	382.75	422.31	492	86	320										
9:48:58	40.28892	106.4048	31894	384.66	422.40	504	87	4	2.4	31200	384.50	422.44	493	86											
9:49:10	40.29033	106.3686	31029	386.31	422.48	519	87	4	2.4	30300	386.19	422.44	494	89	310			74					484	293	39
9:49:22	40.29175	106.3315	30052	388.02	422.57	519	87	4	2.4	29400	387.75	422.50	495	88	300										
9:49:58	40.29605	106.2202	27320	393.13	422.84	498	87	4	2.3	26700	392.88	422.81	495	87	270			74					502	10	16
9:50:10	40.29751	106.1829	26541	394.84	422.93	505	87	4	2.3	26000	394.63	422.94	496	86	260										
9:50:22	40.29893	106.1465	25822	396.51	423.02	503	87	4	2.3	25300	396.25	423.06	497	86				74					498	339	16
9:50:34	40.30032	106.1106	25121	398.16	423.11	487	87	4	2.3	24600	397.94	423.06	497	89	250								495	22	18
9:50:46	40.30169	106.0750	24507	399.79	423.20	492	87	4	2.0	24000	399.63	423.25	497	85	240			74							
9:50:58	40.30303	106.0394	24069	401.42	423.29	458	87	4	2.3	23600	401.19	423.31	497	87				74					491	61	36
9:51:10	40.30434	106.0055	23499	402.98	423.37	471	87	4	2.3	23100	402.81	423.31	497	89	230										
9:51:22	40.30571	105.9708	22801	404.57	423.46	474	87	4	2.3	22400	404.50	423.38	497	88				74					473	352	13
9:51:34	40.30706	105.9371	22019	406.12	423.55	474	87	4	2.3	21600	405.94	423.50	496	86	220								465	325	17
9:51:46	40.30839	105.9022	21443	407.72	423.64	480	87	4	2.3	20900	407.44	423.63	495	85	210			74							
9:51:58	40.30975	105.8668	20841	409.35	423.74	489	87	4	2.3	20500	409.25	423.69	494	87									471	308	24
9:52:10	40.31096	105.8324	20646	410.93	423.82	473	87	4	2.3	20300	410.75	423.88	493	84											
9:52:22	40.31222	105.7981	20371	412.50	423.91	466	86	4	2.3	20000	412.81	424.06	491	85	200										
9:52:34	40.31360	105.7646	19948	414.03	424.00	474	86	4	2.3	19300	414.88	424.00	490	90				74					452	294	25
9:52:46	40.31492	105.7311	19546	415.57	424.09	474	87	4	2.3	19000	416.44	424.19	488	85											
9:52:58	40.31614	105.6983	19342	417.08	424.18	442	87	4	2.2	19000	417.94	424.25	486	87											
9:53:10	40.31721	105.6663	19352	418.55	424.26	424	87	4	2.2	18900	418.63	424.25	483	89									440	41	21
9:53:22	40.31828	105.6346	19370	420.00	424.33	428	87	4	2.2	19000	420.19	424.38	481	87									432	11	13
9:53:34	40.31942	105.6034	19382	421.44	424.42	423	86	4	2.2	19000	422.25	424.56	477	85									415	313	11
9:53:46	40.32061	105.5742	19388	422.77	424.50	389	86	4	2.2	19000	423.50	424.56	473	89											
9:53:58	40.32184	105.5463	19395	424.05	424.59	357	88	4	2.2	19000	424.88	424.63	469	88	190										
9:54:10	40.32256	105.5193	19408	425.29	424.64	356	93	4	2.2	19000	426.13	424.63	463	89				74					377	21	55
9:54:22	40.32208	105.4930	19423	426.50	424.63	343	101	4	2.2	19000	426.56	424.63	456	90									353	9	99
9:54:34	40.31863	105.4687	19434	427.61	424.43	331	111	4	2.2	19000	427.81	424.50	448	94											
9:54:46	40.31197	105.4469	19483	428.62	424.05	323	112	4	2.2	19100	429.19	423.75	437	108											
9:54:47	40.31127	105.4451	19485	428.70	424.01	325	111	4	2.2	19100	429.29	423.72	436	108											







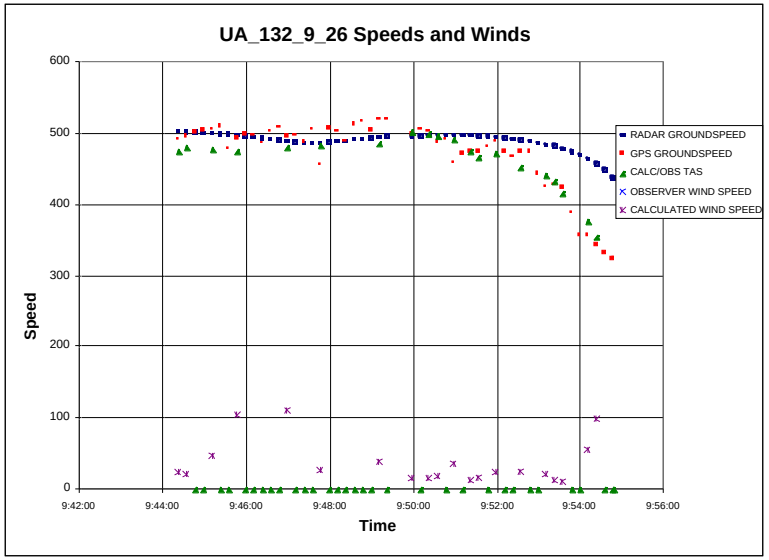
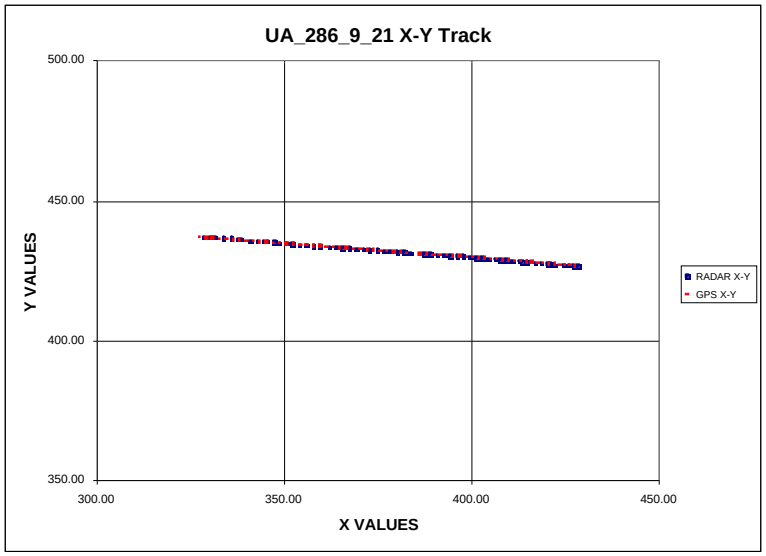
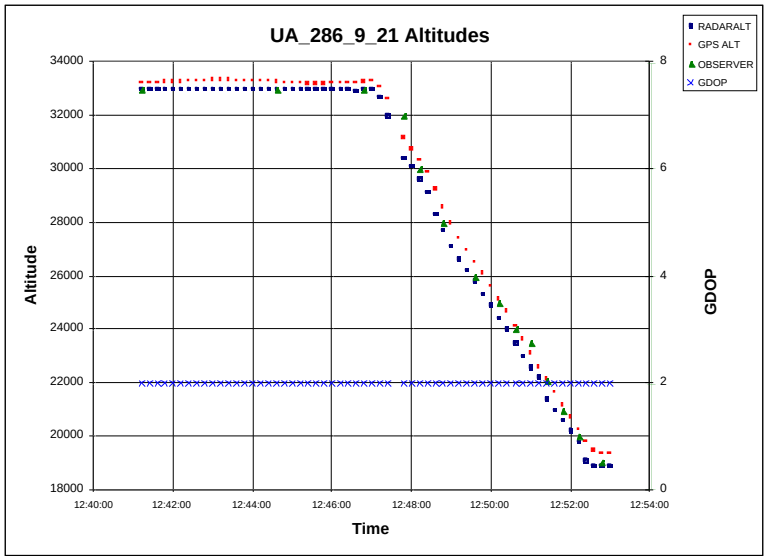


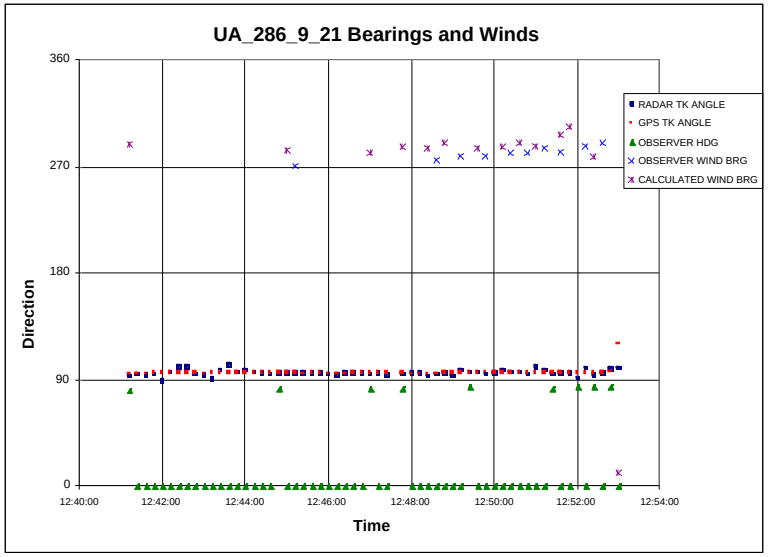
Figure A.7 Graphic Results for Case UA_132_9_26

Table A.8 Tabular Results for Case UA_286_9_21

UA_286_9_21	|<---			GPS	DATA				---\>|	<---	RADAR	DATA		---\>|	<---				OBSERVER DATA					---\>|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
12:41:12	40.52626	107.6476	33226	327.78	436.99	541	95	4	2.0	33000	328.81	437.19	527	93	330		272	81				446	289	98
12:41:24	40.52407	107.6105	33224	329.47	436.83	542	95	4	2.0	33000	330.56	437.00	527	95										
12:41:36	40.52165	107.5720	33231	331.23	436.67	517	95	4	2.0	33000	331.56	436.94	527	94										
12:41:48	40.51910	107.5327	33241	333.03	436.49	523	96	4	2.0	33000	334.06	436.69	527	95										
12:42:00	40.51651	107.4940	33245	334.80	436.32	532	96	4	2.0	33000	336.19	436.81	528	89										
12:42:12	40.51383	107.4544	33259	336.61	436.13	538	96	4	2.0	33000	337.81	436.50	529	97										
12:42:24	40.51124	107.4161	33292	338.36	435.96	536	96	4	2.0	33000	338.63	436.31	530	101										
12:42:36	40.50855	107.3772	33298	340.14	435.78	532	96	4	2.0	33000	341.19	435.81	531	101										
12:42:48	40.50585	107.3380	33309	341.94	435.60	545	96	4	2.0	33000	343.06	435.75	531	95										
12:43:00	40.50333	107.3002	33324	343.66	435.43	549	95	4	2.0	33000	344.75	435.63	531	94										
12:43:12	40.50067	107.2600	33327	345.50	435.26	527	96	4	2.0	33000	345.81	435.63	532	91										
12:43:24	40.49804	107.2214	33323	347.26	435.08	522	96	4	2.0	33000	347.50	435.31	533	98										
12:43:36	40.49530	107.1830	33310	349.02	434.90	535	96	4	2.0	33000	348.81	434.94	532	103										
12:43:48	40.49247	107.1439	33309	350.81	434.72	551	96	4	2.0	33000	350.75	434.81	532	97										
12:44:00	40.48955	107.1038	33296	352.64	434.53	540	96	4	2.0	33000	352.50	434.56	531	98										
12:44:12	40.48657	107.0641	33288	354.46	434.34	553	96	4	2.0	33000	354.25	434.38	530	97										
12:44:24	40.48391	107.0285	33279	356.09	434.17	551	96	4	2.0	33000	356.00	434.19	529	96										
12:44:36	40.48094	106.9893	33260	357.89	433.98	537	96	4	2.0	33000	357.88	434.06	529	95	330									
12:44:48	40.47791	106.9494	33235	359.71	433.79	541	96	4	2.0	33000	359.56	433.88	529	96				83						
12:45:00	40.47507	106.9116	33218	361.44	433.61	540	96	4	2.0	33000	362.31	433.56	528	96			273					448	284	93
12:45:12	40.47205	106.8705	33202	363.32	433.42	542	96	4	2.0	33000	364.00	433.38	527	96					271	93				
12:45:24	40.46948	106.8335	33176	365.02	433.26	522	95	4	2.0	33000	365.81	433.19	527	96										
12:45:36	40.46683	106.7945	33179	366.80	433.09	536	96	4	2.0	33000	367.56	433.00	527	96										
12:45:48	40.46407	106.7547	33197	368.62	432.92	538	96	4	2.0	33000	369.44	432.81	527	96										
12:46:00	40.46141	106.7161	33201	370.39	432.75	533	95	4	2.0	33000	371.25	432.69	527	95										
12:46:13	40.45840	106.6730	33207	372.36	432.57	547	95	4	2.0	33000	372.94	432.56	527	94										
12:46:24	40.45584	106.6372	33215	374.00	432.41	542	95	4	2.0	33000	374.88	432.31	528	96										
12:46:36	40.45304	106.5989	33230	375.76	432.24	548	96	4	2.0	32900	376.75	432.13	528	96										
12:46:48	40.45005	106.5583	33259	377.61	432.06	558	96	4	2.0	33000	378.38	431.94	529	96	330									
12:47:00	40.44715	106.5192	33299	379.40	431.88	554	96	4	2.0	33000	380.25	431.81	530	95			274	83				449	282	105
12:47:12	40.44413	106.4790	33074	381.25	431.70	544	96	4	2.0	32700	382.06	431.63	531	96										
12:47:24	40.44132	106.4414	32628	382.97	431.53	556	96	4	2.0	32000	383.88	431.50	532	94										
12:47:48	40.43529	106.3635	31168	386.54	431.17	541	96	4	2.0	30400	387.63	431.13	532	95	320		300	83				480	287	62
12:48:00	40.43228	106.3245	30706	388.33	430.99	541	95	4	2.0	30100	389.19	430.94	533	96										
12:48:12	40.42927	106.2839	30307	390.18	430.82	525	95	4	2.0	29600	391.00	430.75	534	96	300									
12:48:24	40.42669	106.2471	29856	391.87	430.67	514	95	4	2.0	29100	392.75	430.69	535	93			300					466	286	48
12:48:36	40.42412	106.2102	29228	393.57	430.52	514	95	4	2.0	28300	394.50	430.50	535	95					276	75				
12:48:48	40.42136	106.1726	28572	395.29	430.36	509	96	4	2.0	27700	396.31	430.31	536	96	280		305					458	290	53
12:49:00	40.41826	106.1336	27940	397.08	430.18	525	96	4	2.0	27100	397.88	430.25	535	93										
12:49:12	40.41507	106.0945	27393	398.87	429.99	521	96	4	2.0	26600	399.69	429.94	535	98			300		279	65				
12:49:24	40.41216	106.0601	26967	400.45	429.83	489	96	4	2.0	26200	401.38	429.75	534	97				84						
12:49:36	40.40893	106.0229	26517	402.15	429.64	493	96	4	2.0	25800	402.94	429.56	532	97	260		300					438	286	55
12:49:48	40.40585	105.9880	26082	403.75	429.47	478	97	4	2.0	25300	404.63	429.44	531	95					279	60				
12:50:00	40.40270	105.9531	25624	405.36	429.28	477	96	4	2.0	24900	406.31	429.25	528	96										
12:50:12	40.39944	105.9170	25125	407.01	429.10	478	96	4	2.0	24400	407.81	429.00	525	98	250		299					430	287	48
12:50:24	40.39645	105.8840	24672	408.52	428.93	480	96	4	2.0	24000	409.44	428.81	522	97					282	57				
12:50:37	40.39314	105.8472	24131	410.21	428.74	463	96	4	2.0	23500	410.94	428.63	518	97	240		299					423	290	41
12:50:48	40.39026	105.8154	23626	411.67	428.58	463	96	4	2.0	23000	412.69	428.50	514	95					282	55				
12:51:00	40.38727	105.7818	23111	413.21	428.41	458	96	4	2.0	22600	413.44	428.31	510	101	235		299					420	288	39
12:51:12	40.38411	105.7464	22585	414.84	428.23	465	96	4	2.0	22200	415.00	428.13	506	98					286	50				
12:51:24	40.38138	105.7155	22124	416.26	428.08	444	96	4	2.0	21400	417.13	428.00	501	95	221			83						
12:51:36	40.37846	105.6826	21637	417.77	427.92	451	96	4	2.0	21000	418.69	427.81	495	96			301		283	47		414	297	40
12:51:48	40.37560	105.6505	21173	419.24	427.77	435	96	4	2.0	20600	420.38	427.63	490	96	210		300					406	304	32
12:52:00	40.37274	105.6186	20709	420.70	427.61	445	96	4	2.0	20200	420.94	427.63	485	92				85						
12:52:12	40.36977	105.5852	20230	422.23	427.44	443	96	4	2.0	19800	422.31	427.31	480	100	200				288	43				
12:52:24	40.36711	105.5555	19779	423.60	427.30	428	96	4	2.0	19100	424.63	427.25	474	94			300	85				400	278	28
12:52:36	40.36433	105.5248	19462	425.01	427.15	411	96	4	2.0	18900	426.06	427.06	469	96					290	42				
12:52:48	40.36144	105.4945	19332	426.40	426.99	422	97	4	2.0	18900	427.19	426.88	464	99	190			85						
12:53:00	40.35848	105.4658	19349	427.72	426.82	378	120	4	2.0	18900	428.56	426.63	458	100			275					362	11	152







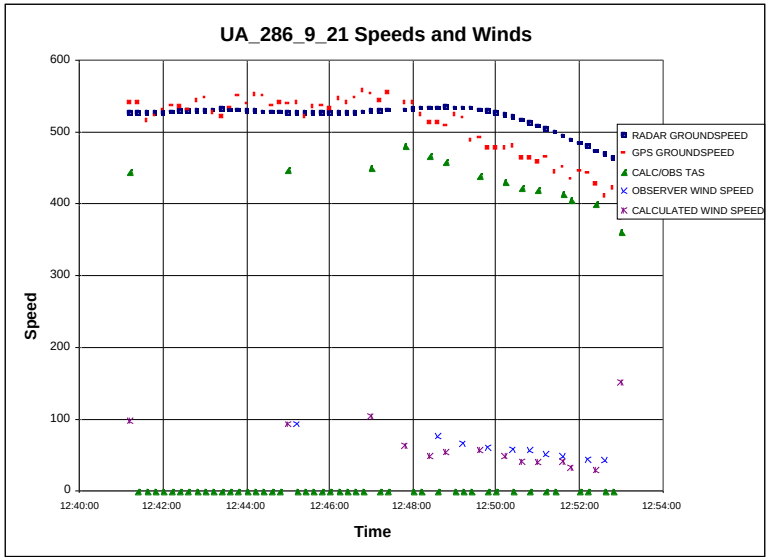
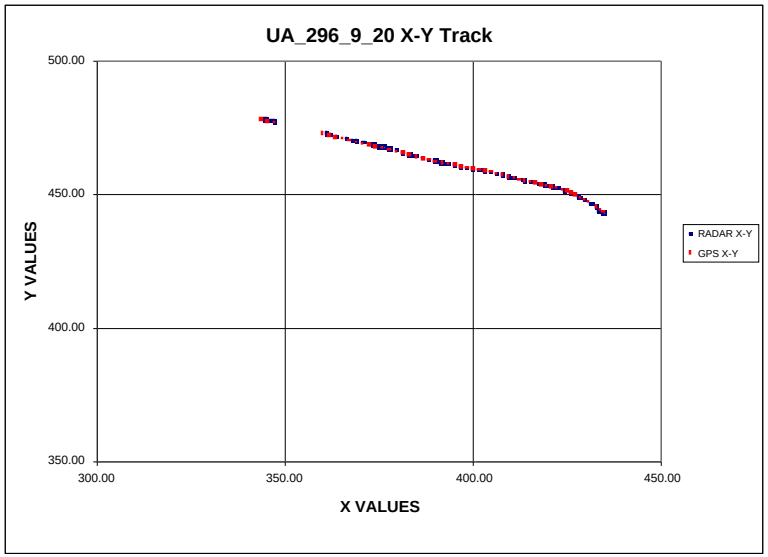
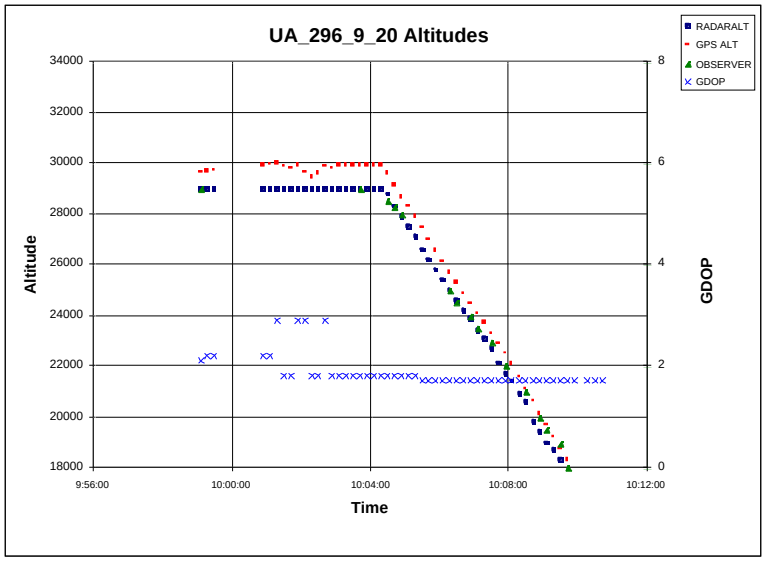


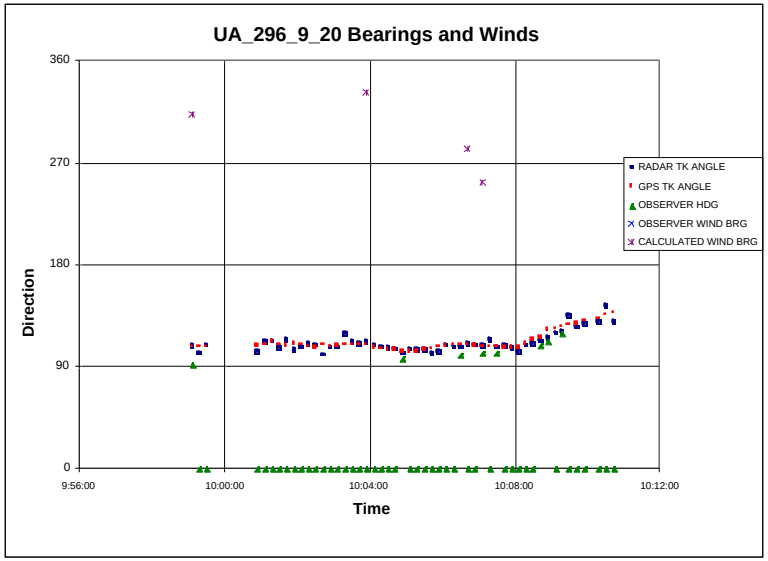
Figure A.8 Graphic Results for Case UA_286_9_21

Table A.9 Tabular Results for Case UA_296_9_20

UA_296_9_20	|<---			GPS	DATA				---\>|	<---	RADAR	DATA		---\>|	<---				OBSERVER	DATA				---\>|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
9:59:06	41.21287	107.3078	29654	343.72	477.98	567	108	4	2.1	29000	344.81	477.88	557	109	290	-40	320	92			gs 545	481	313	97
9:59:18	41.20351	107.2680	29697	345.52	477.40	570	108	4	2.2	29000	346.50	477.56	557	103										
9:59:30	41.19406	107.2286	29726	347.30	476.82	568	108	4	2.2	29000	347.38	477.19	557	110										
10:00:54	41.12617	106.9467	29932	360.05	472.66	574	109	4	2.2	29000	360.94	472.88	564	104										
10:01:06	41.11628	106.9081	29961	361.79	472.06	566	110	4	2.2	29000	362.00	472.38	565	112							alpoe -25			
10:01:18	41.10593	106.8695	29999	363.54	471.43	566	112	4	2.9	29000	363.63	471.69	566	113										
10:01:30	41.09476	106.8311	29898	365.28	470.75	562	110	4	1.8	29000	366.44	470.94	566	107										
10:01:42	41.08377	106.7917	29820	367.06	470.08	559	109	4	1.8	29000	368.06	470.13	566	114										
10:01:54	41.07280	106.7501	29935	368.95	469.42	575	111	4	2.9	29000	369.06	469.94	565	105										
10:02:06	41.06210	106.7130	29662	370.63	468.77	570	110	4	2.9	29000	370.81	469.31	565	108										
10:02:18	41.05131	106.6732	29460	372.44	468.12	572	108	4	1.8	29000	373.44	468.25	564	111										
10:02:30	41.04183	106.6343	29622	374.20	467.55	564	107	4	1.8	29000	375.19	467.63	563	110										
10:02:42	41.03248	106.5951	29895	375.98	466.99	587	110	4	2.9	29000	376.19	467.50	562	101										
10:02:54	41.02156	106.5534	29796	377.87	466.33	580	108	4	1.8	29000	377.88	466.88	562	108										
10:03:06	41.01221	106.5156	29904	379.59	465.77	568	109	4	1.8	29000	379.75	466.25	561	108										
10:03:18	41.00178	106.4755	29915	381.41	465.14	577	110	4	1.8	29000	381.25	465.25	561	119										
10:03:30	40.99141	106.4371	29913	383.16	464.52	566	110	4	1.8	29000	383.00	464.63	560	112										
10:03:42	40.98034	106.3975	29909	384.96	463.86	563	110	4	1.8	29000	384.63	464.00	559	111	290									
10:03:54	40.96885	106.3569	29919	386.80	463.17	549	110	4	1.8	29000	386.44	463.25	559	112			320					487	332	89
10:04:06	40.95905	106.3215	29932	388.41	462.59	528	107	4	1.8	29000	388.19	462.63	558	110										
10:04:18	40.95009	106.2840	29911	390.12	462.05	518	106	4	1.8	29000	389.88	462.13	557	108			290							
10:04:30	40.94190	106.2466	29621	391.82	461.56	530	105	4	1.8	28800	391.69	461.56	557	107	285		285							
10:04:42	40.93456	106.2112	29144	393.43	461.12	528	105	4	1.8	28300	393.06	461.19	555	106	283		285							
10:04:54	40.92674	106.1726	28685	395.18	460.66	500	104	4	1.8	27900	395.13	460.75	553	103	280		285	97						
10:05:06	40.91974	106.1374	28310	396.79	460.25	500	104	4	1.8	27500	396.75	460.25	550	106										
10:05:18	40.91287	106.1009	27890	398.45	459.84	507	104	4	1.8	27100	398.25	459.88	546	105			285							
10:05:30	40.90631	106.0660	27445	400.04	459.46	495	105	4	1.7	26600	399.94	459.44	542	105										
10:05:42	40.89929	106.0307	26982	401.65	459.04	509	106	4	1.7	26200	401.56	459.13	537	102										
10:05:54	40.89107	105.9945	26536	403.30	458.56	494	108	4	1.7	25800	403.00	458.75	531	104										
10:06:06	40.88300	105.9622	26116	404.77	458.08	481	109	4	1.7	25400	404.69	458.06	526	110										
10:06:18	40.87396	105.9289	25694	406.29	457.55	488	110	4	1.7	25000	406.13	457.63	520	108	250		290							
10:06:30	40.86476	105.8955	25279	407.81	457.01	482	110	4	1.7	24600	407.69	457.13	514	108	245			100						
10:06:42	40.85541	105.8626	24877	409.32	456.46	473	110	4	1.7	24200	409.38	456.44	509	111			290					418	282	55
10:06:54	40.84580	105.8285	24464	410.87	455.89	458	109	4	1.7	23900	410.63	456.00	503	110	240		290							
10:07:06	40.83713	105.7968	24089	412.32	455.38	474	108	4	1.7	23400	413.13	455.13	499	109	235			103				412	253	77
10:07:18	40.82918	105.7654	23709	413.76	454.92	465	108	4	1.7	23100	413.75	454.81	495	114										
10:07:30	40.82128	105.7335	23311	415.21	454.46	463	108	4	1.7	22700	415.44	454.38	492	108	230			102						
10:07:42	40.81353	105.7022	22915	416.64	454.00	448	107	4	1.7	22100	417.31	453.69	486	109										
10:07:54	40.80565	105.6698	22491	418.12	453.54	431	107	4	1.7	21700	418.88	453.25	479	107	220									
10:08:05	40.79860	105.6407	22061	419.45	453.13	436	107	4	1.7	21400	420.31	452.94	472	104			282							
10:08:18	40.79112	105.6092	21570	420.89	452.69	439	111	4	1.7	20900	421.06	452.63	464	110							slowed 280 due to chop			
10:08:29	40.78267	105.5797	21098	422.24	452.20	433	114	4	1.7	20600	422.31	452.13	459	111	210		282							
10:08:42	40.77290	105.5494	20609	423.62	451.63	439	116	4	1.7	19800	424.31	451.25	453	113				110						
10:08:54	40.76249	105.5194	20120	425.00	451.02	436	123	4	1.7	19400	425.75	450.50	448	116	200		290	112						
10:09:06	40.74989	105.4946	19681	426.14	450.28	422	124	4	1.7	19000	426.75	449.88	444	120	195									
10:09:17	40.73641	105.4697	19215	427.28	449.48	432	126	4	1.7	18700	428.06	449.06	439	121			286	120						
10:09:29	40.72194	105.4443	18751	428.45	448.63	428	127	4	1.7	18300	428.44	448.44	436	135	190		290							
10:09:42	40.70746	105.4197	18300	429.58	447.77	433	128	4	1.7	17900	429.63	447.69	432	126	180									
10:09:54	40.69232	105.3956	17877	430.70	446.88	407	131	4	1.7	17300	431.38	446.25	430	128			290							
10:10:17	40.66233	105.3519	17471	432.71	445.11	400	133	4	1.7	17000	432.63	445.19	430	130	170		290							
10:10:30	40.64666	105.3302	17398	433.72	444.18	405	136	4	1.7	16900	433.19	443.69	423	144			280							
10:10:42	40.63100	105.3098	17428	434.66	443.25	389	138	4	1.7	16900	434.69	443.06	418	130	170						ramms -10			
10:10:54	40.61388	105.2897	17470	435.59	442.24	404	139	4	1.7	17000	435.88	442.31	414	125			280							
10:11:06	40.59756	105.2721	17500	436.41	441.27	393	142	0	1.7	17000	436.88	440.63	410	139										
10:11:17	40.58050	105.2552	17522	437.19	440.26	380	143	4	1.7	17000	437.88	439.63	410	136										
10:11:30	40.56267	105.2382	17519	437.99	439.20	381	144	4	1.7	17000	438.06	439.13	408	150							ramms -4 began slow down			
10:11:41	40.54564	105.2223	17505	438.73	438.19	372	145	4	0.7	16900	438.88	438.13	405	144			265							
10:11:54	40.52799	105.2066	17446	439.46	437.14	367	146	4	1.7	16900	439.56	437.13	401	145			250							
10:12:01	40.51902	105.1989	17420	439.82	436.61	352	147	4	1.7	16900	440.06	436.27	398	147										







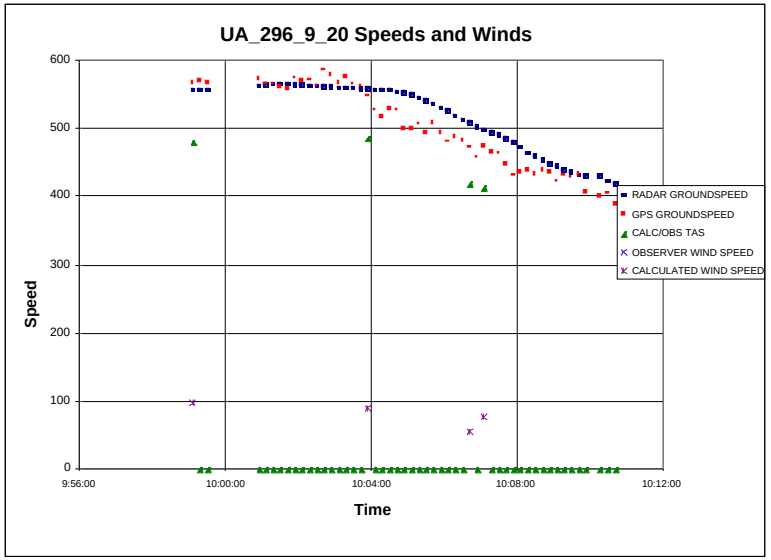


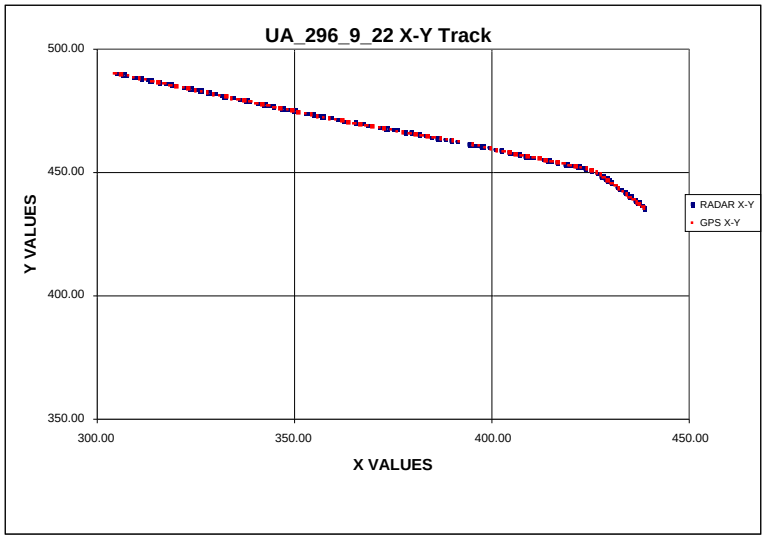
Figure A.9 Graphic Results for Case UA_296_9_20

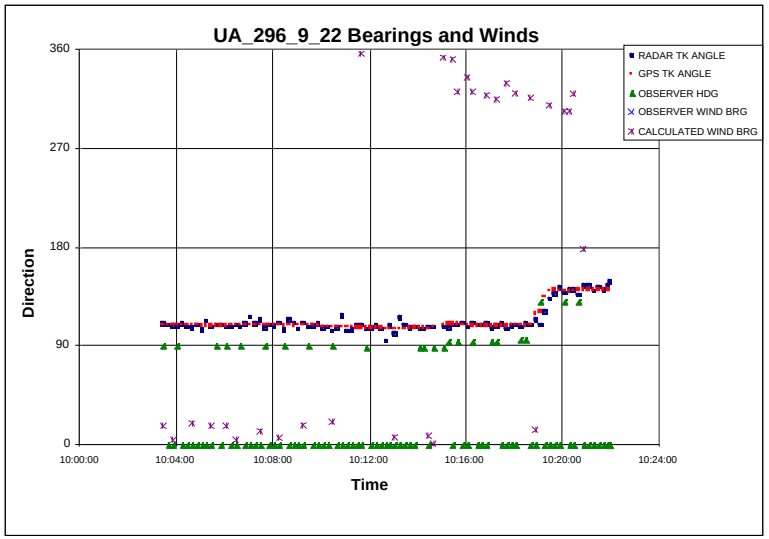
Table A.10 Tabular Results for Case UA_296_9_22

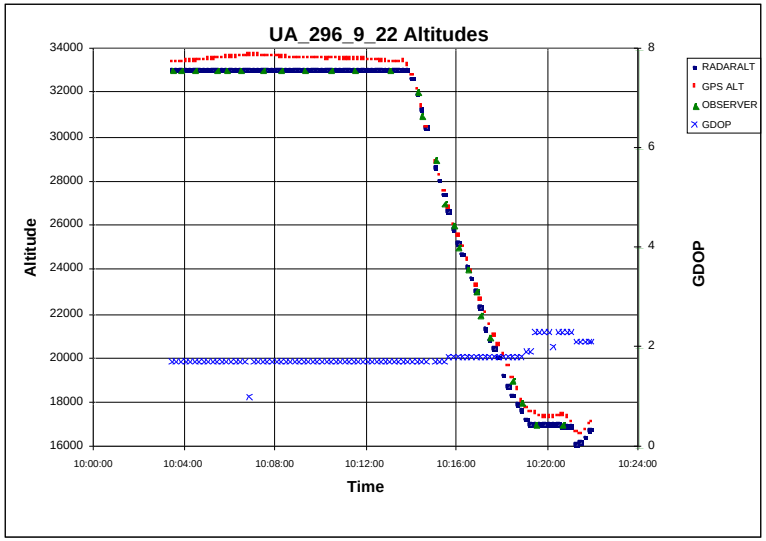
UA_296_9_22	|<---			GPS	DATA				---> |	<---	RADAR	DATA		---> |	<---				OBSERVER	DATA			---> |	
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
10:03:28	41.40540	108.1724	33414	304.80	490.09	490	109	4	1.7	33000	305.31	490.00	494	110	330			90				492	16	67
10:03:40	41.39670	108.1374	33427	306.37	489.55	503	109	4	1.7	33000	306.75	489.50	495	109										
10:03:52	41.38815	108.1021	33431	307.95	489.00	506	109	4	1.7	33000	307.56	489.25	496	108	330							493	4	69
10:04:04	41.37939	108.0659	33443	309.57	488.45	518	109	4	1.7	33000	309.81	488.50	496	108				90						
10:04:16	41.37117	108.0322	33459	311.09	487.93	495	109	4	1.7	33000	311.50	487.88	495	110										
10:04:28	41.36253	107.9971	33475	312.67	487.38	489	109	4	1.7	33000	313.00	487.44	495	107	330									
10:04:40	41.35378	107.9615	33489	314.27	486.83	490	109	4	1.7	33000	313.94	487.19	496	106								496	19	68
10:04:52	41.34550	107.9275	33512	315.79	486.30	488	109	4	1.7	33000	316.06	486.38	496	109										
10:05:04	41.33669	107.8910	33542	317.43	485.75	484	108	4	1.7	33000	317.81	486.00	496	104										
10:05:16	41.32863	107.8571	33567	318.96	485.24	481	108	4	1.7	33000	319.25	485.31	496	112										
10:05:28	41.32038	107.8223	33580	320.53	484.72	487	108	4	1.7	33000	320.19	485.06	496	107	330							489	16	60
10:05:40	41.31232	107.7881	33598	322.07	484.22	487	108	4	1.7	33000	322.44	484.25	496	109				90						
10:05:52	41.30442	107.7548	33633	323.56	483.72	487	108	4	1.7	33000	323.94	483.75	496	109	330									
10:06:04	41.29594	107.7193	33651	325.16	483.19	481	108	4	1.7	33000	325.44	483.31	495	107				90				482	16	61
10:06:16	41.28817	107.6869	33661	326.62	482.70	485	109	4	1.7	33000	326.50	483.00	494	107										
10:06:28	41.27986	107.6525	33678	328.17	482.18	496	109	4	1.7	33000	328.56	482.25	493	109	330							484	4	67
10:06:40	41.27139	107.6176	33697	329.74	481.65	496	109	4	1.7	33000	330.25	481.75	492	107				90						
10:06:52	41.26305	107.5839	33711	331.26	481.13	498	109	4	1.0	33000	331.69	481.19	491	110										
10:07:04	41.25386	107.5475	33714	332.90	480.56	499	109	4	1.7	33000	332.50	480.75	490	116										
10:07:16	41.24557	107.5149	33708	334.37	480.04	497	109	4	1.7	33000	334.75	480.06	489	110										
10:07:28	41.23671	107.4799	33699	335.95	479.49	492	109	4	1.7	33000	336.31	479.38	488	113	330							489	12	69
10:07:40	41.22829	107.4464	33691	337.46	478.97	491	109	4	1.7	33000	338.00	479.00	487	106				90						
10:07:52	41.21982	107.4121	33688	339.00	478.45	486	109	4	1.7	33000	338.69	478.75	487	109										
10:08:04	41.21054	107.3759	33675	340.64	477.87	502	109	4	1.7	33000	341.00	478.00	486	108										
10:08:16	41.20265	107.3440	33658	342.08	477.39	492	109	4	1.7	33000	342.56	477.38	486	111	330							481	5	65
10:08:28	41.19431	107.3099	33636	343.62	476.87	480	108	4	1.7	33000	344.06	477.06	486	104				90						
10:08:40	41.18597	107.2757	33606	345.16	476.36	476	109	4	1.7	33000	344.81	476.69	485	113										
10:08:52	41.17763	107.2418	33586	346.69	475.84	492	108	4	1.7	33000	347.06	475.88	484	111										
10:09:04	41.16881	107.2062	33583	348.31	475.30	493	109	4	1.7	33000	348.69	475.50	484	105										
10:09:16	41.16071	107.1738	33597	349.76	474.80	481	109	4	1.7	33000	350.13	474.88	483	111	330							483	17	66
10:09:28	41.15215	107.1398	33604	351.30	474.27	493	109	4	1.7	33000	351.00	474.63	484	107				90						
10:09:40	41.14362	107.1063	33599	352.82	473.75	487	109	4	1.7	33000	353.25	473.88	484	108										
10:09:52	41.13476	107.0715	33589	354.39	473.21	479	108	4	1.7	33000	354.88	473.25	485	110										
10:10:04	41.12639	107.0366	33579	355.97	472.69	506	107	4	1.7	33000	356.31	472.88	485	106										
10:10:16	41.11848	107.0024	33571	357.52	472.21	493	107	4	1.7	33000	357.31	472.56	486	107										
10:10:28	41.11070	106.9683	33577	359.06	471.74	482	107	4	1.7	33000	359.44	472.13	485	103	330			90				488	20	52
10:10:40	41.10286	106.9340	33576	360.61	471.26	486	107	4	1.7	33000	361.19	471.56	485	106										
10:10:52	41.09491	106.8994	33568	362.18	470.77	495	107	4	1.7	33000	362.50	470.75	485	117										
10:11:04	41.08670	106.8636	33561	363.80	470.27	478	107	4	1.7	33000	363.50	470.75	484	103										
10:11:16	41.07919	106.8302	33558	365.32	469.82	471	107	4	1.7	33000	365.63	470.19	484	104										
10:11:28	41.07177	106.7968	33549	366.83	469.37	501	106	4	1.7	33000	367.38	469.56	483	108	330									
10:11:40	41.06430	106.7624	33547	368.39	468.91	498	106	4	1.7	33000	368.75	469.06	483	109								485	356	44
10:11:52	41.05695	106.7282	33543	369.94	468.46	507	106	4	1.7	33000	369.56	468.88	481	105				88						
10:12:04	41.04923	106.6923	33526	371.57	468.00	474	106	4	1.7	33000	371.94	468.19	481	106										
10:12:16	41.04260	106.6613	33505	372.98	467.60	475	106	4	1.7	33000	373.44	467.69	481	108										
10:12:28	41.03516	106.6264	33483	374.56	467.15	485	106	4	1.7	33000	375.00	467.31	481	105										
10:12:40	41.02790	106.5921	33464	376.12	466.71	480	105	4	1.7	33000	375.88	467.31	481	94										
10:12:52	41.02069	106.5573	33444	377.69	466.28	492	105	4	1.7	33000	378.19	466.25	480	108										
10:13:04	41.01330	106.5214	33428	379.32	465.83	485	105	4	1.7	33000	379.69	466.06	480	101	330							480	6	53
10:13:16	41.00651	106.4886	33427	380.81	465.42	478	105	4	1.7	33000	380.25	465.63	478	115										
10:13:28	40.99939	106.4544	33429	382.37	464.99	501	105	4	1.7	33000	381.69	465.19	476	109										
10:13:40	40.99214	106.4198	33455	383.94	464.56	485	106	4	1.7	33000	383.44	464.75	473	106										
10:13:52	40.98493	106.3861	33286	385.48	464.13	486	106	4	1.7	33000	384.81	464.31	471	107										
10:14:04	40.97713	106.3498	32770	387.12	463.66	485	106	4	1.7	32600	386.56	463.88	471	105				88						
10:14:16	40.96972	106.3152	32136	388.70	463.22	494	106	4	1.7	31900	388.13	463.44	472	105	320			88						
10:14:28	40.96220	106.2798	31375	390.31	462.77	485	105	4	1.7	31200	389.75	462.94	473	107	310							481	7	54
10:14:40	40.95489	106.2451	30428	391.89	462.34	495	107	4	1.7	30400	391.19	462.50	475	107				88				480	0	67
10:15:04	40.93723	106.1719	28853	395.22	461.29	515	109	4	1.7	28600	394.56	461.44	475	107	290			88				484	353	90

Table A.10 (continued)

10:15:16	40.92869	106.1393	28284	396.70	460.79	486	110	4	1.7	28000	396.13	461.00	478	106			94						
10:15:28	40.91906	106.1046	27570	398.28	460.21	495	110	4	1.7	27400	397.63	460.44	482	109	270					474	351	48	
10:15:40	40.90958	106.0708	26789	399.82	459.65	528	110	4	1.8	26600	399.31	459.88	486	109			94			468	321	72	
10:15:52	40.89975	106.0355	26052	401.43	459.07	506	109	4	1.8	25800	400.81	459.25	491	111	260								
10:16:04	40.89007	106.0001	25540	403.05	458.50	500	109	4	1.8	25200	402.38	458.81	492	107	250					469	335	47	
10:16:16	40.88120	105.9669	25041	404.56	457.97	500	108	4	1.8	24700	404.38	458.00	495	111			94			457	321	51	
10:16:28	40.87235	105.9327	24476	406.12	457.45	486	108	4	1.8	24100	405.75	457.56	498	109	240								
10:16:40	40.86369	105.8988	23910	407.66	456.94	462	108	4	1.8	23600	407.00	457.13	499	109									
10:16:52	40.85546	105.8662	23304	409.15	456.46	483	108	4	1.8	23000	408.56	456.56	501	110	230					444	318	45	
10:17:04	40.84671	105.8315	22651	410.74	455.95	482	108	4	1.8	22300	410.06	456.19	499	106	220		94						
10:17:16	40.83859	105.7992	22088	412.21	455.47	486	108	4	1.8	21300	412.88	455.19	500	108			94			442	315	49	
10:17:28	40.83012	105.7656	21545	413.74	454.97	478	108	4	1.8	20800	414.19	454.69	501	110	210								
10:17:40	40.82189	105.7330	21040	415.23	454.49	460	108	4	1.8	20400	415.06	454.50	502	105						434	329	34	
10:17:52	40.81357	105.7004	20592	416.72	454.00	474	109	4	1.8	20000	416.50	454.00	504	108									
10:18:04	40.80452	105.6666	20146	418.27	453.48	473	109	4	1.8	19200	418.69	453.25	501	109						427	320	54	
10:18:16	40.79647	105.6364	19642	419.64	453.01	465	109	4	1.8	18700	420.25	452.81	497	107			96						
10:18:28	40.78781	105.6034	19088	421.15	452.50	456	108	4	1.8	18300	421.69	452.25	493	110	190		96						
10:18:40	40.77971	105.5722	18590	422.58	452.03	451	109	4	1.8	17900	422.44	452.00	486	109						419	316	36	
10:18:52	40.77183	105.5403	18064	424.04	451.57	431	119	4	1.8	17600	423.63	451.44	481	113	180					417	13	86	
10:19:04	40.76023	105.5113	17749	425.37	450.89	431	121	4	1.9	17200	425.00	451.00	475	109			130						
10:19:16	40.74642	105.4868	17561	426.50	450.07	430	134	4	1.9	17000	426.81	449.69	467	121									
10:19:28	40.72913	105.4649	17531	427.51	449.05	436	140	4	2.3	17000	427.88	448.56	459	132	170					401	309	35	
10:19:40	40.71023	105.4448	17403	428.44	447.93	439	141	4	2.3	17000	428.75	447.56	451	137									
10:19:52	40.69194	105.4253	17342	429.34	446.84	435	140	4	2.3	17000	429.25	446.88	444	142									
10:20:04	40.67200	105.4038	17370	430.33	445.66	443	140	4	2.3	17000	430.19	445.88	439	138			130			407	304	37	
10:20:16	40.65372	105.3839	17367	431.26	444.57	454	139	4	2.0	17000	431.56	444.13	435	141						406	304	49	
10:20:28	40.63497	105.3634	17405	432.21	443.46	420	140	4	2.3	17000	432.44	443.06	432	141						130	319	290	
10:20:40	40.61674	105.3435	17429	433.13	442.38	439	141	4	2.3	16900	433.63	441.94	431	136	170		130						
10:20:52	40.59758	105.3233	17352	434.07	441.24	409	141	4	2.3	16900	433.94	441.44	431	144						410	178	0	
10:21:04	40.57870	105.3037	17126	434.98	440.12	412	141	4	2.3	16900	434.81	440.25	431	144									
10:21:16	40.56168	105.2864	16667	435.79	439.11	402	141	4	2.1	16100	436.19	438.69	432	140									
10:21:28	40.54379	105.2680	16577	436.64	438.05	405	141	4	2.1	16200	436.88	437.75	431	143									
10:21:40	40.52658	105.2502	16784	437.47	437.03	388	141	4	2.1	16400	437.81	436.63	429	141									
10:21:52	40.50917	105.2321	17051	438.31	436.00	385	141	4	2.1	16700	438.56	435.56	426	144									
10:21:56	40.50273	105.2255	17112	438.62	435.62	382	141	4	2.1	16773	438.63	435.36	424	148									







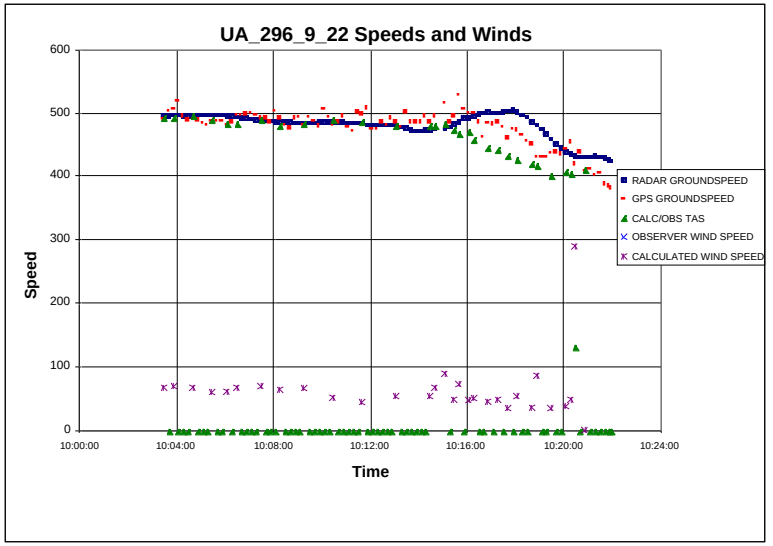
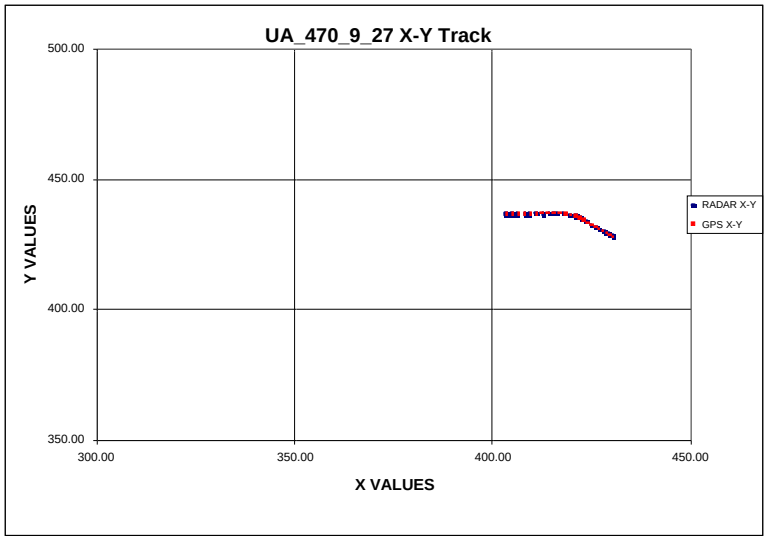
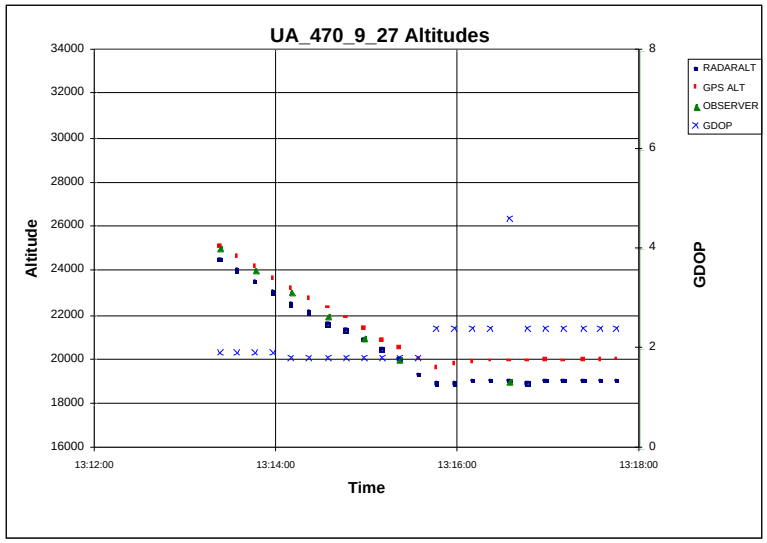


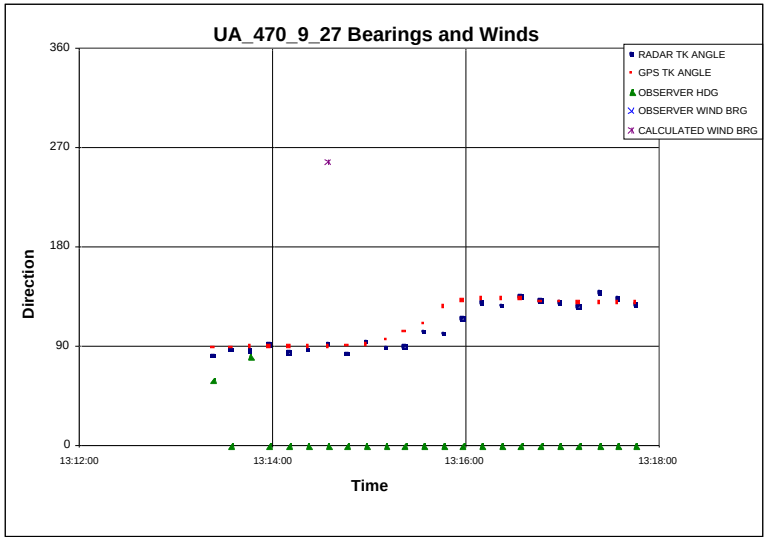
Figure A.10 Graphic Results for Case UA_296_9_22

Table A.11 Tabular Results for Case UA_470_9_27

UA_470_9_27	|<---			GPS	DATA				---\>|	<---	RADAR	DATA		---\>|	<---				OBSERVER	DATA				---\>|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
13:13:23	40.52523	105.9864	25103	403.79	436.62	458	88	4	1.9	24500	403.38	436.63	473	81	250	-8	280	60						
13:13:34	40.52594	105.9554	24648	405.21	436.67	447	88	4	1.9	24000	404.94	436.63	468	87										
13:13:46	40.52692	105.9217	24178	406.74	436.74	439	89	4	1.9	23500	406.31	436.75	463	86	240			80						
13:13:58	40.52703	105.8899	23653	408.20	436.76	443	89	4	1.9	23000	408.13	436.63	459	91										
13:14:10	40.52763	105.8568	23185	409.71	436.80	432	89	4	1.8	22500	409.25	436.81	455	84	230		280							
13:14:22	40.52789	105.8239	22751	411.22	436.83	439	89	4	1.8	22100	410.88	436.88	451	87										
13:14:34	40.52797	105.7934	22345	412.62	436.84	435	89	4	1.8	21600	412.63	436.75	449	92	220	-1						385	257	51
13:14:46	40.52802	105.7627	21892	414.02	436.86	423	90	4	1.8	21300	414.25	437.06	449	83										
13:14:58	40.52786	105.7309	21395	415.47	436.86	433	91	4	1.8	20900	415.56	436.88	449	94	210									
13:15:10	40.52771	105.6984	20862	416.96	436.87	427	96	4	1.8	20400	416.38	436.94	451	88										
13:15:22	40.52486	105.6667	20482	418.42	436.71	433	103	4	1.8	20000	417.75	436.94	451	89	200									
13:15:34	40.51929	105.6370	20007	419.77	436.39	397	110	4	1.8	19300	419.63	436.31	447	103										
13:15:46	40.51079	105.6093	19610	421.05	435.89	397	125	4	2.4	18900	421.06	436.06	443	101										
13:15:58	40.49811	105.5856	19774	422.14	435.14	396	131	4	2.4	18900	422.19	435.25	436	115										
13:16:10	40.48345	105.5642	19892	423.13	434.27	398	133	4	2.4	19000	422.56	434.69	427	129										
13:16:22	40.46774	105.5423	19912	424.14	433.34	384	133	4	2.4	19000	423.63	433.94	419	126										
13:16:34	40.45308	105.5224	19905	425.06	432.47	399	133	4	4.6	19000	424.94	432.50	409	134	190									
13:16:46	40.43799	105.5015	19936	426.03	431.57	365	130	4	2.4	18900	426.00	431.63	399	131										
13:16:58	40.42455	105.4811	19941	426.97	430.78	360	130	4	2.4	19000	426.88	430.94	393	129										
13:17:10	40.41140	105.4611	19928	427.90	430.00	342	129	4	2.4	19000	427.94	430.25	387	125			270							
13:17:23	40.39862	105.4406	19952	428.85	429.24	350	129	4	2.4	19000	428.31	429.75	384	138										
13:17:34	40.38700	105.4220	19971	429.71	428.56	341	129	4	2.4	19000	429.25	428.94	381	133										
13:17:45	40.37666	105.4056	20004	430.47	427.95	324	129	4	2.4	19000	430.47	428.16	377	127										







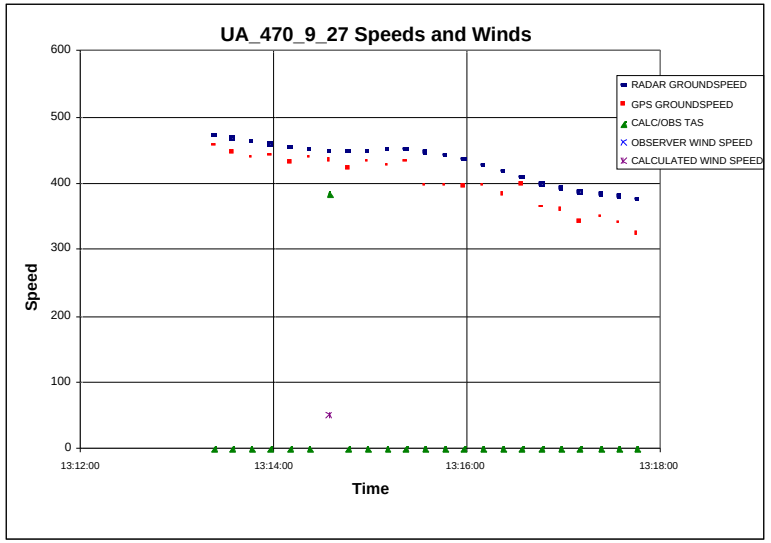


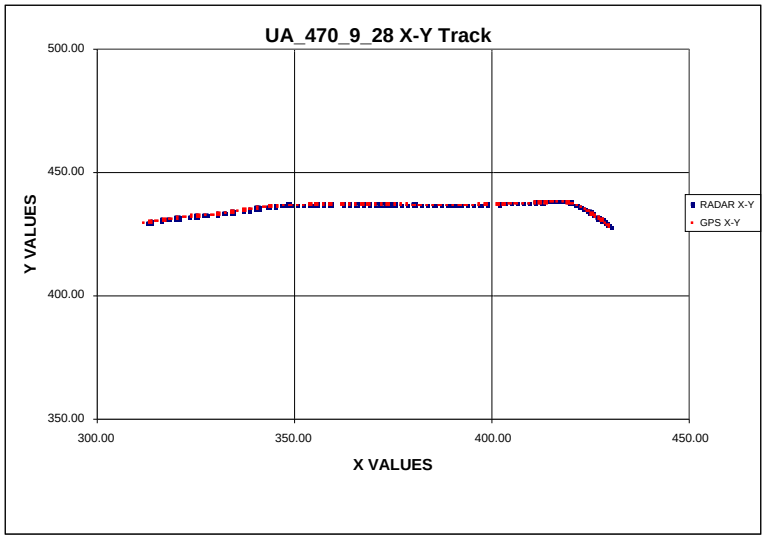
Figure A.11 Graphic Results for Case UA_470_9_27

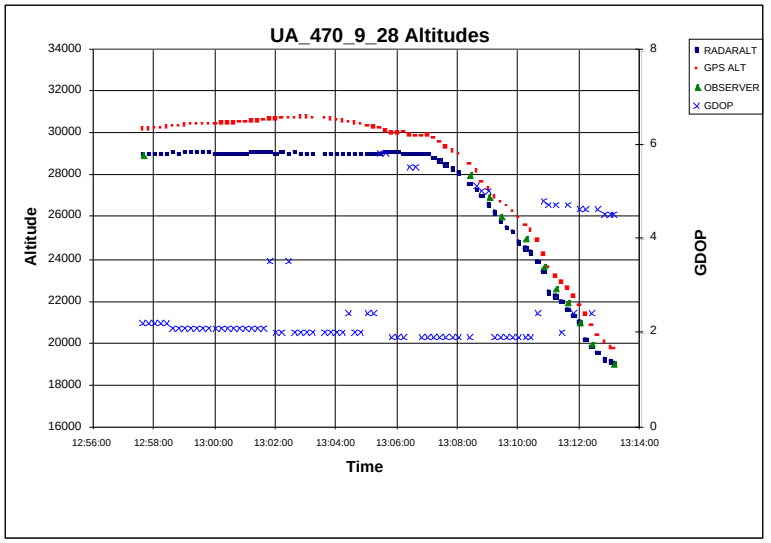
Table A.12 Tabular Results for Case UA_470_9_28

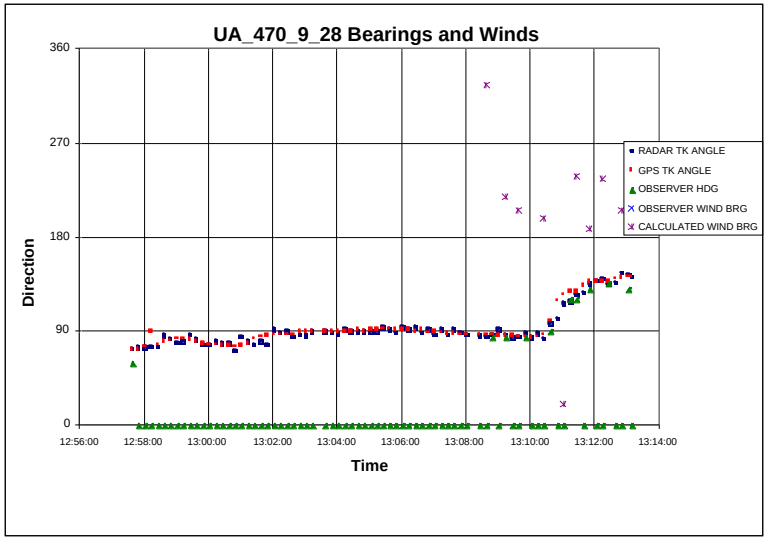
UA_470_9_28	|<---			GPS	DATA					---\>|	<---	RADAR	DATA			---\>|	<---				OBSERVER	DATA				---\>|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP		R_ALT	R_X	R_Y	R_GS	R_TRK		OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
12:57:38	40.39309	107.9873	30191	312.10	429.24	520	72	4	2.2		29000	313.31	429.50	516	73		290	-7	300	60						
12:57:50	40.40250	107.9508	30193	313.78	429.78	536	72	4	2.2		29000	314.19	429.75	517	74											
12:58:02	40.41216	107.9136	30226	315.50	430.33	542	75	4	2.2		29000	316.75	430.50	518	74											
12:58:14	40.42051	107.8747	30254	317.29	430.80	508	90	4	2.2		29000	318.44	430.94	519	75											
12:58:26	40.42619	107.8384	30284	318.96	431.12	522	77	4	2.2		29000	320.38	431.44	520	75											
12:58:38	40.43480	107.7999	30325	320.73	431.60	547	80	4	2.1		29100	321.13	431.44	521	86											
12:58:50	40.44026	107.7630	30356	322.42	431.91	541	81	4	2.1		29000	323.69	431.81	521	83											
12:59:02	40.44519	107.7240	30378	324.21	432.18	528	83	4	2.1		29100	325.56	432.25	522	79											
12:59:14	40.44955	107.6840	30415	326.05	432.41	513	83	4	2.1		29100	327.38	432.56	523	80											
12:59:26	40.45338	107.6484	30433	327.68	432.62	516	82	4	2.1		29100	328.13	432.56	523	87											
12:59:38	40.45770	107.6107	30441	329.42	432.86	521	80	4	2.1		29100	330.69	433.00	524	82											
12:59:50	40.46245	107.5738	30420	331.11	433.12	515	78	4	2.1		29100	332.50	433.50	524	77											
13:00:02	40.46859	107.5382	30445	332.74	433.47	488	77	4	2.1		29000	332.75	433.38	523	77											
13:00:14	40.47525	107.5018	30464	334.42	433.85	507	77	4	2.1		29000	334.63	433.81	523	80											
13:00:26	40.48137	107.4690	30467	335.92	434.20	508	76	4	2.1		29000	337.19	434.38	521	78											
13:00:38	40.48844	107.4332	30490	337.56	434.60	500	76	4	2.1		29000	338.94	434.75	520	78											
13:00:50	40.49555	107.3981	30516	339.18	435.01	512	75	4	2.1		29000	340.69	435.44	519	71											
13:01:02	40.50316	107.3624	30549	340.82	435.45	508	76	4	2.1		29000	341.19	435.38	517	85											
13:01:14	40.51113	107.3246	30580	342.55	435.91	508	78	4	2.1		29100	343.63	435.94	514	80											
13:01:26	40.51718	107.2906	30585	344.11	436.26	488	83	4	2.1		29100	345.44	436.38	511	77											
13:01:38	40.52095	107.2534	30632	345.81	436.47	494	85	4	2.1		29100	347.06	436.63	509	80											
13:01:50	40.52339	107.2173	30662	347.46	436.60	499	86	3	3.5		29100	348.75	437.06	507	77											
13:02:02	40.52550	107.1805	30675	349.15	436.71	505	87	4	2.0		29000	349.19	436.63	504	91											
13:02:14	40.52719	107.1418	30703	350.92	436.80	501	87	4	2.0		29100	350.81	436.69	502	89											
13:02:26	40.52858	107.1075	30733	352.49	436.87	506	87	3	3.5		29000	352.50	436.69	499	90											
13:02:38	40.53023	107.0706	30746	354.18	436.96	497	87	4	2.0		29100	354.19	436.88	497	85											
13:02:50	40.53211	107.0346	30756	355.83	437.06	498	90	4	2.0		29000	355.81	436.94	494	87											
13:03:02	40.53294	106.9987	30757	357.47	437.10	496	90	4	2.0		29000	357.44	437.06	492	86											
13:03:14	40.53295	106.9622	30742	359.14	437.09	490	90	4	2.0		29000	359.13	437.00	490	90											
13:03:38	40.53267	106.8923	30703	362.34	437.06	489	90	4	2.0		29000	362.44	436.94	487	90											
13:03:50	40.53290	106.8559	30665	364.00	437.06	489	90	4	2.0		29000	364.06	437.00	485	89											
13:04:02	40.53315	106.8201	30610	365.65	437.07	483	90	4	2.0		29000	365.75	437.06	484	88											
13:04:14	40.53349	106.7833	30584	367.33	437.09	494	90	4	2.0		29000	367.44	437.00	484	91											
13:04:26	40.53355	106.7496	30525	368.87	437.08	472	90	4	2.4		29000	369.13	437.00	484	90											
13:04:38	40.53343	106.7136	30496	370.52	437.07	494	91	4	2.0		29000	370.81	437.00	484	90											
13:04:50	40.53322	106.6780	30435	372.14	437.06	511	90	4	2.0		29000	372.38	437.00	484	90											
13:05:02	40.53303	106.6415	30360	373.82	437.04	480	91	4	2.4		29000	373.75	437.00	485	90											
13:05:14	40.53277	106.6033	30288	375.56	437.02	491	91	4	2.4		29000	375.50	437.00	485	90											
13:05:26	40.53233	106.5696	30228	377.10	436.99	499	92	4	5.8		29000	377.25	436.88	485	93											
13:05:38	40.53155	106.5336	30084	378.75	436.94	483	92	4	5.8		29100	378.75	436.88	485	91											
13:05:50	40.53067	106.4986	30017	380.35	436.89	504	91	4	1.9		29100	380.44	436.94	485	89											
13:06:02	40.52987	106.4618	30006	382.04	436.84	499	91	4	1.9		29100	382.13	436.81	485	93											
13:06:14	40.52925	106.4239	30036	383.77	436.81	494	91	4	1.9		29000	383.75	436.81	485	91											
13:06:26	40.52853	106.3897	29935	385.33	436.76	512	90	4	5.5		29000	385.56	436.69	485	93											
13:06:38	40.52826	106.3534	29878	387.00	436.75	477	91	4	5.5		29000	387.19	436.75	484	89											
13:06:50	40.52829	106.3171	29881	388.66	436.75	504	89	4	1.9		29000	388.88	436.69	484	91											
13:07:01	40.52855	106.2812	29906	390.29	436.77	504	90	4	1.9		29000	390.56	436.81	485	87											
13:07:14	40.52865	106.2433	29762	392.03	436.78	492	89	4	1.9		28800	392.13	436.75	486	91											
13:07:25	40.52875	106.2093	29573	393.59	436.79	489	88	4	1.9		28700	393.69	436.88	486	87											
13:07:37	40.52952	106.1737	29364	395.22	436.84	482	88	4	1.9		28500	395.38	436.81	487	91											
13:07:50	40.53038	106.1376	29143	396.87	436.90	478	87	4	1.9		28300	397.13	436.88	487	89											
13:08:02	40.53164	106.1025	29012	398.47	436.98	483	87	4	1.9		28100	398.75	437.00	488	87											
13:08:25	40.53461	106.0341	28554	401.60	437.18	467	87	4	1.9		27600	401.81	437.25	488	86		280		275							
13:08:38	40.53596	105.9993	28221	403.19	437.26	462	87	4	5.1		27300	403.13	437.38	488	85			-7						410	326	133
13:08:49	40.53700	105.9667	27690	404.68	437.34	458	87	4	5.0		27000	404.75	437.44	488	87					85						
13:09:01	40.53823	105.9331	27352	406.22	437.42	461	86	4	5.0		26600	406.31	437.38	487	91		270		275							
13:09:14	40.53973	105.8974	26984	407.85	437.52	461	86	4	1.9		26200	407.94	437.50	485	87			-6		85				405	218	92
13:09:26	40.54127	105.8655	26729	409.31	437.62	440	86	4	1.9		25800	409.50	437.69	483	84		260									

Table A.12 (continued)

13:09:38	40.54295	105.8330	26556	410.80	437.73	439	85	4	1.9	25500	410.94	437.81	481	85		-4	275			400	206	88
13:09:50	40.54478	105.8010	26274	412.26	437.85	434	85	4	1.9	25300	412.69	437.81	479	88				85				
13:10:02	40.54691	105.7683	25953	413.76	437.99	416	84	4	1.9	24800	414.75	438.13	477	84								
13:10:14	40.54914	105.7369	25594	415.19	438.13	412	85	4	1.9	24500	416.13	438.13	474	88	250		275					
13:10:25	40.55070	105.7082	25342	416.50	438.24	412	87	4	1.9	24300	417.63	438.38	470	83		-4				394	198	63
13:10:38	40.55046	105.6782	24892	417.87	438.24	399	100	4	2.4	23900	418.38	438.19	466	97				90				
13:10:50	40.54521	105.6504	24207	419.15	437.93	405	119	4	4.8	23400	419.63	437.88	463	102	237							
13:11:01	40.53492	105.6252	23621	420.31	437.33	395	125	4	4.7	22400	421.19	436.63	456	116		-1	275			389	20	160
13:11:14	40.52195	105.6001	23159	421.46	436.56	395	128	4	4.7	22200	422.31	436.00	449	118	226		275	120				
13:11:26	40.50874	105.5784	22903	422.46	435.78	391	128	4	2.0	22000	423.25	435.25	441	125		1		120		384	238	20
13:11:38	40.49503	105.5562	22604	423.49	434.97	377	133	4	4.7	21600	424.31	434.44	433	127	220		275					
13:11:50	40.48067	105.5368	22226	424.38	434.12	366	137	4	2.4	21300	424.75	433.94	424	135		15		130		391	188	38
13:12:02	40.46581	105.5182	21797	425.25	433.24	370	137	4	4.6	21000	425.50	433.06	415	138	210							
13:12:14	40.44982	105.4988	21363	426.14	432.29	372	137	4	4.6	20200	426.75	431.56	406	140		2	270			369	235	23
13:12:26	40.43524	105.4816	20826	426.94	431.42	372	137	4	2.4	19800	427.69	430.75	397	134	200			135				
13:12:38	40.42007	105.4633	20369	427.79	430.52	366	140	4	4.6	19500	428.50	429.88	389	136			270					
13:12:50	40.40424	105.4460	20027	428.60	429.58	348	141	4	4.5	19200	428.81	429.31	382	146		2				363	206	31
13:13:02	40.38879	105.4302	19773	429.33	428.66	348	142	4	4.5	19100	429.44	428.50	377	144				130				
13:13:08	40.38069	105.4222	19725	429.70	428.18	340	142	4	4.5	19048	430.06	427.75	375	142	190							







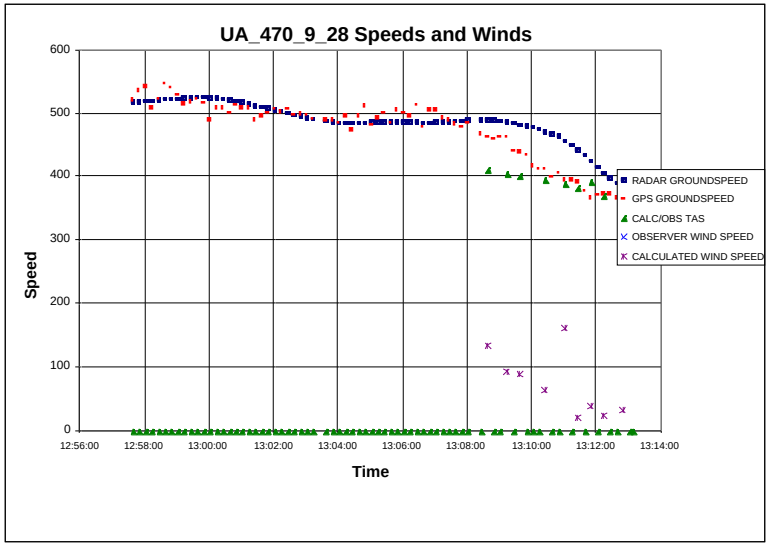
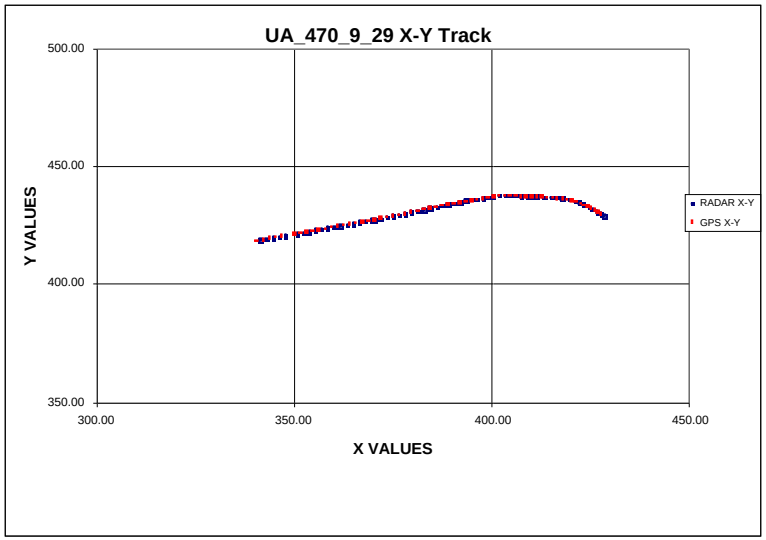
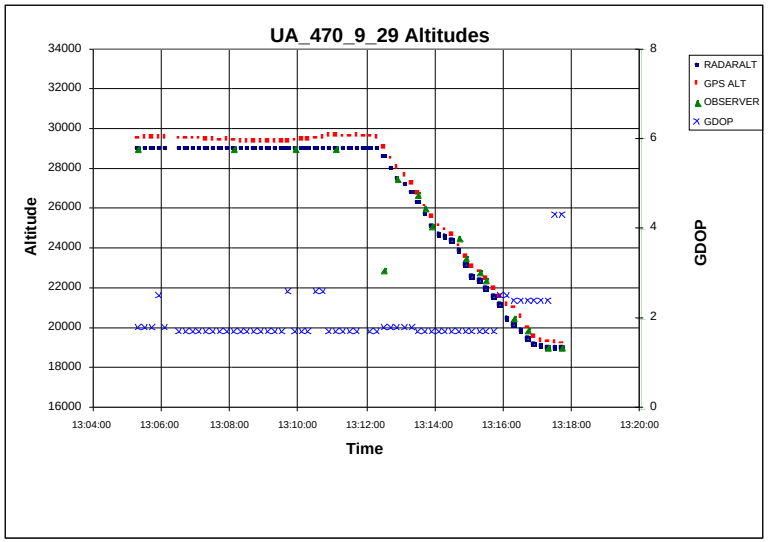


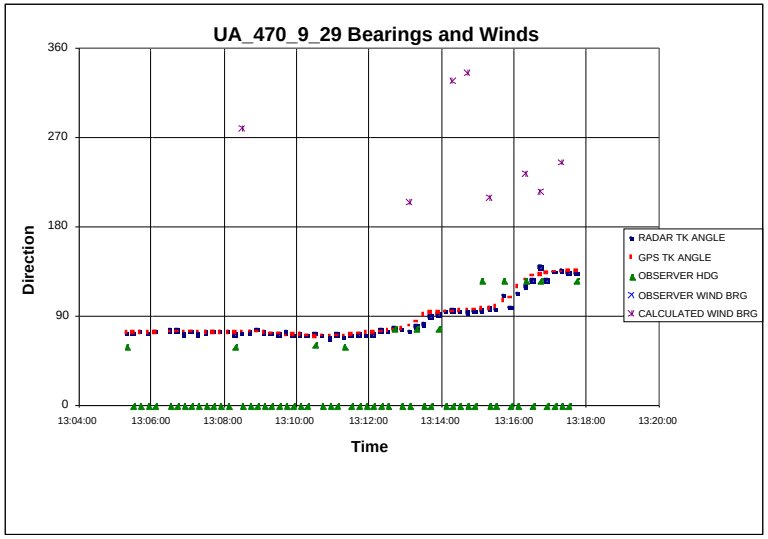
Figure A.12 Graphic Results for Case UA_470_9_28

Table A.13 Tabular Results for Case UA_470_9_29

UA_470_9_29	|<---			GPS	DATA				---\>|	<---	RADAR	DATA		---\>|	<---				OBSERVER	DATA				---\>|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
13:05:19	40.21858	107.3614	29527	340.69	418.39	492	73	4	1.8	29000	341.69	418.63	486	72	290	-14	300	60						
13:05:31	40.22672	107.3278	29542	342.23	418.86	492	73	4	1.8	29000	343.19	419.13	487	72							lgt/mod chop			
13:05:43	40.23536	107.2927	29548	343.85	419.36	483	73	4	1.8	29000	344.81	419.56	487	74										
13:05:55	40.24352	107.2596	29556	345.37	419.84	491	73	4	2.5	29000	346.31	420.06	487	72										
13:06:07	40.25164	107.2267	29546	346.89	420.31	479	73	4	1.8	29000	347.94	420.50	488	74										
13:06:31	40.26802	107.1574	29532	350.08	421.27	482	74	4	1.7	29000	350.94	421.31	488	75										
13:06:43	40.27601	107.1229	29534	351.67	421.73	498	74	4	1.7	29000	352.63	421.75	488	75										
13:06:55	40.28321	107.0906	29524	353.16	422.16	492	74	4	1.7	29000	353.94	422.25	487	71										
13:07:06	40.29055	107.0572	29500	354.70	422.59	474	74	4	1.7	29000	355.56	422.69	487	74										
13:07:18	40.29839	107.0222	29483	356.31	423.04	491	74	4	1.7	29000	357.06	423.25	486	71										
13:07:31	40.30626	106.9881	29446	357.88	423.51	486	73	4	1.7	29000	358.56	423.69	485	73										
13:07:43	40.31431	106.9537	29432	359.46	423.98	482	73	4	1.7	29000	360.19	424.13	484	74										
13:07:55	40.32221	106.9209	29443	360.96	424.44	489	73	4	1.7	29000	361.88	424.63	483	74										
13:08:07	40.33044	106.8871	29418	362.52	424.93	488	73	4	1.7	29000	363.44	425.06	482	74	290									
13:08:19	40.33860	106.8536	29385	364.06	425.41	507	73	4	1.7	29000	365.00	425.63	482	71				59						
13:08:31	40.34664	106.8192	29349	365.64	425.89	498	74	4	1.7	29000	366.56	426.13	481	72		-15	300					443	280	63
13:08:43	40.35464	106.7840	29346	367.26	426.36	480	74	4	1.7	29000	368.00	426.56	481	73										
13:08:55	40.36214	106.7502	29355	368.81	426.81	489	74	4	1.7	29000	369.63	426.94	481	76										
13:09:07	40.36987	106.7156	29355	370.39	427.27	504	73	4	1.7	29000	370.38	427.19	481	73										
13:09:19	40.37797	106.6817	29384	371.95	427.74	493	72	4	1.7	29000	371.94	427.69	481	72										
13:09:31	40.38636	106.6480	29373	373.50	428.24	488	72	4	1.7	29000	373.56	428.25	481	71										
13:09:43	40.39522	106.6121	29370	375.14	428.77	487	70	4	2.6	29000	375.00	428.69	482	73										
13:09:55	40.40393	106.5789	29413	376.67	429.29	493	71	4	1.7	29000	376.63	429.31	482	70	290									
13:10:07	40.41300	106.5451	29451	378.21	429.84	480	71	4	1.7	29000	378.13	429.81	481	71										
13:10:18	40.42180	106.5116	29460	379.75	430.36	492	70	0	1.7	29000	379.75	430.44	482	70			300							
13:10:31	40.43143	106.4774	29510	381.32	430.94	501	69	4	2.6	29000	381.44	430.94	482	72				62						
13:10:43	40.44143	106.4432	29584	382.88	431.54	496	70	4	2.6	29000	382.94	431.50	482	70										
13:10:55	40.45114	106.4112	29660	384.35	432.12	485	70	4	1.7	29000	384.50	432.19	483	67										
13:11:07	40.46066	106.3773	29642	385.91	432.69	488	70	4	1.7	29000	386.13	432.69	483	71	290									
13:11:19	40.46980	106.3438	29597	387.44	433.24	487	70	4	1.7	29000	387.44	433.25	484	68		-12		60						
13:11:31	40.47882	106.3101	29601	388.98	433.79	480	71	4	1.7	29000	389.00	433.81	484	70										
13:11:43	40.48795	106.2757	29643	390.55	434.34	489	72	4	1.7	29000	390.56	434.31	485	71			300							
13:11:55	40.49573	106.2444	29628	391.99	434.81	465	73	4	17.0	29000	392.06	434.88	485	70										
13:12:06	40.50322	106.2124	29625	393.45	435.26	443	73	4	1.7	29000	393.56	435.38	485	71										
13:12:19	40.51053	106.1796	29542	394.95	435.71	445	74	4	1.7	29000	395.06	435.75	485	75										
13:12:31	40.51688	106.1499	29066	396.30	436.09	437	75	4	1.8	28600	396.31	436.13	484	74	229		265							
13:12:43	40.52336	106.1181	28497	397.76	436.48	436	76	4	1.8	28000	397.75	436.44	483	77				78						
13:12:54	40.52903	106.0884	28066	399.12	436.83	429	77	4	1.8	27500	399.19	436.81	480	76	275									
13:13:07	40.53487	106.0572	27685	400.55	437.18	425	80	4	1.8	27200	400.44	437.19	477	74		-14						387	205	74
13:13:19	40.53905	106.0266	27258	401.94	437.44	410	84	4	1.8	26800	401.94	437.44	474	79				78						
13:13:30	40.54106	105.9964	26763	403.32	437.57	423	91	4	1.7	26300	403.31	437.63	470	81	267		265							
13:13:43	40.54046	105.9655	26122	404.74	437.54	417	93	4	1.7	25700	404.56	437.56	466	89	260									
13:13:55	40.53926	105.9363	25550	406.07	437.48	412	93	4	1.7	25100	406.06	437.50	461	91	251			78						
13:14:07	40.53786	105.9064	25144	407.44	437.40	400	94	4	1.7	24700	407.50	437.38	456	94			265							
13:14:18	40.53633	105.8774	24918	408.77	437.32	398	94	4	1.7	24600	409.00	437.25	450	95		-9						377	327	38
13:14:30	40.53469	105.8477	24656	410.13	437.23	384	95	4	1.7	24400	410.06	437.19	444	94							mnt wave in des			
13:14:43	40.53286	105.8183	24110	411.48	437.13	395	96	4	1.7	23900	411.38	437.13	438	93	245	-9	265					373	335	49
13:14:55	40.53069	105.7905	23568	412.74	437.01	405	96	4	1.7	23200	413.13	437.00	432	94	235									
13:15:06	40.52828	105.7624	23077	414.04	436.88	395	97	4	1.7	22600	415.13	436.81	428	95			265	126						
13:15:19	40.52548	105.7338	22808	415.34	436.72	379	97	4	1.7	22400	416.44	436.63	424	97	228	-7	265					365	210	251
13:15:30	40.52255	105.7065	22459	416.59	436.55	386	99	4	1.7	22000	417.63	436.50	420	96	224									
13:15:43	40.51936	105.6781	21994	417.89	436.37	379	105	4	1.7	21600	418.06	436.19	416	110				126						
13:15:54	40.51421	105.6526	21573	419.06	436.08	372	108	4	2.5	21200	419.44	436.13	412	98			265							
13:16:06	40.50732	105.6263	21199	420.27	435.67	376	119	4	2.5	20500	421.06	435.25	408	112		-5								
13:16:19	40.49741	105.6027	21031	421.36	435.09	371	126	4	2.4	20200	422.06	434.63	404	119	205			126				354	234	72
13:16:31	40.48527	105.5802	20602	422.40	434.37	362	130	4	2.4	19900	423.06	433.88	399	125		-1	265							
13:16:43	40.47171	105.5595	20040	423.35	433.57	349	131	4	2.4	19500	423.38	433.25	395	139	199			126				354	216	39
13:16:54	40.45933	105.5412	19587	424.20	432.83	352	133	4	2.4	19200	424.56	432.69	390	125			265							
13:17:06	40.44574	105.5220	19395	425.09	432.03	366	134	4	2.4	19100	425.25	431.94	385	134		1								
13:17:18	40.43173	105.5033	19327	425.95	431.20	356	134	4	2.4	19000	426.56	430.63	380	135	190							350	245	18
13:17:30	40.41760	105.4853	19272	426.79	430.36	359	135	4	4.3	19000	427.44	429.81	374	133										
13:17:43	40.40254	105.4662	19245	427.67	429.47	349	135	4	4.3	19000	428.38	429.00	370	132	190			126						







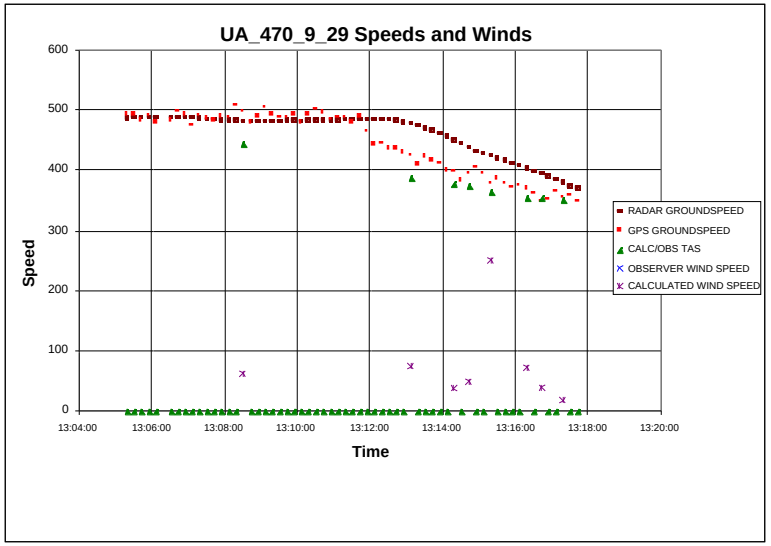
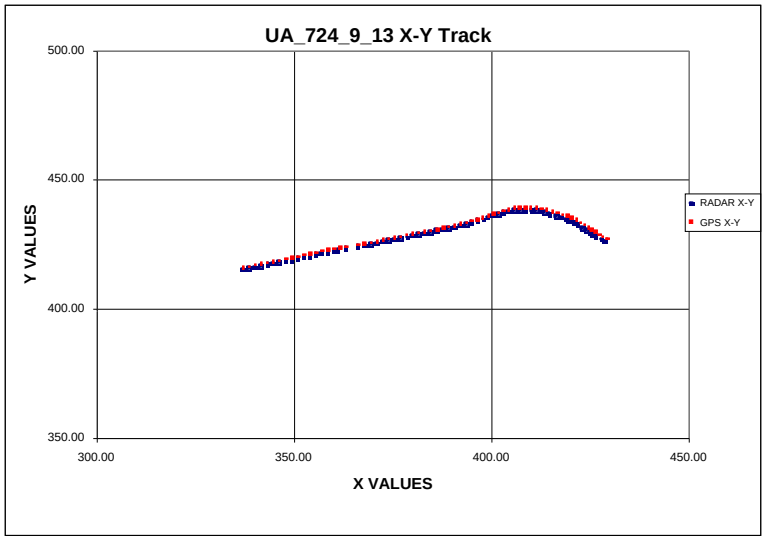
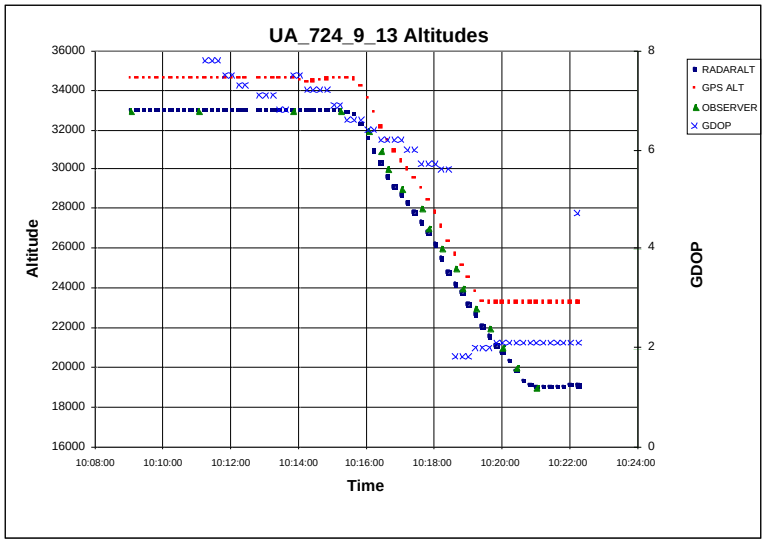


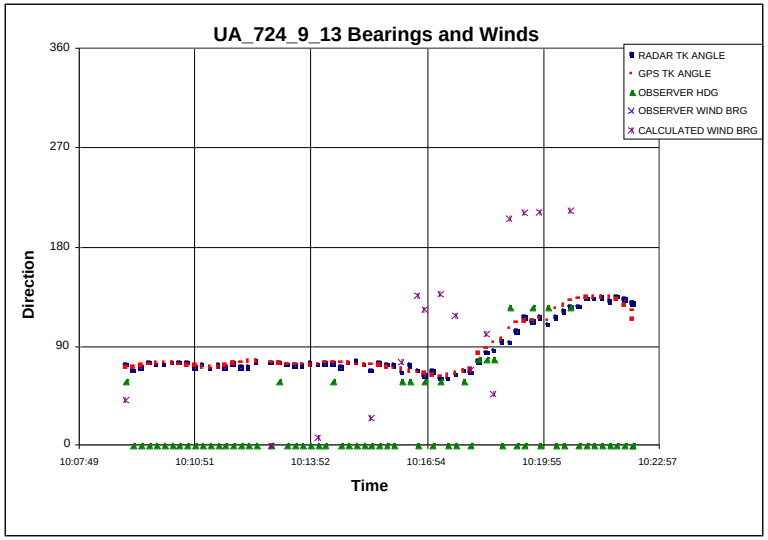
Figure A.13 Graphic Results for Case UA_470_9_29

Table A.14 Tabular Results for Case UA_724_9_13

UA_724_9_13	|<---			GPS	DATA				---->|	<---	RADAR	DATA		---->|	<---				OBSERVER	DATA			---->|	
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
10:09:02	40.17778	107.4332	34610	337.36	415.98	479	71	3	9.1	33000	337.19	415.44	471	73	330			58				506	41	30
10:09:14	40.18690	107.4004	34611	338.87	416.50	489	71	3	9.1	33000	338.56	416.06	471	68										
10:09:26	40.19590	107.3673	34610	340.40	417.03	482	72	3	9.1	33000	340.19	416.56	471	71										
10:09:38	40.20449	107.3339	34610	341.94	417.53	490	73	3	8.7	33000	341.75	416.94	471	75										
10:09:50	40.21240	107.3007	34610	343.47	417.99	504	74	3	8.7	33000	343.31	417.44	471	73										
10:10:02	40.21994	107.2670	34610	345.03	418.43	486	75	3	8.7	33000	344.75	417.88	471	73										
10:10:14	40.22736	107.2333	34611	346.58	418.86	495	74	3	8.4	33000	346.31	418.25	472	75										
10:10:26	40.23500	107.2001	34610	348.11	419.30	478	73	3	8.4	33000	347.94	418.69	472	75										
10:10:38	40.24322	107.1658	34610	349.69	419.78	482	72	3	8.1	33000	349.38	419.06	473	75										
10:10:50	40.25164	107.1332	34610	351.19	420.28	469	72	3	8.1	33000	351.06	419.69	473	71										
10:11:02	40.26042	107.0999	34611	352.72	420.79	488	71	3	8.1	33000	352.50	420.13	474	73	330									
10:11:14	40.26935	107.0670	34610	354.24	421.31	484	71	3	7.8	33000	354.06	420.75	475	70										
10:11:26	40.27837	107.0339	34610	355.76	421.85	467	71	3	7.8	33000	355.56	421.19	476	72										
10:11:38	40.28697	107.0011	34610	357.27	422.35	495	72	3	7.8	33000	356.94	421.69	476	71										
10:11:50	40.29513	106.9682	34611	358.79	422.83	500	74	3	7.5	33000	358.56	422.13	477	74										
10:12:02	40.30250	106.9353	34611	360.30	423.27	482	75	3	7.5	33000	360.06	422.69	477	71										
10:12:14	40.30947	106.9013	34610	361.86	423.67	473	76	3	7.3	33000	361.19	423.06	477	71										
10:12:26	40.31605	106.8677	34610	363.40	424.06	473	76	3	7.3	33000	363.19	423.50	476	76										
10:12:50	40.32890	106.7999	34611	366.52	424.82	489	75	3	7.1	33000	366.25	424.31	476	75								507	0	57
10:13:02	40.33568	106.7666	34610	368.05	425.22	482	74	3	7.1	33000	367.88	424.75	476	75				58						
10:13:14	40.34345	106.7324	34610	369.62	425.68	476	73	3	7.1	33000	369.38	425.25	476	73										
10:13:26	40.35117	106.6995	34610	371.13	426.14	483	73	3	6.8	33000	370.88	425.75	477	72										
10:13:38	40.35938	106.6653	34610	372.70	426.63	464	73	3	6.8	33000	372.38	426.25	477	72										
10:13:50	40.36747	106.6318	34585	374.24	427.11	481	72	4	7.5	33000	373.94	426.69	477	74	330									
10:14:02	40.37544	106.5988	34500	375.75	427.59	489	73	4	7.5	33000	375.56	427.19	477	73								507	7	39
10:14:14	40.38313	106.5662	34407	377.25	428.05	484	75	4	7.2	33000	377.13	427.63	477	74										
10:14:26	40.39021	106.5325	34459	378.79	428.47	481	75	4	7.2	33000	378.69	428.06	478	74				58						
10:14:38	40.39716	106.4992	34490	380.32	428.89	479	75	4	7.2	33000	380.06	428.56	479	71										
10:14:50	40.40446	106.4649	34525	381.89	429.32	471	74	4	7.2	33000	381.69	428.94	479	75										
10:15:02	40.41207	106.4315	34568	383.42	429.78	487	73	4	6.9	33000	383.19	429.31	479	76										
10:15:14	40.42006	106.3981	34594	384.96	430.26	478	72	4	6.9	33000	384.69	429.81	479	73	330									
10:15:26	40.42808	106.3645	34589	386.49	430.74	479	73	4	6.6	32900	386.13	430.44	478	68								508	24	41
10:15:38	40.43607	106.3312	34537	388.02	431.22	485	72	4	6.6	32800	387.75	430.81	478	74										
10:15:50	40.44417	106.2985	34175	389.51	431.71	469	71	4	6.6	32300	389.13	431.25	478	73										
10:16:02	40.45246	106.2671	33567	390.95	432.21	474	70	4	6.4	31600	390.69	431.75	478	72	320									
10:16:14	40.46114	106.2352	32862	392.41	432.73	470	69	4	6.4	30900	392.06	432.44	477	66				58				485	75	14
10:16:26	40.47033	106.2037	32140	393.85	433.29	459	67	4	6.2	30300	393.63	432.88	477	72	310			58						
10:16:38	40.48035	106.1726	31489	395.27	433.89	470	66	4	6.2	29600	395.06	433.50	477	68	300							480	136	28
10:16:50	40.49066	106.1423	30925	396.66	434.52	455	65	4	6.2	29100	396.38	434.25	476	63				58				475	123	35
10:17:02	40.50143	106.1117	30400	398.06	435.17	460	63	4	6.2	28700	397.88	434.81	476	67	290									
10:17:14	40.51289	106.0820	30004	399.41	435.86	449	62	4	6.0	28300	399.06	435.56	475	61				58				467	137	57
10:17:26	40.52433	106.0534	29551	400.72	436.55	448	63	4	6.0	27800	400.31	436.25	473	61										
10:17:38	40.53548	106.0253	29043	402.00	437.23	429	65	4	5.7	27300	401.69	436.88	472	64	280							455	118	42
10:17:50	40.54589	105.9968	28458	403.30	437.86	431	67	4	5.7	26800	403.00	437.38	470	68	270			58						
10:18:02	40.55500	105.9680	27824	404.62	438.41	412	69	4	5.7	26200	404.38	438.00	467	66								450	68	38
10:18:14	40.56204	105.9382	27103	405.98	438.84	422	83	4	5.6	25500	405.75	438.25	465	76	260			78						
10:18:26	40.56508	105.9072	26334	407.40	439.04	423	88	4	5.6	24800	407.25	438.31	462	84				78				448	100	25
10:18:38	40.56605	105.8771	25684	408.77	439.10	415	93	4	1.8	24200	408.69	438.38	458	86	250			78				446	46	43
10:18:50	40.56517	105.8462	25136	410.18	439.06	423	96	4	1.8	23800	410.19	438.19	454	94	240									
10:19:02	40.56285	105.8145	24566	411.63	438.93	413	106	4	1.8	23200	411.38	438.13	450	93				126				438	205	229
10:19:14	40.55633	105.7858	23840	412.95	438.55	415	111	3	2.0	22700	412.75	437.69	445	103	230									
10:19:26	40.54778	105.7573	23322	414.26	438.05	424	112	3	2.0	22100	413.38	437.31	439	116								434	211	186
10:19:38	40.53827	105.7265	23280	415.67	437.49	420	113	3	2.0	21600	414.69	436.81	434	112	220			126						
10:19:50	40.52912	105.6990	23280	416.93	436.95	417	115	3	2.1	21100	416.44	435.88	428	116								428	212	161
10:20:02	40.51943	105.6720	23279	418.18	436.38	405	113	3	2.1	20700	417.75	435.50	423	109	210			126						
10:20:14	40.50923	105.6453	23279	419.40	435.78	411	124	3	2.1	20300	419.00	434.81	418	116										
10:20:26	40.49636	105.6203	23278	420.56	435.02	415	127	3	2.1	19800	419.56	434.44	413	121	200									
10:20:38	40.48263	105.5954	23277	421.70	434.21	397	131	3	2.1	19300	420.63	433.63	409	126				126				405	213	42
10:20:50	40.46771	105.5735	23278	422.71	433.32	409	133	3	2.1	19100	421.63	432.88	406	126										
10:21:02	40.45237	105.5528	23278	423.67	432.41	398	134	3	2.1	19000	423.06	431.38	403	133	190									
10:21:14	40.43688	105.5319	23278	424.64	431.49	410	134	3	2.1	19000	423.94	430.56	400	133										
10:21:26	40.42142	105.5110	23278	425.61	430.57	404	134	3	2.1	19000	424.88	429.63	399	134										
10:21:38	40.40618	105.4904	23278	426.56	429.67	380	134	3	2.1	19000	425.44	429.19	398	130										
10:21:50	40.39095	105.4699	23279	427.51	428.77	366	132	3	2.1	19000	426.38	428.19	398	135										
10:22:02	40.37741	105.4506	23279	428.40	427.97	354	127	3	2.1	19100	427.75	427.00	397	132										
10:22:14	40.36522	105.4301	23279	429.36	427.25	373	122	3	4.7	19100	428.63	426.31	397	129										
10:22:15	40.36382	105.4276	23279	429.47	427.17	355	114	3	2.1	19076	428.76	426.25	397	128										







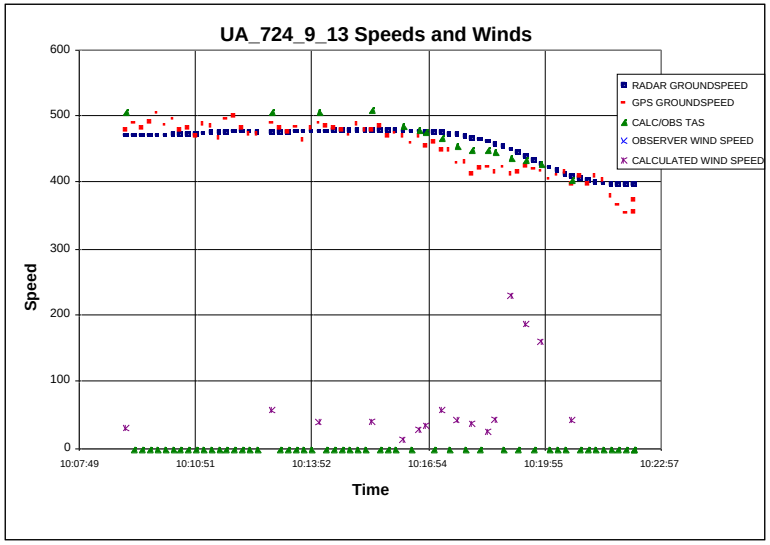
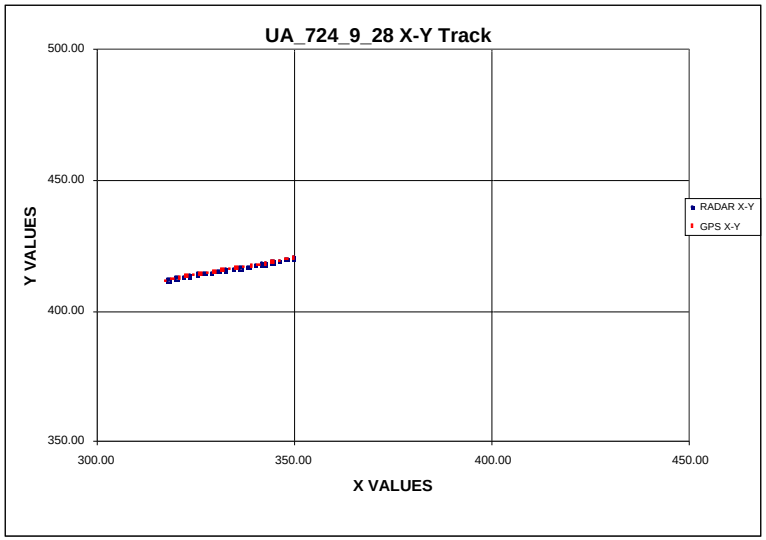
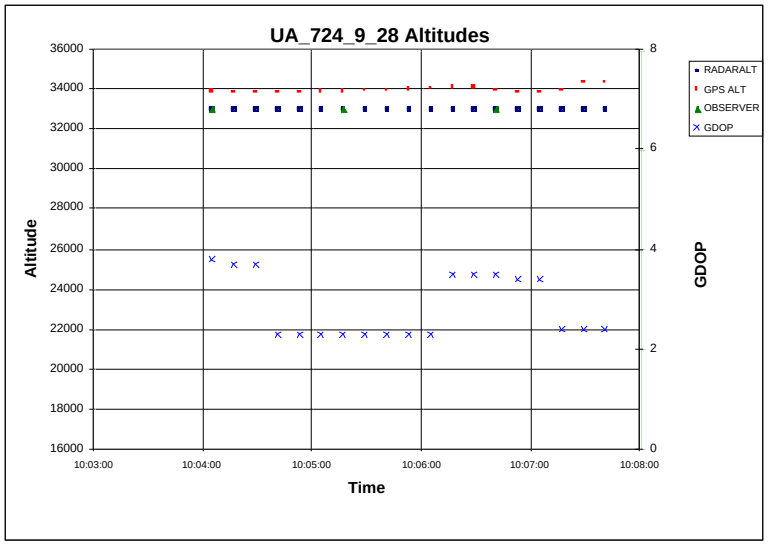


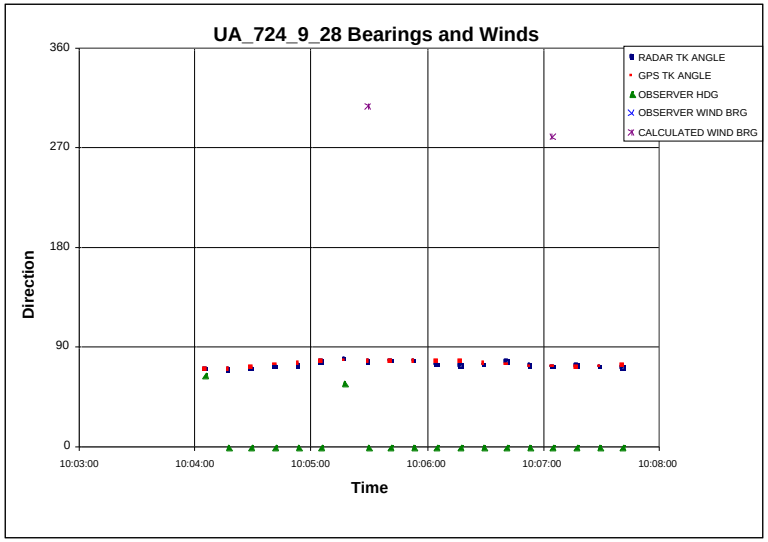
Figure A.14 Graphical Results for Case UA_724_9_13

Table A.15 Tabular Results for Case UA_724_9_28

UA_724_9_28	|<---			GPS	DATA				---\>|	<---	RADAR	DATA		---\>|	<---				OBSERVER	DATA				---\>|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
10:04:05	40.09539	107.8592	33922	317.69	411.30	563	70	4	3.8	33000	318.50	411.56	534	71	330	-13	310	66						
10:04:17	40.10642	107.8228	33860	319.38	411.93	545	70	4	3.7	33000	320.31	412.25	534	70			310							
10:04:29	40.11779	107.7842	33848	321.17	412.59	558	72	4	3.7	33000	322.06	412.81	533	71										
10:04:41	40.12803	107.7447	33835	322.99	413.18	558	75	4	2.3	33000	323.75	413.31	533	73										
10:04:53	40.13640	107.7073	33858	324.72	413.65	559	76	4	2.3	33000	325.63	413.81	533	74										
10:05:05	40.14406	107.6683	33893	326.52	414.09	560	77	4	2.3	33000	327.44	414.19	533	77			320							
10:05:17	40.15102	107.6292	33907	328.32	414.48	558	78	4	2.3	33000	329.31	414.50	534	80	330			58						
10:05:29	40.15794	107.5903	33936	330.12	414.87	558	77	4	2.3	33000	331.00	414.94	535	77		-12						503	308	95
10:05:41	40.16544	107.5490	33977	332.02	415.30	561	77	4	2.3	33000	332.88	415.31	535	78										
10:05:53	40.17257	107.5104	34022	333.80	415.70	558	77	4	2.3	33000	334.81	415.75	536	78										
10:06:05	40.17993	107.4713	34057	335.61	416.12	555	77	4	2.3	33000	336.56	416.25	538	75										
10:06:17	40.18734	107.4327	34124	337.39	416.55	555	77	4	3.5	33000	338.50	416.81	540	74										
10:06:29	40.19496	107.3933	34083	339.21	416.98	553	76	4	3.5	33000	340.25	417.25	542	75										
10:06:41	40.20306	107.3531	33952	341.06	417.45	565	75	4	3.5	33000	341.94	417.63	544	77	330									
10:06:53	40.21145	107.3149	33866	342.82	417.94	551	73	4	3.4	33000	342.75	417.88	546	74			320							
10:07:05	40.22098	107.2764	33874	344.60	418.50	560	73	4	3.4	33000	344.50	418.44	547	73		-12						503	280	65
10:07:17	40.23087	107.2376	33967	346.38	419.07	576	72	4	2.4	33000	346.50	419.00	548	74										
10:07:29	40.24109	107.1997	34345	348.13	419.67	564	73	4	2.4	33000	348.25	419.56	549	73										
10:07:41	40.25067	107.1591	34351	350.00	420.23	564	74	4	2.4	33000	349.94	420.13	551	72										







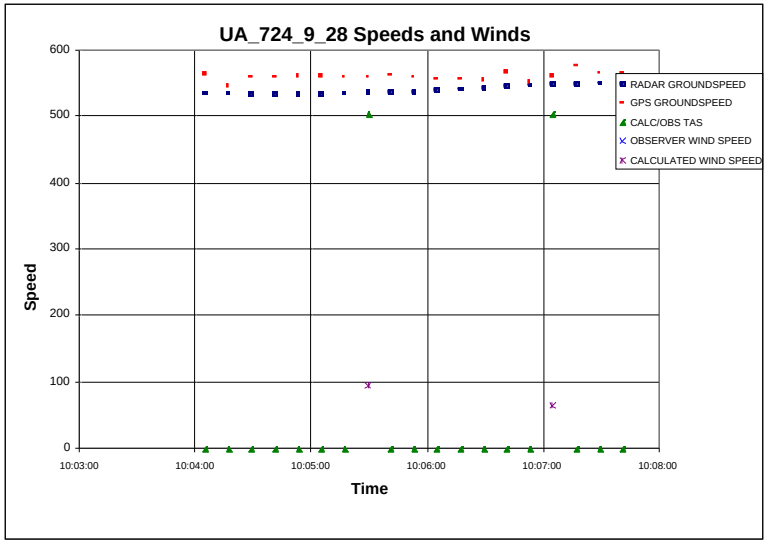
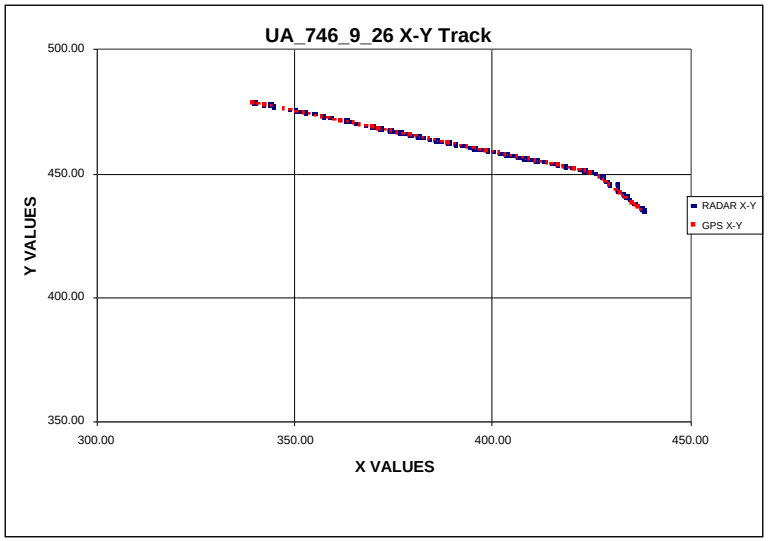
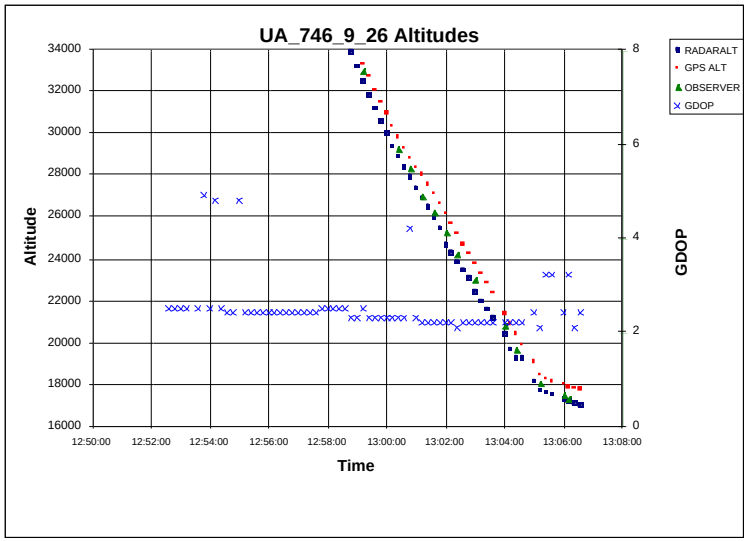


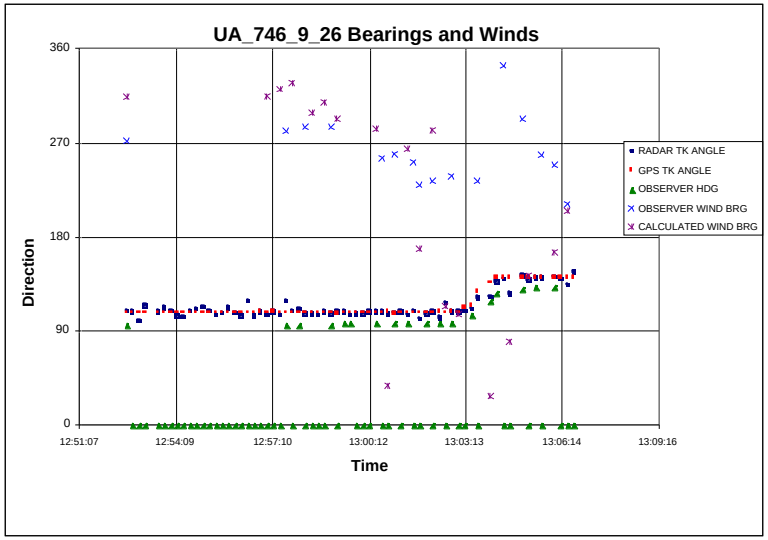
Figure A.15 Graphic Results for Case UA_724_9_28

Table A.16 Tabular Results for Case UA_746_9_26

UA_746_9_26	|<---			GPS	DATA				---->|	<---	RADAR	DATA		---->|	<---				OBSERVER	DATA			---->|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
12:52:35	41.22074	107.4022	38023	339.45	478.50	511	108	4	2.5	37000	339.94	478.38	502	110	370		266	95	271	28	weight 190.3 at ocs	475	313	40
12:52:47	41.21238	107.3669	38024	341.04	477.98	492	108	4	2.5	37000	342.31	477.56	502	109										
12:52:59	41.20418	107.3323	38021	342.61	477.47	494	108	4	2.5	37000	343.94	477.38	502	100										
12:53:11	41.19562	107.2959	38020	344.25	476.94	512	108	4	2.5	37000	344.81	476.88	501	114										
12:53:35	41.17866	107.2264	37990	347.39	475.90	514	108	4	2.5	37000	348.81	475.69	501	109										
12:53:47	41.17007	107.1907	37974	349.01	475.37	508	108	4	4.9	37000	350.25	475.06	501	112										
12:53:59	41.16158	107.1554	37970	350.60	474.84	489	108	4	2.5	37000	351.19	474.75	501	110										
12:54:11	41.15268	107.1186	37956	352.26	474.30	507	108	4	4.8	37000	352.75	474.38	501	105										
12:54:23	41.14439	107.0842	37958	353.82	473.79	508	108	4	2.5	37000	355.19	473.81	501	104										
12:54:35	41.13616	107.0501	37961	355.36	473.29	482	108	4	2.4	37000	356.88	473.13	501	110							descent clearance			
12:54:47	41.12761	107.0149	37962	356.95	472.76	486	108	4	2.4	37000	357.50	472.88	501	111							14w alpoe 310 kt			
12:54:59	41.11906	106.9793	37978	358.56	472.24	499	108	4	4.8	37000	359.06	472.19	500	113										
12:55:11	41.11061	106.9443	37983	360.15	471.72	497	108	4	2.4	37000	361.44	471.38	500	110										
12:55:23	41.10206	106.9093	37968	361.74	471.20	494	108	4	2.4	37000	363.19	470.94	501	106										
12:55:35	41.09345	106.8739	37969	363.34	470.68	497	108	4	2.4	37000	363.94	470.69	500	108										
12:55:47	41.08485	106.8389	37952	364.92	470.15	501	108	4	2.4	37000	365.50	470.00	501	112										
12:55:59	41.07610	106.8033	37940	366.54	469.63	501	108	4	2.4	37000	367.88	469.31	501	108										
12:56:11	41.06747	106.7679	37935	368.14	469.10	509	108	4	2.4	37000	369.63	468.88	501	105										
12:56:23	41.05870	106.7323	37915	369.75	468.57	495	108	4	2.4	37000	370.19	468.25	501	119										
12:56:35	41.05016	106.6975	37900	371.33	468.05	501	108	4	2.4	37000	371.81	468.06	501	105										
12:56:47	41.04178	106.6629	37915	372.90	467.55	510	109	4	2.4	37000	374.13	467.19	501	109										
12:56:59	41.03288	106.6277	37844	374.50	467.01	511	108	4	2.4	37000	375.88	466.75	501	106	370							476	314	39
12:57:11	41.02401	106.5920	37810	376.12	466.48	482	109	4	2.4	37000	376.69	466.44	501	109			267							
12:57:23	41.01543	106.5575	37756	377.68	465.96	497	108	4	2.4	37000	378.13	466.06	501	106	370							470	321	33
12:57:35	41.00656	106.5217	37594	379.31	465.42	490	108	4	2.4	36800	379.38	465.19	501	119				95	281	26				
12:57:47	40.99803	106.4868	37360	380.90	464.91	490	108	4	2.5	36600	381.19	464.69	500	110	367							472	328	23
12:57:59	40.98958	106.4524	37060	382.46	464.41	497	108	4	2.5	36300	382.56	464.13	499	111				96						
12:58:11	40.98106	106.4179	36681	384.03	463.90	492	108	4	2.5	35900	384.13	463.69	498	107					285	30				
12:58:23	40.97221	106.3822	36157	385.65	463.37	516	108	4	2.5	35300	385.81	463.19	497	107								469	298	47
12:58:35	40.96361	106.3471	35496	387.25	462.85	503	108	4	2.5	34600	387.19	462.81	495	106										
12:58:47	40.95475	106.3117	34788	388.86	462.32	510	108	4	2.3	33900	388.81	462.19	494	109	345							480	309	32
12:58:59	40.94570	106.2758	34060	390.49	461.78	516	108	4	2.3	33200	390.50	461.69	493	107				96	285	28				
12:59:11	40.93639	106.2400	33292	392.12	461.23	519	107	4	2.5	32500	392.31	461.06	491	109	330							487	292	32
12:59:23	40.92793	106.2050	32697	393.71	460.73	497	108	4	2.3	31800	394.06	460.44	491	109				97						
12:59:35	40.91870	106.1689	32060	395.36	460.18	513	108	4	2.3	31200	395.44	460.06	491	106				97						
12:59:47	40.90987	106.1333	31501	396.98	459.65	527	108	4	2.3	30600	397.00	459.56	491	107										
12:59:59	40.90150	106.0997	30941	398.51	459.16	489	108	4	2.3	30000	398.69	459.06	491	107										
13:00:11	40.89275	106.0645	30329	400.11	458.64	487	108	4	2.3	29400	400.19	458.50	492	109										
13:00:23	40.88399	106.0293	29813	401.71	458.13	504	108	4	2.3	28900	401.81	457.94	492	109	293			97				486	283	18
13:00:35	40.87552	105.9952	29319	403.27	457.63	492	108	4	2.3	28400	403.50	457.38	494	109					255	10				
13:00:47	40.86718	105.9621	28840	404.78	457.13	472	109	4	4.2	27900	404.94	456.94	495	107	283							474	38	4
13:00:59	40.85873	105.9289	28369	406.29	456.64	501	107	4	2.3	27400	406.50	456.44	496	108				97	259	10				
13:01:11	40.85086	105.8967	27994	407.76	456.17	465	108	4	2.2	26900	408.06	455.88	497	109	270									
13:01:23	40.84276	105.8645	27548	409.23	455.70	461	108	4	2.2	26500	409.50	455.50	498	106				97				458	264	3
13:01:35	40.83465	105.8321	27097	410.71	455.22	461	108	4	2.2	26000	410.94	454.94	497	110	262				251	12				
13:01:47	40.82653	105.7997	26639	412.19	454.75	452	108	4	2.2	25500	412.94	454.63	498	102					230	10		453	169	2
13:01:59	40.81853	105.7680	26171	413.64	454.28	459	108	4	2.2	24700	414.94	453.94	497	107	253			97						
13:02:11	40.81046	105.7369	25673	415.06	453.80	456	108	4	2.2	24300	416.38	453.44	496	109					233	8		448	282	8
13:02:23	40.80282	105.7061	25234	416.47	453.36	462	109	4	2.1	23900	418.13	453.13	495	103	242			97						
13:02:35	40.79452	105.6745	24712	417.91	452.87	436	108	4	2.2	23500	418.38	452.75	492	117								439	113	2
13:02:47	40.78716	105.6440	24286	419.31	452.45	424	109	4	2.2	23100	419.94	452.31	489	109				97	238	7				
13:02:59	40.77944	105.6143	23803	420.66	451.99	410	108	4	2.2	22400	422.00	451.63	484	109	230							433	106	23
13:03:11	40.77139	105.5843	23299	422.04	451.52	413	112	4	2.2	22000	423.19	451.19	479	110										
13:03:23	40.76227	105.5558	22839	423.34	450.99	427	114	4	2.2	21600	424.56	450.63	473	111				105						
13:03:35	40.75261	105.5273	22344	424.65	450.43	427	128	4	2.2	21200	425.75	449.75	467	122					233	9				
13:03:59	40.72144	105.4805	21357	426.80	448.58	428	136	4	2.2	20400	427.56	448.56	467	123	208			118				414	28	55
13:04:11	40.70398	105.4604	20880	427.73	447.55	425	141	4	2.2	19700	428.63	446.63	459	137				127						
13:04:23	40.68633	105.4417	20399	428.60	446.50	412	141	4	2.2	19300	429.44	445.63	451	140	197				344	4				
13:04:35	40.66836	105.4230	19885	429.46	445.43	393	141	4	2.2	19300	431.25	445.63	444	126								407	80	27
13:04:59	40.63286	105.3855	19071	431.20	443.32	427	141	4	2.4	18200	431.50	443.00	429	143				130	292	4				
13:05:11	40.61528	105.3681	18491	432.01	442.28	388	141	4	2.1	17700	433.00	441.38	423	139	181							402	143	14
13:05:23	40.59777	105.3498	18258	432.86	441.23	382	141	3	3.2	17600	433.69	440.50	419	141				132						
13:05:35	40.58094	105.3323	18141	433.67	440.24	370	141	3	3.2	17500	434.50	439.50	414	141					258	14				
13:05:59	40.54875	105.2986	18006	435.24	438.33	350	141	4	2.4	17300	435.63	438.00	414	142	175			132	249	13		372	166	24
13:06:11	40.53241	105.2820	17838	436.01	437.36	361	141	3	3.2	17200	436.50	437.00	410	140	173									
13:06:23	40.51764	105.2664	17793	436.73	436.48	350	141	4	2.1	17100	437.69	435.94	404	134					211	12		357	205	15
13:06:35	40.50314	105.2512	17744	437.44	435.62	344	141	4	2.4	17004	438.11	434.91	400	147										







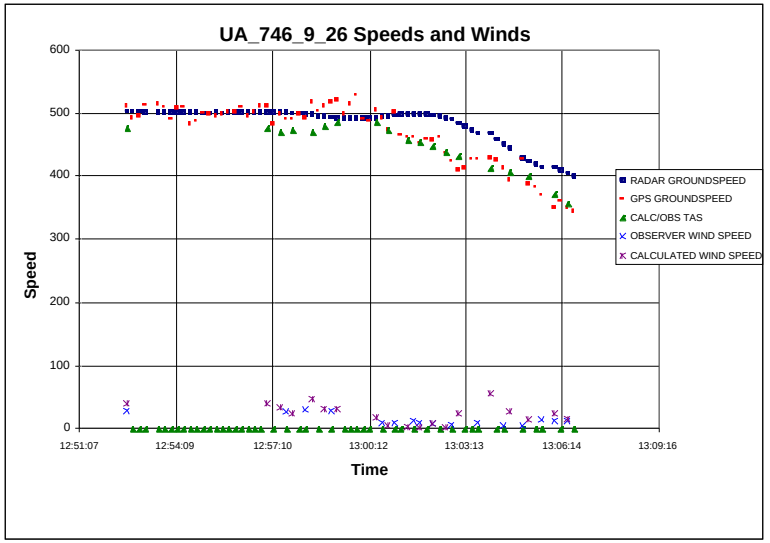


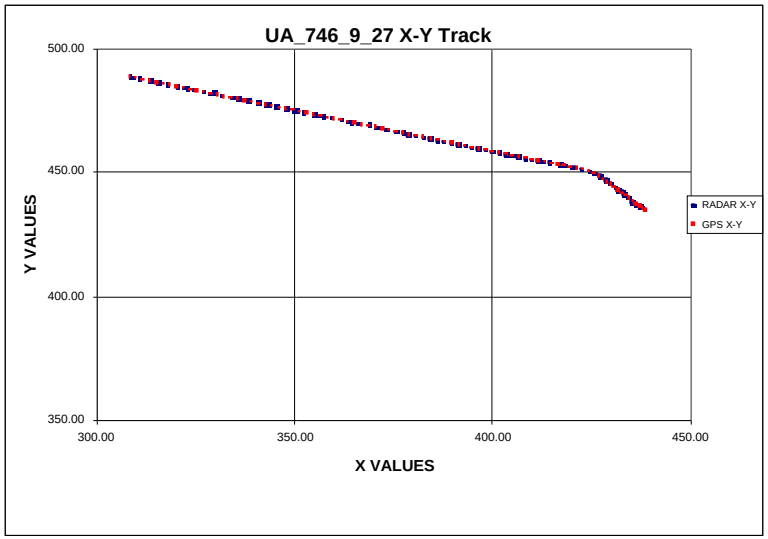
Figure A.16 Graphic Results for Case UA_746_9_26

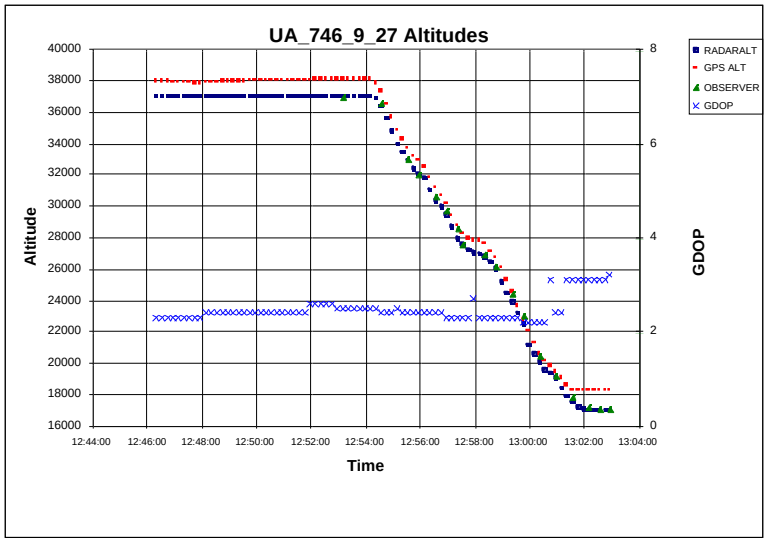
Table A.17 Tabular Results for Case UA_746_9_27

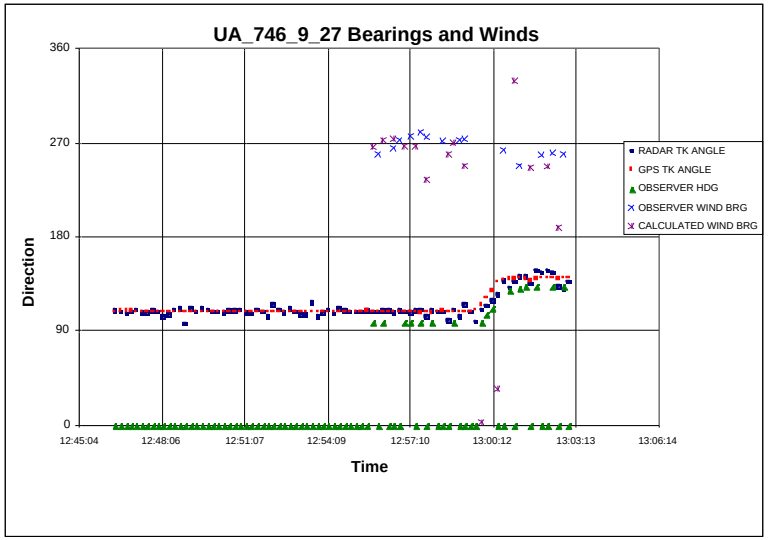
UA_746_9_27	|<---			GPS	DATA				---\>|	<---	RADAR	DATA		---\>|	<---				OBSERVER	DATA				---\>|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
12:46:21	41.38441	108.0913	37965	308.44	488.77	563	108	4	2.3	37000	308.63	488.69	544	109										
12:46:33	41.37549	108.0536	37954	310.13	488.20	549	109	4	2.3	37000	309.44	488.44	544	108										
12:46:46	41.36584	108.0130	37943	311.95	487.59	552	109	4	2.3	37000	311.19	487.94	544	106										
12:46:57	41.35712	107.9764	37935	313.60	487.04	545	109	4	2.3	37000	313.88	487.06	546	108										
12:47:09	41.34809	107.9386	37905	315.29	486.47	527	108	4	2.3	37000	315.50	486.44	547	110										
12:47:21	41.33899	107.9002	37896	317.02	485.89	528	108	4	2.3	37000	316.19	486.25	545	107										
12:47:33	41.33005	107.8623	37882	318.72	485.33	540	108	4	2.3	37000	318.06	485.69	544	107										
12:47:46	41.32082	107.8233	37869	320.48	484.75	536	108	4	2.3	37000	320.63	484.75	542	109										
12:47:57	41.31224	107.7869	37873	322.12	484.21	526	108	4	2.3	37000	322.25	484.25	539	108										
12:48:09	41.30346	107.7496	37889	323.79	483.66	512	108	4	2.4	37000	323.06	484.06	538	104										
12:48:21	41.29453	107.7117	37912	325.50	483.10	534	108	4	2.4	37000	324.94	483.56	537	105										
12:48:33	41.28561	107.6739	37934	327.20	482.54	535	108	4	2.4	37000	327.25	482.63	535	110										
12:48:46	41.27653	107.6361	37954	328.91	481.97	541	108	4	2.4	37000	329.00	481.94	534	111										
12:48:57	41.26785	107.5989	37960	330.59	481.43	535	108	4	2.4	37000	330.06	482.13	533	97										
12:49:09	41.25872	107.5603	37954	332.32	480.86	549	108	4	2.4	37000	331.63	481.25	532	111										
12:49:21	41.24995	107.5230	37964	334.00	480.31	528	108	4	2.4	37000	334.38	480.44	533	108										
12:49:33	41.24090	107.4845	37986	335.74	479.75	551	108	4	2.4	37000	335.88	479.81	534	111										
12:49:46	41.23137	107.4438	38018	337.57	479.15	534	108	4	2.4	37000	336.75	479.50	536	110										
12:49:57	41.22297	107.4081	38033	339.19	478.63	556	108	4	2.4	37000	338.63	478.94	537	108										
12:50:09	41.21374	107.3689	38036	340.95	478.06	549	108	4	2.4	37000	341.13	478.13	539	108										
12:50:21	41.20468	107.3306	38029	342.69	477.50	541	108	4	2.4	37000	342.94	477.56	541	107										
12:50:33	41.19560	107.2922	38025	344.42	476.94	545	108	4	2.4	37000	343.63	477.31	541	109										
12:50:46	41.18610	107.2520	38028	346.23	476.35	539	108	4	2.4	37000	345.50	476.69	541	109										
12:50:57	41.17742	107.2156	38022	347.88	475.82	537	108	4	2.4	37000	348.06	475.75	542	110										
12:51:09	41.16854	107.1782	38017	349.57	475.27	543	108	4	2.4	37000	349.81	475.25	542	107										
12:51:21	41.15930	107.1392	38032	351.33	474.70	562	108	4	2.4	37000	350.50	475.06	542	106										
12:51:33	41.15019	107.1010	38056	353.06	474.14	551	108	4	2.4	37000	352.38	474.31	542	110										
12:51:46	41.14075	107.0617	38064	354.84	473.56	549	108	4	2.4	37000	355.00	473.50	542	108										
12:51:57	41.13162	107.0239	38065	356.55	473.00	539	108	4	2.6	37000	356.75	473.13	542	104										
12:52:09	41.12229	106.9859	38073	358.27	472.43	552	108	4	2.6	37000	357.50	472.69	543	115										
12:52:21	41.11281	106.9474	38089	360.01	471.86	550	108	4	2.6	37000	359.31	472.13	544	110										
12:52:33	41.10369	106.9098	38093	361.71	471.30	562	108	4	2.6	37000	361.94	471.38	544	107										
12:52:46	41.09408	106.8703	38097	363.50	470.72	540	108	4	2.6	37000	363.63	470.69	545	111										
12:52:57	41.08495	106.8327	38095	365.20	470.16	549	108	4	2.5	37000	364.44	470.44	545	108										
12:53:09	41.07566	106.7945	38083	366.93	469.60	553	108	4	2.5	37000	366.31	470.00	545	105	370									
12:53:21	41.06614	106.7553	38090	368.71	469.02	548	108	4	2.5	37000	369.00	469.25	545	105										
12:53:33	41.05669	106.7167	38096	370.46	468.44	543	108	4	2.5	37000	370.50	468.31	544	117										
12:53:46	41.04705	106.6777	38097	372.23	467.86	552	108	4	2.5	37000	371.38	468.19	544	104										
12:53:57	41.03798	106.6411	38099	373.89	467.32	560	108	4	2.5	37000	373.19	467.56	544	107										
12:54:09	41.02845	106.6028	38077	375.63	466.74	560	108	4	2.5	37000	375.69	466.63	544	110										
12:54:21	41.01881	106.5639	37871	377.40	466.16	556	108	4	2.5	36900	377.56	466.13	544	106										
12:54:33	41.00955	106.5268	37348	379.08	465.60	563	108	4	2.4	36400	378.88	465.56	543	111	366									
12:54:46	40.99955	106.4869	36511	380.89	465.00	561	108	4	2.4	35600	380.56	465.00	542	109										
12:54:57	40.98994	106.4486	35675	382.63	464.43	579	108	4	2.4	34800	382.50	464.38	540	108										
12:55:09	40.97974	106.4079	34886	384.48	463.81	562	108	4	2.5	34000	384.31	463.81	540	108										
12:55:21	40.97021	106.3695	34322	386.23	463.25	566	108	4	2.4	33500	386.19	463.19	540	108										
12:55:33	40.96032	106.3295	33760	388.05	462.66	558	109	4	2.4	33000	387.63	462.69	542	109	331									
12:55:46	40.94989	106.2888	33234	389.90	462.04	534	108	4	2.4	32400	389.56	462.06	543	108				99				493	266	44
12:55:57	40.94095	106.2531	32962	391.52	461.50	542	108	4	2.4	32100	391.38	461.50	545	108	321				259	72				
12:56:09	40.93158	106.2159	32555	393.21	460.95	536	108	4	2.4	31800	393.13	460.88	547	109				99				480	273	57
12:56:21	40.92195	106.1778	31854	394.95	460.37	534	108	4	2.4	31100	394.75	460.31	548	109										
12:56:33	40.91276	106.1414	31193	396.61	459.83	552	108	4	2.4	30400	396.44	459.81	549	107	307				265	59		487	274	66
12:56:46	40.90282	106.1023	30715	398.39	459.24	534	108	4	2.4	30000	398.25	459.19	549	109					273	53				
12:56:57	40.89387	106.0670	30174	400.00	458.71	526	108	4	2.3	29500	399.94	458.63	548	108	298			99				480	267	49
12:57:09	40.88469	106.0305	29440	401.66	458.17	525	108	4	2.3	28700	401.63	458.13	547	107				99	276	44				
12:57:21	40.87539	105.9941	28792	403.32	457.62	531	108	4	2.3	28000	403.38	457.50	546	109	286							489	267	44
12:57:33	40.86593	105.9572	28304	405.00	457.06	528	107	4	2.3	27600	404.94	456.94	544	110	276			99	280	37				
12:57:45	40.85641	105.9192	28000	406.74	456.50	503	108	4	2.3	27300	406.44	456.63	541	104					275	31		490	235	22

Table A.17 (continued)

12:57:57	40.84742	105.8840	27849	408.35	455.97	519	107	4	2.7	27100	408.25	455.94	539	109		99							
12:58:09	40.83864	105.8483	27828	409.97	455.46	516	108	4	2.3	27000	409.81	455.44	536	108									
12:58:21	40.82976	105.8127	27636	411.60	454.94	511	109	4	2.3	26800	411.50	454.88	533	108	270		272	29					
12:58:33	40.82034	105.7769	27167	413.23	454.38	514	108	4	2.3	26500	412.69	454.75	533	100						488	259	30	
12:58:45	40.81107	105.7406	26739	414.90	453.84	529	108	4	2.3	26100	414.19	454.06	533	110	262	99				483	270	48	
12:58:57	40.80248	105.7064	26148	416.45	453.33	490	108	4	2.3	25200	416.94	453.50	534	104			273	33					
12:59:09	40.79322	105.6706	25325	418.09	452.80	492	108	4	2.3	24500	418.25	452.75	535	115			274	35		472	248	26	
12:59:21	40.78450	105.6362	24545	419.66	452.29	515	108	4	2.3	23900	420.06	452.25	535	108	245								
12:59:33	40.77561	105.6013	23667	421.26	451.77	501	110	4	2.3	23200	420.69	452.19	532	99									
12:59:45	40.76613	105.5671	22795	422.83	451.21	475	115	4	2.2	22500	422.19	451.50	527	110	230	99				460	3	45	
12:59:57	40.75412	105.5357	22052	424.26	450.51	466	122	4	2.2	21200	424.38	450.44	520	114		106							
13:00:09	40.73947	105.5072	21348	425.57	449.65	484	128	4	2.2	20600	425.69	449.63	512	119		112							
13:00:21	40.72269	105.4809	20645	426.78	448.65	460	137	4	2.2	20100	427.06	448.63	505	124	205					448	34	114	
13:00:33	40.70349	105.4583	20167	427.83	447.51	464	139	4	2.2	19600	427.38	448.00	496	138			263	30					
13:00:46	40.68293	105.4361	19858	428.86	446.30	435	140	3	3.1	19400	428.63	447.00	490	131		129							
13:00:57	40.66491	105.4170	19485	429.74	445.22	451	140	4	2.4	19100	429.63	445.81	484	137	193					436	329	15	
13:01:09	40.64590	105.3965	19096	430.69	444.10	427	141	4	2.4	18400	430.88	444.06	475	142		130	248	24					
13:01:21	40.62700	105.3764	18615	431.62	442.97	437	140	3	3.1	17900	431.75	442.94	468	142		132							
13:01:33	40.60828	105.3560	18259	432.57	441.87	443	138	3	3.1	17500	432.88	441.94	461	135	179					433	246	37	
13:01:46	40.58880	105.3340	18260	433.59	440.71	458	140	3	3.1	17200	433.19	441.31	453	148		132							
13:01:57	40.57048	105.3146	18259	434.49	439.62	429	141	3	3.1	17100	434.06	440.06	450	146			258	19					
13:02:09	40.55213	105.2953	18259	435.38	438.53	418	141	3	3.1	17000	435.13	438.25	446	148	172					414	247	17	
13:02:21	40.53400	105.2763	18260	436.27	437.46	401	141	3	3.1	17000	435.94	437.06	443	146		132	260	25					
13:02:33	40.51695	105.2583	18260	437.11	436.45	368	140	3	3.1	17000	437.13	436.38	440	132	171					384	189	23	
13:02:45	40.50039	105.2409	18260	437.92	435.46	357	141	3	3.1	17000	437.63	436.00	436	129		132	259	25					
13:02:55	40.48739	105.2273	18259	438.55	434.69	357	141	3	3.2	17000	438.32	435.09	432	137	171								







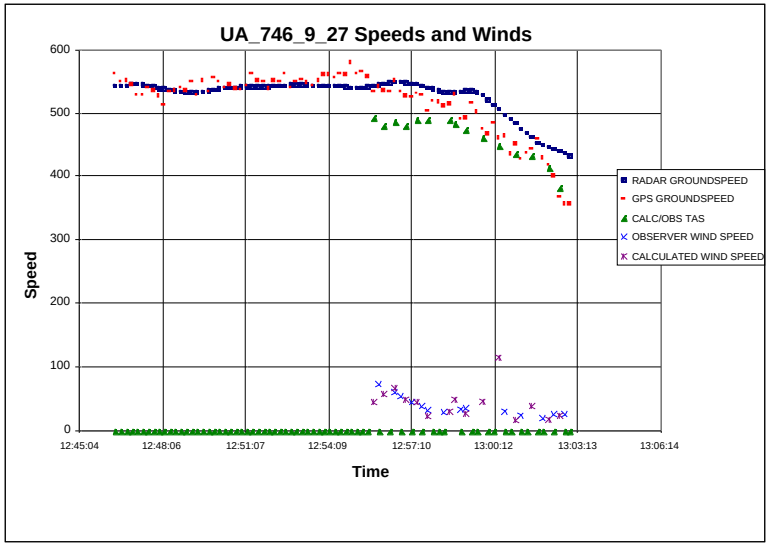


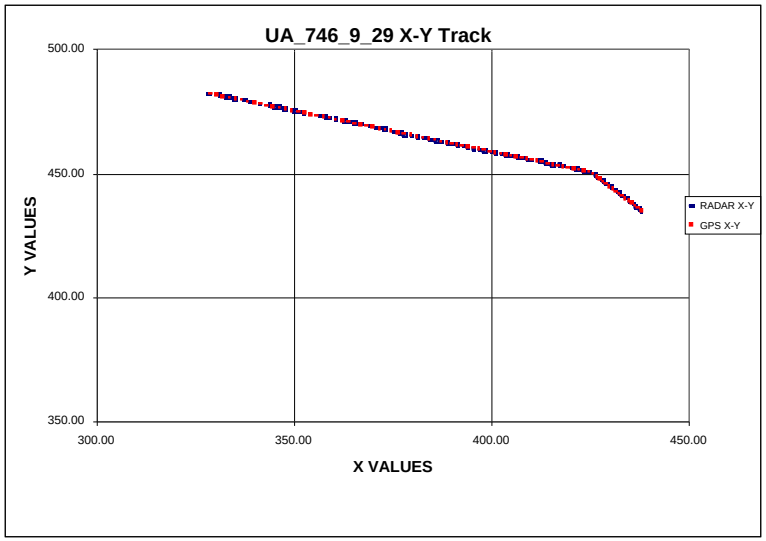
Figure A.17 Graphic Results for Case UA_746_9_27

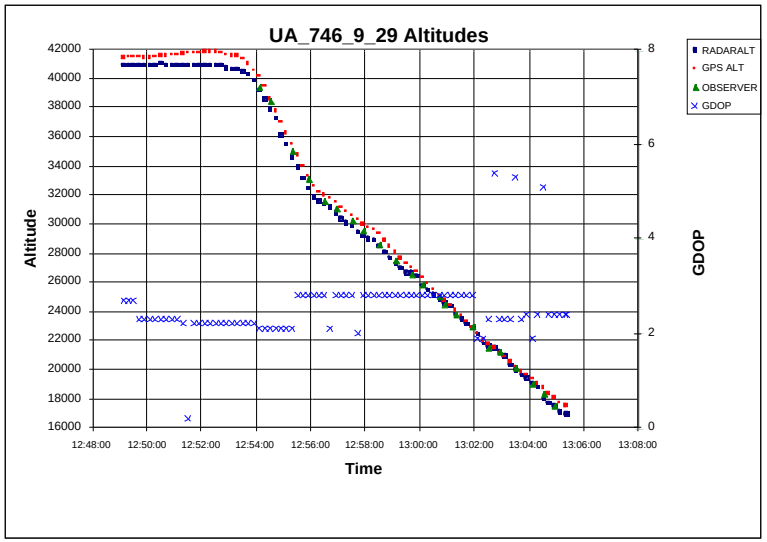
Table A.18 Tabular Results for Case UA_746_9_29

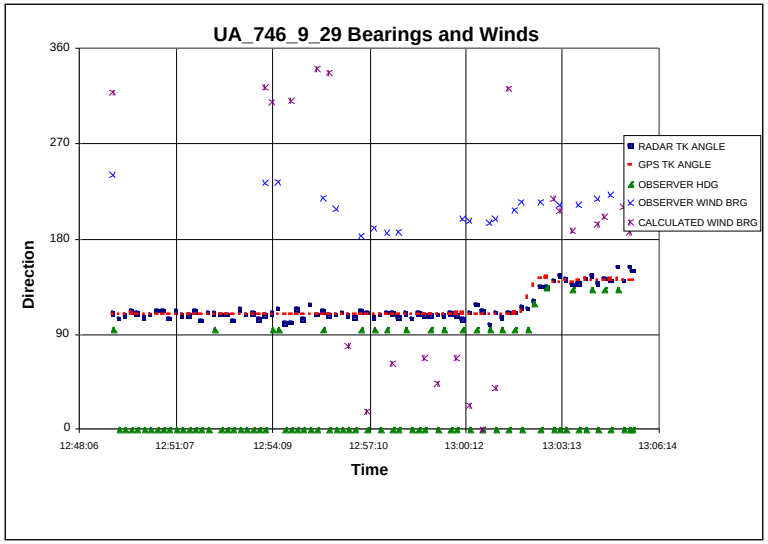
UA_746_9_29	|<---			GPS	DATA				---\>|	<---	RADAR	DATA		---\>|	<---				OBSERVER	DATA				---\>|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
12:49:07	41.27672	107.6334	41486	329.03	481.98	498	108	4	2.7	41000	328.63	482.06	495	109			237	95	240	45		468	319	35
12:49:19	41.26849	107.5987	41497	330.59	481.47	506	108	4	2.7	41000	331.19	481.44	496	105										
12:49:31	41.26012	107.5636	41499	332.18	480.94	491	108	4	2.7	41000	332.75	480.94	497	107										
12:49:43	41.25142	107.5275	41491	333.80	480.40	501	109	4	2.3	41000	333.50	480.63	497	111										
12:49:55	41.24312	107.4945	41437	335.29	479.88	487	108	4	2.3	41000	335.19	480.06	498	109										
12:50:07	41.23463	107.4585	41485	336.91	479.36	499	108	4	2.3	41000	337.50	479.44	498	106										
12:50:19	41.22643	107.4238	41525	338.48	478.85	499	108	4	2.3	41000	339.19	478.88	498	108										
12:50:31	41.21818	107.3889	41564	340.05	478.34	513	108	4	2.3	41100	339.88	478.56	499	112										
12:50:43	41.20952	107.3524	41594	341.70	477.80	499	108	4	2.3	41000	341.44	477.94	499	112										
12:50:55	41.20137	107.3181	41625	343.25	477.30	493	108	4	2.3	41000	343.88	477.44	499	105										
12:51:07	41.19313	107.2833	41678	344.82	476.79	506	108	4	2.3	41000	345.31	476.81	499	111										
12:51:19	41.18471	107.2479	41727	346.42	476.27	503	108	4	2.2	41000	346.25	476.56	500	107										
12:51:31	41.17638	107.2130	41762	347.99	475.76	488	108	4	0.2	41000	347.69	476.13	499	107										
12:51:43	41.16793	107.1776	41791	349.59	475.24	498	108	4	2.2	41000	350.13	475.13	500	111										
12:51:55	41.15979	107.1435	41819	351.14	474.73	506	108	4	2.2	41000	351.69	474.88	500	103										
12:52:07	41.15136	107.1082	41838	352.73	474.22	498	108	4	2.2	41000	352.56	474.50	500	110							ctas descent clearance			
12:52:19	41.14277	107.0725	41840	354.34	473.69	507	108	4	2.2	41000	354.00	474.00	500	109				95						
12:52:31	41.13430	107.0375	41837	355.93	473.17	497	108	4	2.2	41000	356.50	473.19	500	108										
12:52:43	41.12556	107.0012	41792	357.57	472.63	491	108	4	2.2	41000	358.00	472.69	500	108										
12:52:55	41.11743	106.9677	41679	359.09	472.14	496	108	4	2.2	40800	359.06	472.50	501	103										
12:53:07	41.10880	106.9323	41596	360.70	471.61	494	108	4	2.2	40700	360.50	471.75	501	113										
12:53:18	41.10038	106.8978	41556	362.26	471.10	488	108	4	2.2	40700	362.94	471.06	502	108										
12:53:31	41.09186	106.8631	41351	363.83	470.58	495	108	4	2.2	40500	364.38	470.56	502	109							left cruise early	back up		
12:53:43	41.08297	106.8270	41016	365.46	470.04	495	108	4	2.2	40300	365.31	470.38	502	104										
12:53:55	41.07470	106.7934	40586	366.98	469.54	484	108	4	2.2	39900	366.81	469.88	502	107					233	61		459	323	30
12:54:07	41.06656	106.7603	40123	368.49	469.05	506	108	4	2.1	39200	369.13	469.06	502	109	395			95				459	309	50
12:54:19	41.05795	106.7255	39437	370.07	468.53	506	108	4	2.1	38600	370.69	468.31	501	114				95	234	59				
12:54:31	41.04926	106.6905	38589	371.65	468.00	508	108	4	2.1	37900	371.50	468.31	500	100	385									
12:54:43	41.04024	106.6540	37734	373.31	467.46	516	108	4	2.1	37300	372.94	468.00	500	101			261					474	310	45
12:54:54	41.03198	106.6205	37007	374.83	466.95	523	108	4	2.1	36100	375.31	466.75	499	113										
12:55:06	41.02327	106.5851	36285	376.43	466.43	502	108	4	2.1	35500	377.13	466.44	498	104										
12:55:19	41.01414	106.5480	35498	378.12	465.88	489	108	4	2.1	34600	378.06	465.69	497	118	350									
12:55:31	41.00541	106.5126	34748	379.73	465.36	508	108	4	2.8	33900	379.88	465.25	495	108								495	341	21
12:55:43	40.99635	106.4759	33972	381.39	464.81	495	108	4	2.8	33200	381.25	464.69	493	111				95	219	47				
12:55:54	40.98857	106.4442	33285	382.84	464.35	488	108	4	2.8	32500	383.13	464.19	492	107	332							475	337	20
12:56:07	40.98021	106.4102	32607	384.38	463.85	466	108	4	2.8	31900	384.56	463.69	491	108					208	50				
12:56:18	40.97224	106.3783	32191	385.83	463.37	453	108	4	2.8	31600	386.00	463.13	490	110										
12:56:30	40.96438	106.3467	31996	387.27	462.90	441	108	4	2.8	31400	387.38	462.75	489	107	316							468	78	31
12:56:43	40.95622	106.3136	31837	388.77	462.41	418	108	4	2.1	31200	388.94	462.31	488	106										
12:56:55	40.94893	106.2842	31533	390.11	461.98	439	108	4	2.8	30800	390.13	461.81	486	111	311			95	183	55				
12:57:06	40.94170	106.2552	31155	391.43	461.55	444	108	4	2.8	30400	391.38	461.38	483	110								444	17	19
12:57:18	40.93415	106.2254	30818	392.78	461.10	417	108	4	2.8	30100	392.88	461.00	480	106				95	190	55				
12:57:30	40.92658	106.1956	30574	394.14	460.65	443	108	4	2.8	29900	394.00	460.63	477	108	302									
12:57:43	40.91862	106.1639	30272	395.59	460.18	452	108	4	2.0	29500	395.44	460.06	473	110				95	186	59				
12:57:54	40.91128	106.1345	29966	396.92	459.74	439	108	4	2.8	29200	397.19	459.50	469	109	296							454	62	21
12:58:06	40.90373	106.1042	29764	398.31	459.30	446	108	4	2.8	29000	398.31	459.19	464	106					187	62				
12:58:18	40.89627	106.0742	29614	399.67	458.85	429	108	4	2.8	28900	399.88	458.63	459	109				95						
12:58:30	40.88905	106.0452	29331	400.99	458.42	428	108	4	2.8	28500	401.13	458.31	455	105	286									
12:58:43	40.88136	106.0136	28865	402.43	457.97	411	108	4	2.8	28100	402.50	457.81	451	109										
12:58:54	40.87465	105.9863	28424	403.68	457.57	413	108	4	2.8	27700	403.81	457.44	446	107			281					429	67	20
12:59:06	40.86738	105.9571	28014	405.01	457.15	438	108	4	2.8	27300	405.19	457.00	443	107	275			95						
12:59:18	40.85983	105.9272	27634	406.37	456.70	427	108	4	2.8	27000	406.69	456.50	440	108			290					434	43	16
12:59:30	40.85234	105.8977	27312	407.72	456.26	422	108	4	2.8	26700	407.94	456.13	438	107				95						
12:59:43	40.84459	105.8672	27042	409.11	455.81	425	108	4	2.8	26700	409.31	455.63	437	109	266									
12:59:54	40.83733	105.8386	26758	410.41	455.38	400	109	4	2.8	26500	409.94	455.44	435	107								421	67	27
13:00:06	40.83001	105.8106	26343	411.69	454.95	410	109	4	2.8	25800	412.38	454.88	435	104	259			95	199	61				
13:00:18	40.82253	105.7822	25932	412.99	454.51	412	108	4	2.8	25500	413.63	454.38	434	110					197	53		414	23	17
13:00:31	40.81493	105.7531	25530	414.32	454.07	421	108	4	2.8	25200	414.56	453.81	433	118				95						

Table A.18 (continued)

13:00:43	40.80723	105.7236	25123	415.67	453.62	422	108	4	2.8	24900	415.31	453.56	432	111	251										417	0	18
13:00:55	40.80024	105.6966	24759	416.90	453.21	421	108	4	2.8	24600	417.13	453.44	432	99	245			95		195	46						
13:01:07	40.79285	105.6678	24409	418.21	452.77	409	108	4	2.8	24400	418.19	452.94	432	110						199	42				415	39	15
13:01:19	40.78557	105.6393	24077	419.52	452.35	413	108	4	2.8	23800	420.19	452.44	431	106	238			95									
13:01:31	40.77826	105.6103	23717	420.84	451.92	426	108	4	2.8	23500	421.44	451.94	430	110											403	322	28
13:01:43	40.77073	105.5812	23325	422.18	451.49	414	109	4	2.8	23200	422.63	451.50	428	110				95		207	33						
13:01:55	40.76363	105.5546	22937	423.40	451.08	408	111	4	2.8	22900	423.25	451.19	426	115	230					215	32						
13:02:07	40.75486	105.5266	22482	424.68	450.56	435	124	4	1.9	22500	424.56	450.63	423	114				95									
13:02:19	40.74144	105.5023	22038	425.80	449.77	392	136	4	1.9	21800	426.31	449.44	420	121				119									
13:02:31	40.72470	105.4827	21751	426.70	448.78	395	142	4	2.3	21600	427.00	448.44	417	135	215					215	30						
13:02:43	40.70704	105.4657	21462	427.49	447.72	390	143	4	5.4	21500	427.94	447.56	415	134				134									
13:02:55	40.69052	105.4492	21045	428.25	446.74	383	139	4	2.3	21200	428.38	447.00	411	140	212										393	218	43
13:03:07	40.67381	105.4306	20864	429.11	445.75	373	139	4	2.3	20900	429.06	445.94	407	145						212	27				392	206	44
13:03:19	40.65773	105.4135	20526	429.90	444.79	376	140	4	2.3	20300	430.31	444.50	403	141													
13:03:31	40.64125	105.3958	20193	430.72	443.82	365	139	4	5.3	20000	431.25	443.56	399	137	201			132							387	188	32
13:03:43	40.62441	105.3776	19841	431.57	442.82	373	140	4	2.3	19600	432.06	442.63	396	138						212	18						
13:03:55	40.60882	105.3606	19611	432.36	441.89	370	141	4	2.4	19400	432.44	442.13	393	142													
13:04:07	40.59263	105.3435	19327	433.15	440.93	369	140	4	1.9	19100	433.13	441.06	390	145	190			132									
13:04:19	40.57642	105.3260	19041	433.96	439.97	363	140	4	2.4	18800	434.00	440.19	388	138						218	17				377	194	24
13:04:31	40.56062	105.3092	18714	434.74	439.03	362	140	4	5.1	18000	435.06	438.75	385	142	184			132							373	201	21
13:04:43	40.54432	105.2919	18359	435.55	438.07	372	141	4	2.4	17700	435.88	437.81	383	140						221	18						
13:04:55	40.52894	105.2761	18041	436.28	437.16	374	141	4	2.4	17500	436.25	436.69	381	154	176			133									
13:05:07	40.51333	105.2598	17709	437.04	436.23	354	140	4	2.4	17100	437.06	436.38	379	140		282									363	210	24
13:05:19	40.49724	105.2429	17481	437.83	435.28	345	140	4	2.4	16900	437.44	435.25	378	154						219	11				367	187	31
13:05:23	40.49125	105.2365	17507	438.12	434.92	365	140	4	2.4	16939	437.90	434.74	377	150													







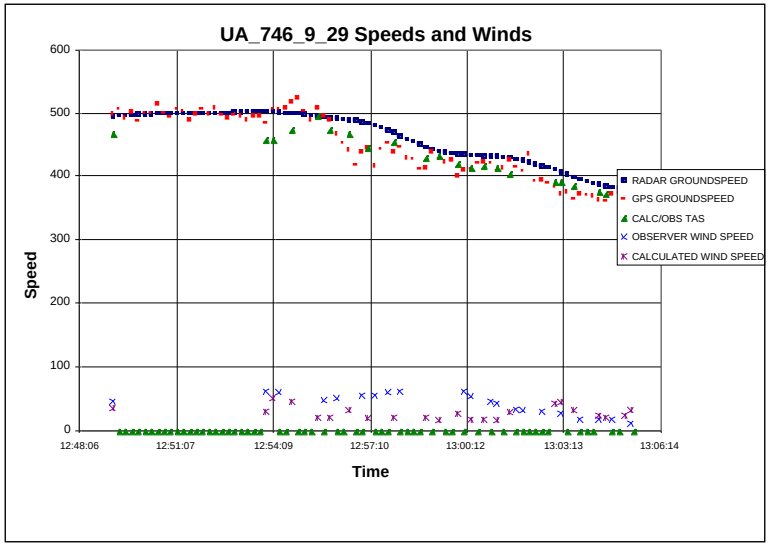
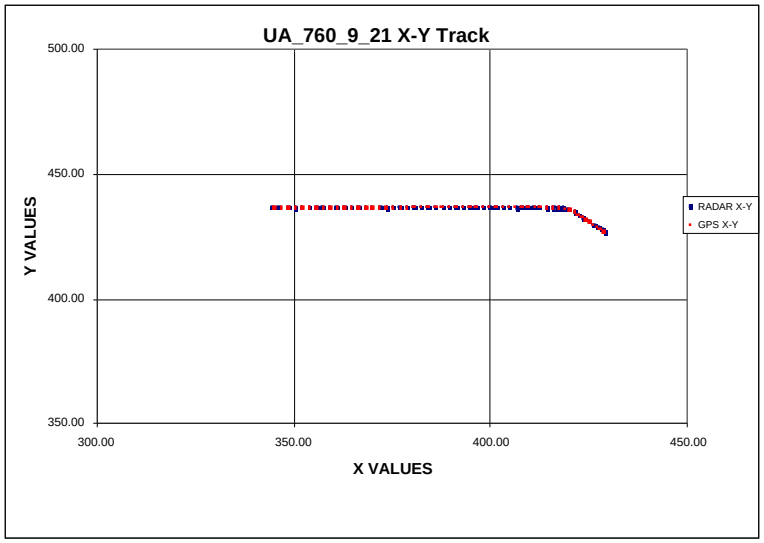
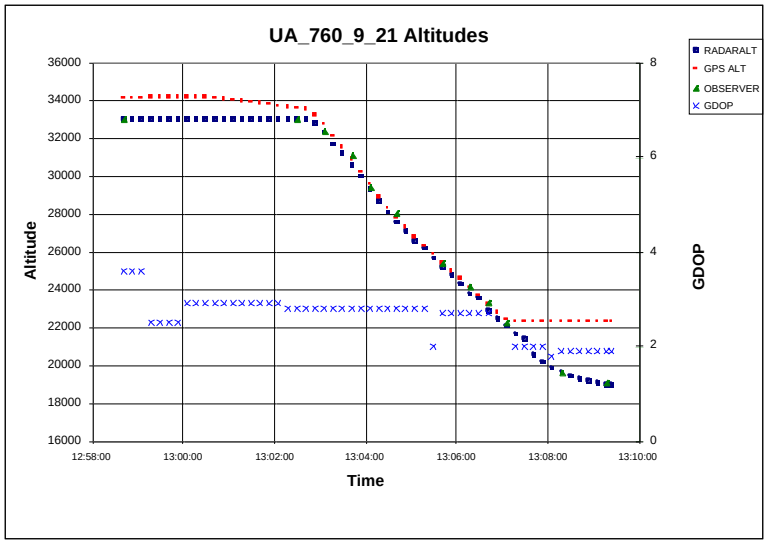


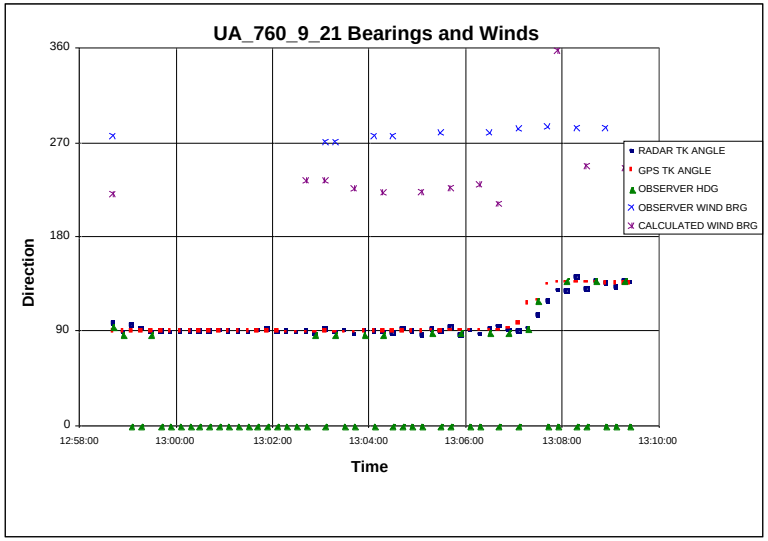
Figure A.18 Graphic Results for Case UA-746_9_29

Table A.19 Tabular Results for Case UA_760_9_21

UA_760_9_21	|<---			GPS	DATA					---\>|	<---	RADAR	DATA		---\>|	<---				OBSERVER	DATA				---\>|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP		R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
12:58:41	40.51881	107.2643	34079	345.31	436.34	525	90	4	3.6		33000	344.69	436.63	524	98	330		266	93.7	276	81	atc requested mach	443	221	146
12:58:53	40.51895	107.2262	34093	347.06	436.34	549	90	4	3.6		33000	346.38	436.75	524	89				87						
12:59:05	40.51900	107.1874	34126	348.83	436.32	518	90	4	3.6		33000	348.88	436.38	523	96										
12:59:17	40.51903	107.1469	34163	350.69	436.31	527	90	3	2.5		33000	350.50	436.31	523	93										
12:59:29	40.51917	107.1089	34170	352.42	436.31	543	90	3	2.5		33000	352.19	436.38	521	89				87						
12:59:41	40.51937	107.0699	34170	354.21	436.31	533	90	3	2.5		33000	354.06	436.38	520	90										
12:59:53	40.51956	107.0322	34170	355.93	436.31	540	90	3	2.5		33000	355.94	436.44	518	89							not. at che			
13:00:05	40.51971	106.9930	34170	357.72	436.30	535	90	4	2.9		33000	357.38	436.44	517	90										
13:00:17	40.51981	106.9529	34163	359.56	436.30	542	90	4	2.9		33000	359.31	436.44	516	90										
13:00:29	40.51988	106.9162	34145	361.24	436.30	532	90	4	2.9		33000	361.00	436.44	514	90										
13:00:41	40.51943	106.8782	34109	362.98	436.26	538	90	4	2.9		33000	362.88	436.44	513	90							fms t/			
13:00:53	40.52029	106.8397	34055	364.74	436.30	551	90	4	2.9		33000	364.75	436.38	512	91										
13:01:05	40.52043	106.7997	33990	366.57	436.31	512	90	4	2.9		33000	366.44	436.38	512	90										
13:01:17	40.52079	106.7590	33929	368.44	436.32	523	90	4	2.9		33000	368.25	436.38	513	90										
13:01:29	40.52135	106.7226	33879	370.10	436.35	544	90	4	2.9		33000	369.94	436.44	514	89										
13:01:41	40.52083	106.6828	33820	371.92	436.31	545	90	4	2.9		33000	372.00	436.38	516	91										
13:01:53	40.52096	106.6443	33769	373.68	436.32	546	90	4	2.9		33000	373.81	436.31	518	92										
13:02:05	40.52113	106.6062	33704	375.42	436.32	532	90	4	2.9		33000	375.44	436.38	520	89										
13:02:17	40.52142	106.5647	33630	377.32	436.34	519	89	4	2.8		33000	377.13	436.38	522	90										
13:02:29	40.52178	106.5276	33567	379.03	436.36	535	89	4	2.8		33000	378.94	436.44	524	89	330						fms td 2.5 miles from ctas			
13:02:41	40.52224	106.4892	33501	380.78	436.38	537	89	4	2.8		33000	380.75	436.44	525	90								445	234	117
13:02:53	40.52260	106.4507	33200	382.54	436.41	536	89	4	2.8		32800	382.50	436.56	527	87				86.7						
13:03:05	40.52294	106.4123	32730	384.30	436.43	527	90	4	2.8		32300	384.25	436.44	528	92	324				271	90		442	234	109
13:03:17	40.52325	106.3720	32100	386.15	436.45	520	89	4	2.8		31700	386.00	436.50	529	89				87	271	88				
13:03:29	40.52349	106.3355	31507	387.81	436.46	528	89	4	2.8		31200	388.00	436.44	530	91										
13:03:41	40.52371	106.2983	30884	389.51	436.48	516	89	4	2.8		30600	389.56	436.56	531	87	311							450	226	97
13:03:53	40.52393	106.2598	30215	391.28	436.50	520	90	4	2.8		30000	391.31	436.50	531	91				87.4						
13:04:05	40.52408	106.2227	29565	392.97	436.51	513	90	4	2.8		29300	393.06	436.50	530	90	295				276	71				
13:04:17	40.52413	106.1835	28907	394.77	436.52	513	90	4	2.8		28700	394.81	436.56	530	89				87.4				454	222	93
13:04:29	40.52414	106.1478	28317	396.41	436.52	506	90	4	2.8		28100	396.38	436.63	530	88					276	66				
13:04:41	40.52397	106.1104	27772	398.11	436.52	518	90	4	2.8		27600	398.25	436.44	529	93	281									
13:04:53	40.52370	106.0742	27291	399.77	436.51	489	90	4	2.8		27100	399.94	436.50	528	90										
13:05:05	40.52344	106.0371	26795	401.46	436.50	500	90	4	2.8		26600	401.38	436.63	526	86								447	223	83
13:05:17	40.52311	105.9996	26297	403.18	436.49	483	91	4	2.8		26200	403.25	436.50	525	92				88						
13:05:29	40.52273	105.9659	25877	404.72	436.48	484	90	4	2.0		25700	404.81	436.50	523	90					279	57				
13:05:41	40.52231	105.9311	25444	406.32	436.46	493	91	4	2.7		25200	406.63	436.31	521	94	255							433	227	89
13:05:53	40.52179	105.8950	25008	407.97	436.44	473	91	4	2.7		24800	408.13	436.50	518	86				87.9						
13:06:05	40.52129	105.8608	24577	409.54	436.42	477	91	4	2.7		24300	409.56	436.44	516	91										
13:06:17	40.52073	105.8240	24087	411.22	436.40	489	91	4	2.7		23800	411.06	436.56	512	87	242							422	230	92
13:06:29	40.52022	105.7920	23660	412.68	436.38	457	91	4	2.7		23600	412.31	436.44	509	93				88.4	279	53				
13:06:41	40.51969	105.7580	23223	414.24	436.36	451	91	4	2.7		22900	414.38	436.25	506	95	233							416	212	73
13:06:53	40.51907	105.7245	22799	415.77	436.34	471	93	3	9.4		22500	416.06	436.25	502	91				87.9						
13:07:05	40.51761	105.6918	22435	417.27	436.26	467	98	3	9.4		22100	417.44	436.25	498	90	223				283	50				
13:07:17	40.51074	105.6573	22328	418.85	435.87	418	117	3	2.0		21700	418.31	436.19	494	93				93						
13:07:29	40.50037	105.6299	22327	420.11	435.26	409	120	3	2.0		21400	419.69	435.69	489	105				120						
13:07:41	40.48879	105.6041	22327	421.30	434.57	420	135	3	2.0		20600	421.44	434.38	483	119					285	42				
13:07:53	40.47133	105.5825	22326	422.30	433.54	449	137	3	2.0		20200	422.44	433.44	476	129								400	358	68
13:08:05	40.45366	105.5617	22326	423.27	432.49	415	137	3	1.8		19900	423.50	432.63	469	128				139						
13:08:17	40.43612	105.5408	22325	424.23	431.44	419	137	3	1.9		19700	423.81	431.81	460	142	197				284	39				
13:08:29	40.41965	105.5212	22326	425.14	430.47	398	137	3	1.9		19500	425.00	431.00	452	130								375	248	89
13:08:41	40.40327	105.5016	22327	426.05	429.50	373	137	3	1.9		19300	426.25	429.44	445	138				139						
13:08:53	40.38757	105.4825	22327	426.94	428.56	385	136	3	1.9		19200	427.19	428.50	437	136					284	39				
13:09:05	40.37230	105.4638	22327	427.80	427.66	366	136	3	1.9		19100	428.13	427.69	431	132										
13:09:17	40.35656	105.4445	22327	428.70	426.72	352	136	3	1.9		19000	428.56	427.13	424	139	191			139				332	246	85
13:09:23	40.35031	105.4368	22327	429.05	426.35	352	136	3	1.9		19000	429.00	426.72	421	137										







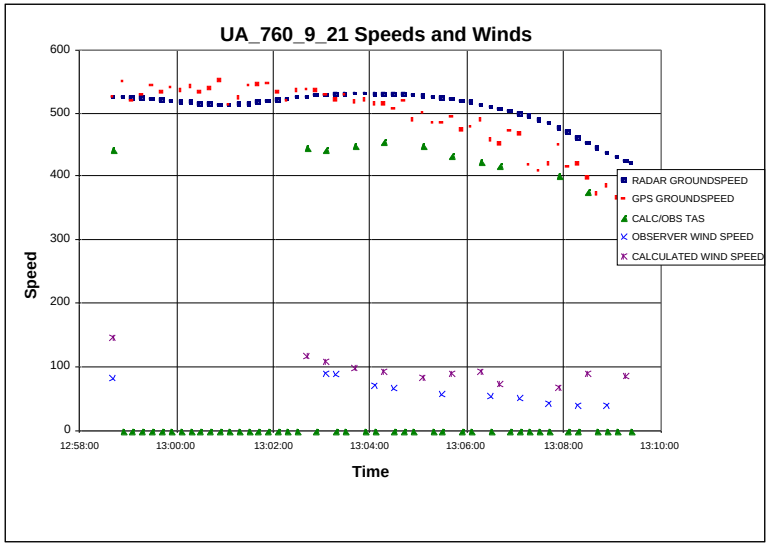
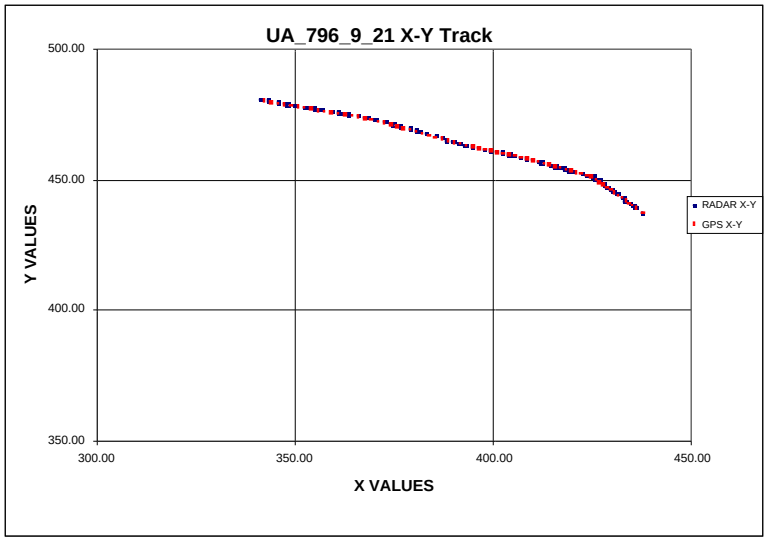
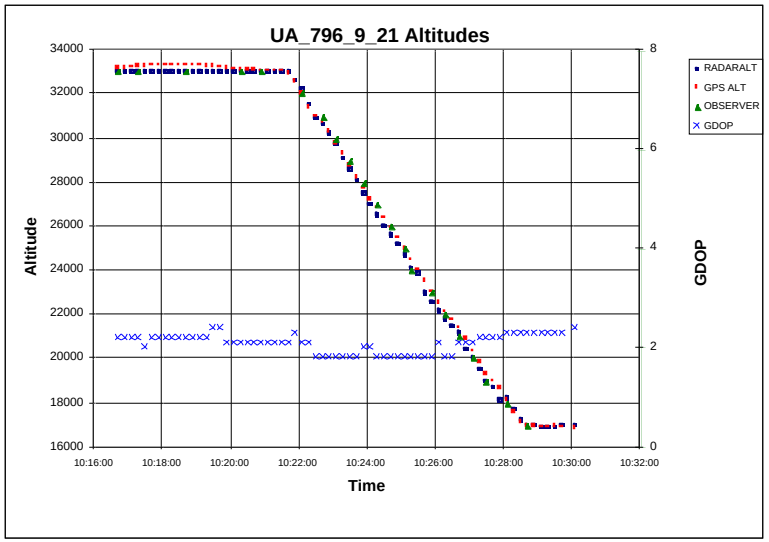


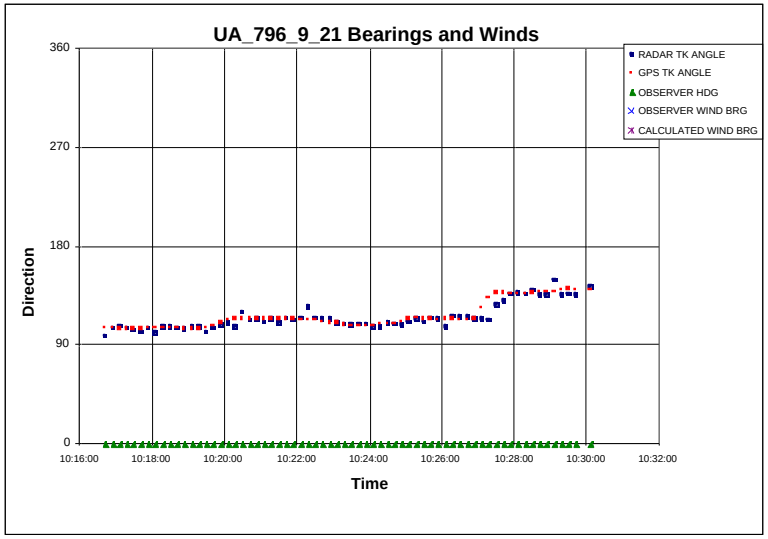
Figure A.19 Graphic Results for Case UA_760_9_21

Table A.20 Tabular Results for Case UA_796_9_21

UA_796_9_21	|<---			GPS	DATA				---\>|	<---	RADAR	DATA		---\>|	<---				OBSERVER	DATA				---\>|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
10:16:42	41.24615	107.3367	33187	342.43	479.99	516	105	4	2.2	33000	341.50	480.63	520	98	330	-23								
10:16:54	41.23861	107.2982	33198	344.17	479.52	533	105	4	2.2	33000	343.31	480.06	520	105										
10:17:06	41.23125	107.2600	33224	345.90	479.06	525	104	4	2.2	33000	345.81	479.25	519	107		-22								
10:17:18	41.22465	107.2248	33256	347.49	478.65	519	104	4	2.2	33000	347.38	478.88	518	105	330									
10:17:30	41.21782	107.1877	33285	349.16	478.23	513	104	4	2.0	33000	348.19	478.69	517	103										
10:17:42	41.21097	107.1504	33310	350.85	477.81	520	104	4	2.2	33000	350.06	478.31	517	102										
10:17:54	41.20411	107.1131	33329	352.53	477.38	516	105	4	2.2	33000	352.63	477.56	517	105										
10:18:06	41.19685	107.0748	33344	354.26	476.93	524	105	4	2.2	33000	354.25	477.31	518	101										
10:18:18	41.18977	107.0380	33344	355.93	476.49	517	105	4	2.2	33000	355.00	477.06	518	106										
10:18:30	41.18257	107.0011	33337	357.60	476.05	516	105	4	2.2	33000	356.75	476.56	518	106										
10:18:42	41.17538	106.9640	33333	359.28	475.62	524	105	4	2.2	33000	359.38	475.88	518	105	330									
10:18:54	41.16814	106.9262	33329	360.99	475.17	526	104	4	2.2	33000	361.00	475.50	517	104										
10:19:06	41.16073	106.8870	33319	362.76	474.71	520	104	4	2.2	33000	361.81	475.25	518	106										
10:19:18	41.15377	106.8504	33294	364.42	474.29	530	104	4	2.2	33000	363.63	474.75	518	106										
10:19:30	41.14676	106.8140	33263	366.07	473.86	537	105	4	2.4	33000	366.13	474.31	518	102										
10:19:42	41.13945	106.7763	33236	367.77	473.42	526	107	4	2.4	33000	367.75	473.81	518	105										
10:19:54	41.13153	106.7404	33205	369.40	472.94	517	110	4	2.1	33000	368.50	473.56	517	108		-22								
10:20:06	41.12092	106.7021	33165	371.13	472.30	519	112	4	2.1	33000	370.31	472.88	516	110										
10:20:18	41.11044	106.6682	33117	372.67	471.67	524	113	4	2.1	33000	372.81	472.25	516	106	330									
10:20:30	41.09934	106.6329	33099	374.27	470.99	525	113	4	2.1	33000	374.19	471.25	516	120										
10:20:42	41.08785	106.5967	33080	375.91	470.31	535	113	4	2.1	33000	374.94	471.00	516	112		-22								
10:20:54	41.07685	106.5624	33069	377.47	469.64	513	113	4	2.1	33000	376.63	470.25	515	113	330									
10:21:06	41.06484	106.5250	33059	379.16	468.92	527	113	4	2.1	33000	379.13	469.38	514	111		-22								
10:21:18	41.05366	106.4903	33056	380.74	468.25	531	113	4	2.1	33000	380.69	468.69	515	113										
10:21:30	41.04252	106.4556	33044	382.31	467.58	508	113	4	2.1	33000	381.44	468.44	516	110										
10:21:42	41.03116	106.4204	32918	383.91	466.90	506	113	4	2.1	33000	383.13	467.63	517	114										
10:21:54	41.01985	106.3851	32566	385.52	466.22	515	113	4	2.3	32600	385.63	466.69	518	112										
10:22:06	41.00854	106.3492	32017	387.15	465.55	508	112	4	2.1	32200	387.19	465.94	520	114	320									
10:22:18	40.99835	106.3164	31395	388.64	464.94	507	112	4	2.1	31500	388.31	465.06	520	124										
10:22:30	40.98738	106.2809	30980	390.25	464.28	510	112	4	1.8	30900	390.00	464.44	518	114										
10:22:42	40.97716	106.2472	30705	391.79	463.68	494	111	4	1.8	30600	391.56	463.81	516	113	310									
10:22:54	40.96702	106.2128	30312	393.35	463.07	491	110	4	1.8	30200	393.13	463.13	513	113										
10:23:06	40.95680	106.1765	29776	395.00	462.46	504	110	4	1.8	29700	394.81	462.56	512	110	300	-22								
10:23:18	40.94767	106.1444	29296	396.47	461.92	498	108	4	1.8	29100	396.25	462.06	511	109		-21								
10:23:30	40.93878	106.1107	28769	398.00	461.39	486	107	4	1.8	28600	397.81	461.56	509	108	290									
10:23:42	40.93069	106.0762	28241	399.57	460.92	472	107	4	1.8	28100	399.44	461.00	507	109		-19						290		
10:23:54	40.92277	106.0417	27712	401.14	460.45	494	107	4	2.0	27500	400.88	460.50	504	109	280									
10:24:06	40.91482	106.0077	27245	402.69	459.98	486	107	4	2.0	27000	402.38	460.13	501	106		-17								
10:24:18	40.90675	105.9747	26831	404.20	459.50	485	109	4	1.8	26500	404.13	459.63	498	106	270	-16								
10:24:30	40.89796	105.9415	26373	405.71	458.98	465	109	4	1.8	26000	405.50	459.06	495	110								290		
10:24:42	40.88913	105.9093	25932	407.17	458.47	460	109	4	1.8	25600	407.00	458.56	491	109	260							290		
10:24:54	40.88018	105.8765	25484	408.67	457.94	472	111	4	1.8	25200	408.38	458.13	488	108		-15								
10:25:06	40.87083	105.8441	24988	410.15	457.39	476	113	4	1.8	24700	409.94	457.50	485	111	250	-14								
10:25:18	40.86092	105.8144	24492	411.51	456.80	449	114	4	1.8	24100	411.31	456.88	482	113	240							300		
10:25:30	40.85058	105.7847	24032	412.87	456.19	448	113	4	1.8	23900	412.31	456.50	481	111		-12						300		
10:25:42	40.84040	105.7541	23536	414.26	455.59	455	113	4	1.8	23000	414.44	455.50	481	114										
10:25:54	40.83076	105.7242	23035	415.63	455.03	455	112	4	1.8	22600	415.75	454.94	481	113	230							280		
10:26:06	40.82056	105.6925	22530	417.08	454.43	439	113	4	2.1	22200	417.31	454.56	481	106		-10								
10:26:18	40.81123	105.6640	22154	418.38	453.88	427	113	4	1.8	21800	418.06	454.13	479	116	220							290		
10:26:30	40.80195	105.6352	21778	419.70	453.34	426	112	4	1.8	21500	419.31	453.56	476	115		-9								
10:26:42	40.79293	105.6062	21397	421.02	452.81	424	112	4	2.1	21200	420.63	452.94	473	115	210									
10:26:54	40.78390	105.5765	20914	422.38	452.28	435	113	4	2.1	20400	422.44	452.19	465	113		-7						290		
10:27:06	40.77340	105.5457	20346	423.80	451.66	433	123	4	2.1	20000	423.81	451.63	457	113	200									
10:27:18	40.76135	105.5216	19826	424.90	450.96	425	132	4	2.2	19500	425.19	451.06	449	112								290		
10:27:30	40.74507	105.4988	19300	425.95	449.99	428	137	4	2.2	19000	425.63	450.44	440	126	190									
10:27:42	40.72835	105.4784	18999	426.89	449.00	402	137	4	2.2	18700	426.69	449.50	435	130		-2						290		
10:27:54	40.71150	105.4578	18672	427.84	448.00	392	136	4	2.2	18100	428.06	447.94	429	136										
10:28:06	40.69420	105.4362	18110	428.84	446.97	411	136	4	2.3	18200	428.94	447.00	423	137	180									
10:28:18	40.67826	105.4164	17578	429.76	446.03	406	136	4	2.3	17700	429.94	446.00	419	136		-1								
10:28:30	40.66165	105.3959	17112	430.70	445.04	411	137	4	2.3	17200	430.38	445.44	414	140										
10:28:42	40.64511	105.3760	16969	431.62	444.06	417	138	4	2.3	17000	431.38	444.50	412	135	170									
10:28:54	40.62774	105.3559	16966	432.56	443.03	409	138	4	2.3	17000	432.88	443.00	412	135		1						300		
10:29:07	40.60952	105.3349	16921	433.53	441.95	405	138	4	2.3	16900	433.31	441.69	411	149								300		
10:29:18	40.59298	105.3161	16914	434.40	440.97	405	140	4	2.3	16900	434.56	440.94	411	135		1								
10:29:30	40.57605	105.2980	16958	435.24	439.97	401	141	4	2.3	16900	435.44	440.00	411	136										
10:29:42	40.55852	105.2796	16923	436.10	438.93	413	140	4	2.3	17000	435.94	439.50	410	135										
10:30:06	40.52436	105.2433	16856	437.78	436.90	372	140	4	2.4	17000	437.63	437.06	410	142										







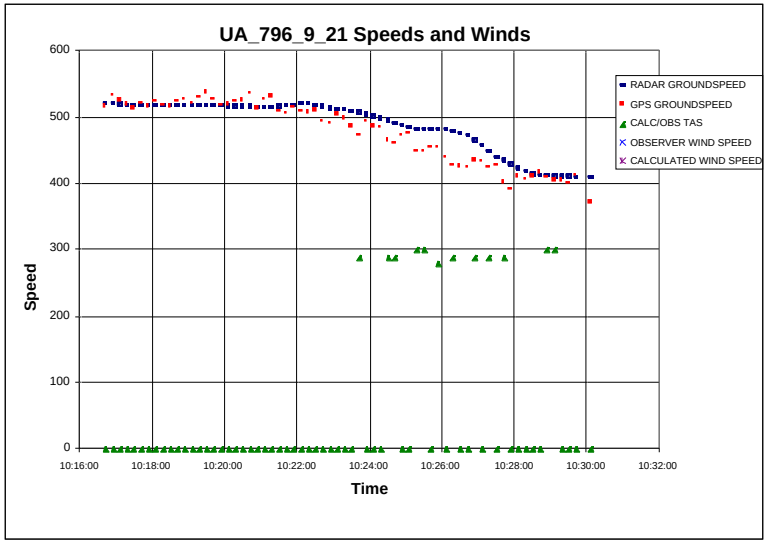


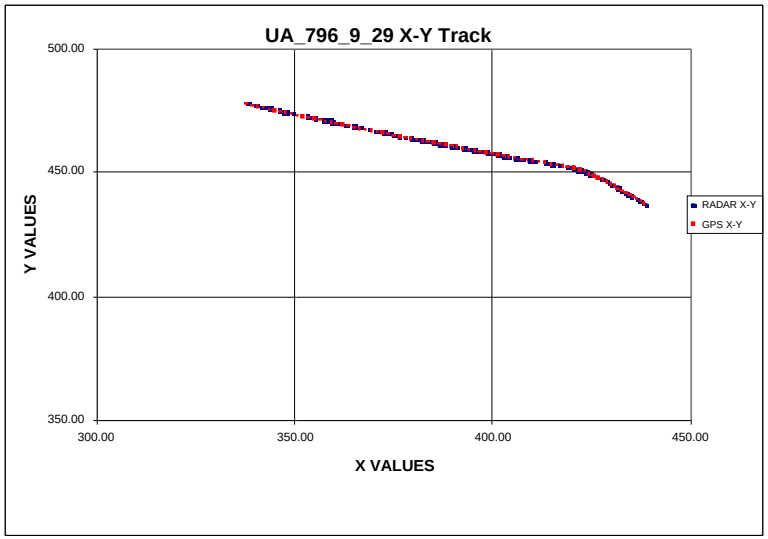
Figure A.20 Graphic Results for Case UA_796_9_21

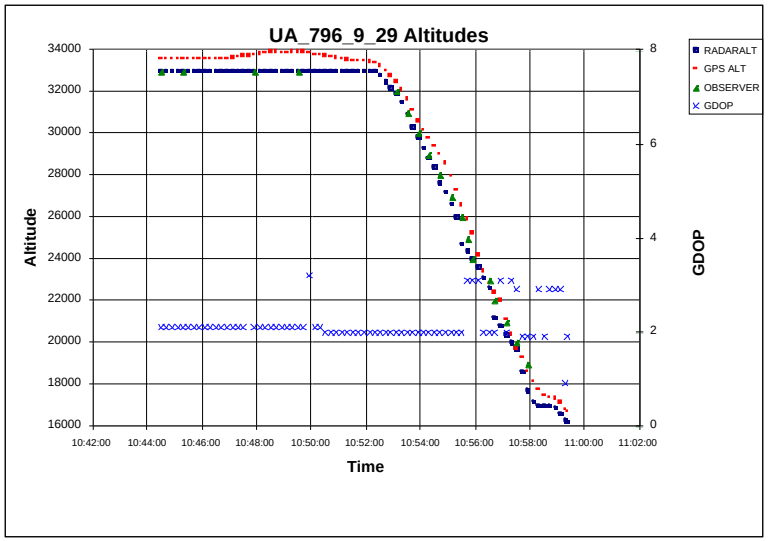
Table A.21 Tabular Results for Case UA_796_9_29

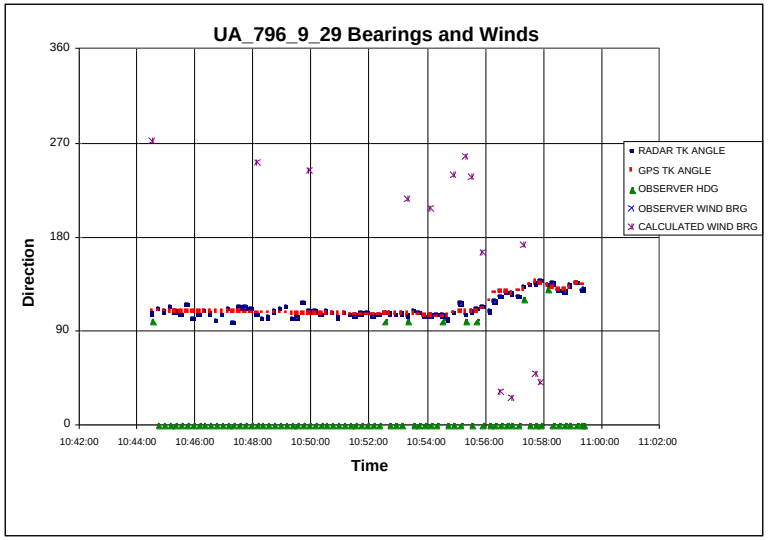
UA_796_9_29	|<---			GPS	DATA				---\>|	<---	RADAR	DATA		---\>|	<---				OBSERVER	DATA				---\>|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
10:44:31	41.20745	107.4338	33590	338.01	477.72	445	110	4	2.1	33000	338.44	477.81	450	107	330	-20	270	100			INTIAL CTAS CLEARANCE	423	271	23
10:44:43	41.19922	107.4027	33584	339.41	477.21	455	110	4	2.1	33000	340.63	476.88	450	111										
10:44:55	41.19109	107.3718	33581	340.81	476.71	452	110	4	2.1	33000	342.00	476.44	450	109										
10:45:08	41.18214	107.3376	33580	342.35	476.15	463	109	4	2.1	33000	342.69	476.13	450	113										
10:45:19	41.17442	107.3077	33565	343.71	475.67	447	109	4	2.1	33000	344.06	475.69	450	109	330									
10:45:31	41.16644	107.2766	33554	345.11	475.18	447	109	4	2.1	33000	346.19	475.13	449	106										
10:45:43	41.15845	107.2452	33549	346.53	474.69	457	109	4	2.1	33000	347.63	474.31	449	115										
10:45:55	41.15051	107.2139	33552	347.94	474.20	446	109	4	2.1	33000	348.25	474.25	448	102										
10:46:08	41.14215	107.1808	33552	349.44	473.69	458	109	4	2.1	33000	349.75	473.75	448	106										
10:46:19	41.13457	107.1507	33552	350.80	473.22	446	109	4	2.1	33000	351.81	472.94	448	110										
10:46:31	41.12682	107.1200	33554	352.19	472.74	449	109	4	2.1	33000	353.38	472.50	448	107										
10:46:43	41.11888	107.0886	33569	353.61	472.26	447	109	4	2.1	33000	353.94	472.44	447	100										
10:46:55	41.11067	107.0562	33588	355.07	471.76	452	109	4	2.1	33000	355.44	471.94	447	106							WINDS AT DIA 360/09			
10:47:08	41.10240	107.0236	33624	356.55	471.25	444	109	4	2.1	33000	357.56	471.00	446	111										
10:47:19	41.09459	106.9927	33664	357.95	470.77	450	109	4	2.1	33000	359.06	470.94	446	98										
10:47:31	41.08678	106.9615	33696	359.36	470.30	459	109	0	2.1	33000	359.69	470.38	447	112										
10:47:43	41.07913	106.9308	33729	360.75	469.83	454	108	4	21.0	33000	361.13	469.81	447	112										
10:47:55	41.07123	106.8990	33767	362.19	469.35	457	108	4	2.1	33000	363.25	469.00	447	111	330		270							
10:48:08	41.06308	106.8659	33822	363.69	468.86	451	108	4	2.1	33000	364.81	468.63	447	106		-20						423	251	35
10:48:19	41.05560	106.8354	33879	365.07	468.40	441	108	4	2.1	33000	365.50	468.50	447	102										
10:48:31	41.04799	106.8041	33893	366.49	467.94	448	108	4	2.1	33000	366.88	468.19	447	103										
10:48:43	41.04029	106.7721	33883	367.95	467.47	457	108	4	2.1	33000	369.06	467.31	447	109										
10:48:55	41.03266	106.7401	33870	369.40	467.01	457	108	4	2.1	33000	370.50	466.75	446	111										
10:49:08	41.02486	106.7072	33859	370.89	466.54	456	108	4	2.1	33000	371.19	466.44	446	113										
10:49:19	41.01762	106.6772	33925	372.25	466.10	452	107	4	2.1	33000	372.63	466.25	446	102										
10:49:31	41.01002	106.6445	33907	373.73	465.64	444	107	4	2.1	33000	374.13	465.88	445	103	330									
10:49:43	41.00256	106.6123	33886	375.20	465.19	455	107	4	2.1	33000	375.31	465.06	445	117			270							
10:49:55	40.99520	106.5802	33861	376.66	464.75	458	107	4	3.2	33000	376.44	464.75	444	109		-20						423	244	47
10:50:08	40.98747	106.5464	33783	378.19	464.28	457	107	4	2.1	33000	378.13	464.19	443	109										
10:50:19	40.98057	106.5166	33748	379.54	463.87	472	107	4	2.1	33000	379.56	463.81	442	106										
10:50:31	40.97299	106.4839	33701	381.03	463.41	453	107	4	2.0	33000	380.88	463.31	441	109										
10:50:43	40.96571	106.4523	33663	382.46	462.98	457	107	4	2.0	33000	382.25	462.88	440	108										
10:50:55	40.95840	106.4204	33618	383.92	462.54	450	107	4	2.0	33000	383.81	462.56	440	103										
10:51:08	40.95085	106.3872	33567	385.42	462.09	449	107	4	2.0	33000	385.31	462.00	439	108										
10:51:19	40.94383	106.3562	33521	386.83	461.67	464	106	4	2.0	33000	386.88	461.56	439	106										
10:51:31	40.93668	106.3245	33492	388.28	461.24	460	106	4	2.0	33000	388.06	461.25	439	105										
10:51:43	40.92946	106.2924	33475	389.74	460.81	451	106	4	2.0	33000	389.88	460.69	440	107										
10:51:55	40.92244	106.2610	33458	391.17	460.39	459	106	4	2.0	33000	391.19	460.25	441	108										
10:52:08	40.91497	106.2277	33446	392.68	459.95	448	106	4	2.0	33000	392.75	459.88	443	105										
10:52:19	40.90793	106.1960	33391	394.13	459.53	458	106	4	2.0	33000	394.06	459.50	444	106										
10:52:31	40.90081	106.1641	33233	395.58	459.11	451	107	4	2.0	32800	395.50	459.00	445	108		-20		100						
10:52:43	40.89337	106.1324	33018	397.02	458.67	443	107	4	2.0	32500	397.00	458.56	447	107										
10:52:55	40.88578	106.1008	32750	398.46	458.22	450	107	4	2.0	32200	398.56	458.13	449	106										
10:53:08	40.87773	106.0673	32458	399.99	457.74	457	107	4	2.0	31900	399.94	457.69	450	107	320	-19								
10:53:19	40.87065	106.0374	32098	401.35	457.32	463	107	4	2.0	31500	401.44	457.31	451	105			295	100				453	216	33
10:53:31	40.86304	106.0051	31618	402.82	456.87	462	107	4	2.0	30900	403.00	456.69	452	110	310									
10:53:43	40.85547	105.9729	31072	404.29	456.43	470	106	4	2.0	30300	404.25	456.31	453	108		-18								
10:53:55	40.84795	105.9405	30577	405.77	455.99	466	105	4	2.0	29800	405.88	455.94	454	104	300	-13								
10:54:08	40.84062	105.9059	30140	407.35	455.56	462	105	4	2.0	29300	407.44	455.50	454	105			300					452	208	51
10:54:19	40.83409	105.8742	29755	408.80	455.17	480	104	4	2.0	28800	409.13	455.00	456	106	290									
10:54:31	40.82753	105.8404	29369	410.34	454.79	480	104	4	2.0	28400	410.38	454.69	457	105		-10		100						
10:54:43	40.82110	105.8069	29006	411.87	454.42	477	105	4	2.0	27600	413.19	454.25	459	101	280									
10:54:55	40.81434	105.7751	28575	413.32	454.02	464	108	4	2.0	27200	414.50	453.75	461	108		-9	300					443	239	32
10:55:08	40.80589	105.7421	27972	414.83	453.53	441	109	4	2.0	26600	415.06	453.44	463	116	270		300							
10:55:19	40.79790	105.7114	27292	416.23	453.06	467	109	4	2.0	26000	416.75	453.06	465	106		-6		100				439	257	33
10:55:31	40.78961	105.6795	26552	417.69	452.57	446	109	4	2.0	24700	419.00	452.25	468	109	260	-3	300					435	237	17
10:55:43	40.78111	105.6483	25911	419.12	452.08	462	109	4	3.1	24400	420.38	451.69	470	111	250			100						
10:55:55	40.77248	105.6169	25230	420.55	451.57	437	111	4	3.1	24000	421.63	451.13	471	113	240	0	310					438	166	1

Table A.21 (continued)

10:56:08	40.76339	105.5847	24173	422.02	451.04	423	119	4	3.1	23600	422.44	450.88	472	109			305						
10:56:19	40.75173	105.5570	23422	423.29	450.36	429	127	4	2.0	23100	423.63	450.13	472	118		0							
10:56:31	40.73763	105.5318	22820	424.45	449.52	419	128	4	2.0	22600	424.69	449.38	471	123	230	1					426	32	128
10:56:43	40.72285	105.5079	22368	425.55	448.65	417	128	4	2.0	21200	426.44	448.00	468	127	220		300						
10:56:55	40.70867	105.4851	21985	426.60	447.81	418	126	4	3.1	20800	427.56	447.19	465	126		4	300				415	27	110
10:57:08	40.69440	105.4594	21081	427.78	446.97	413	129	4	2.0	20400	428.75	446.44	461	123	210		300						
10:57:19	40.68103	105.4371	20378	428.81	446.18	402	130	4	3.1	20000	429.31	445.88	456	132		4		120			409	172	9
10:57:31	40.66636	105.4148	19695	429.84	445.31	394	134	4	2.9	19700	430.19	445.00	451	134	200								
10:57:43	40.65080	105.3940	19305	430.80	444.39	398	137	4	1.9	18600	431.56	443.63	445	135		4	300				403	50	40
10:57:55	40.63434	105.3743	18624	431.71	443.42	398	135	4	1.9	17700	432.44	442.63	439	138	190	4	300				397	41	27
10:58:08	40.61776	105.3539	18122	432.66	442.43	387	133	4	1.9	17200	433.38	441.75	433	134				130					
10:58:19	40.60302	105.3336	17773	433.59	441.56	391	131	4	2.9	17000	433.94	441.19	426	135									
10:58:31	40.58844	105.3122	17466	434.58	440.70	362	130	4	1.9	17000	434.94	440.44	421	129									
10:58:43	40.57514	105.2917	17396	435.53	439.91	352	130	4	2.9	17000	436.38	439.31	415	128									
10:58:55	40.56197	105.2718	17321	436.45	439.14	353	131	4	2.9	16900	437.19	438.50	410	133									
10:59:08	40.54833	105.2522	17120	437.36	438.33	339	135	4	2.9	16600	437.94	437.69	405	136									
10:59:19	40.53573	105.2357	16831	438.12	437.59	329	134	4	0.9	16300	438.88	437.00	399	129									
10:59:22	40.53230	105.2313	16717	438.33	437.38	333	134	4	1.9	16225	438.97	436.91	397	130									







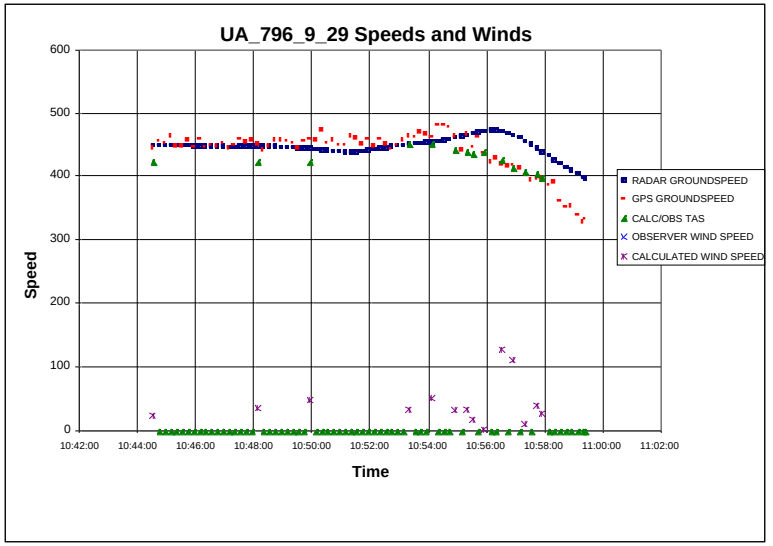
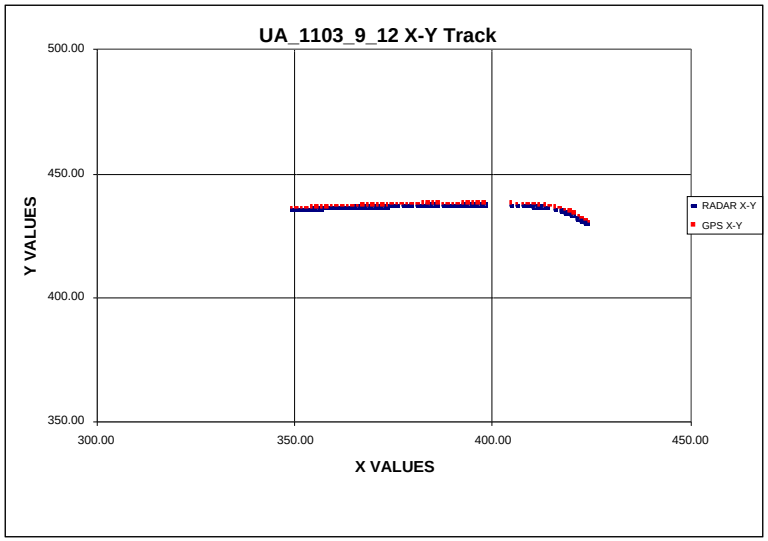
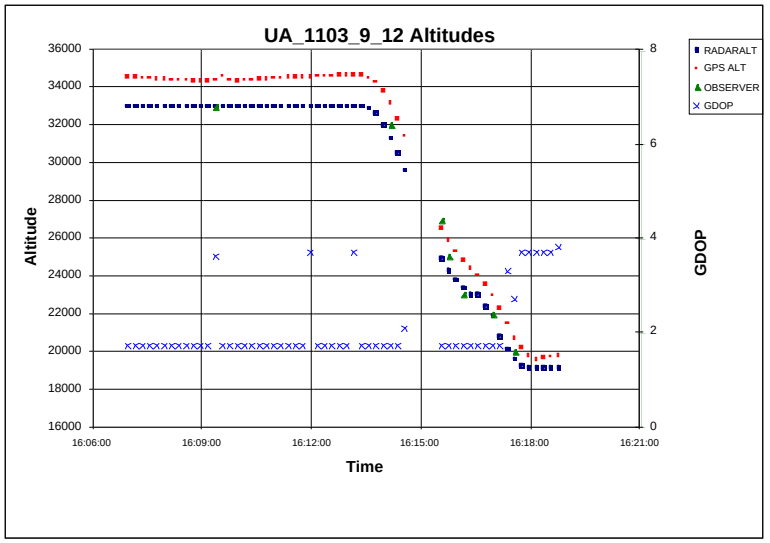


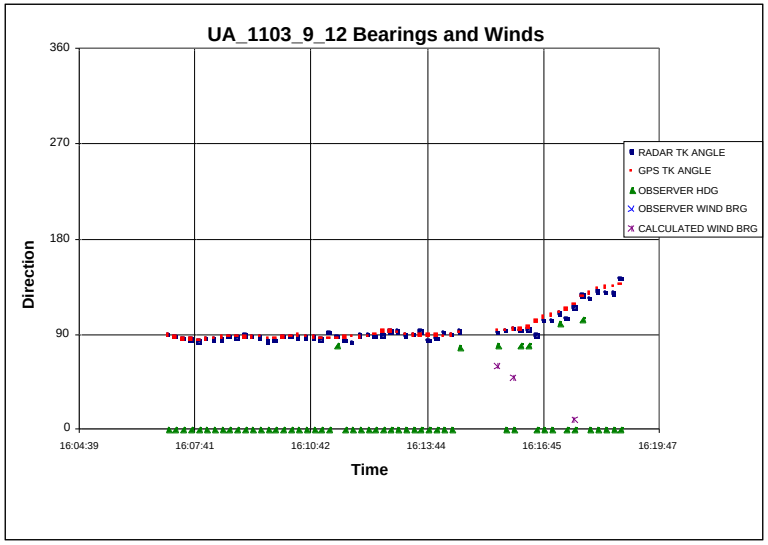
Figure A.21 Graphic Results for Case UA_796_9_29

Table A.22 Tabular Results for Case UA_1103_9_12

UA_1103_9_12	|<---			GPS	DATA					---\>|	<---	RADAR	DATA		---\>|	<---				OBSERVER	DATA				---\>|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP		R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
16:06:58	40.51653	107.1786	34532	349.23	436.17	383	89	4	1.7		33000	349.31	435.25	384	90										
16:07:10	40.51710	107.1499	34499	350.55	436.20	379	87	4	1.7		33000	350.50	435.31	383	88										
16:07:22	40.51864	107.1224	34475	351.81	436.28	402	85	4	1.7		33000	351.88	435.44	383	86										
16:07:34	40.52059	107.0934	34444	353.14	436.39	400	85	4	1.7		33000	353.06	435.56	383	85			262							
16:07:46	40.52286	107.0664	34420	354.37	436.52	380	84	4	1.7		33000	354.38	435.75	382	83										
16:07:58	40.52502	107.0395	34404	355.60	436.64	401	85	4	1.7		33000	355.56	435.81	381	86										
16:08:10	40.52694	107.0113	34374	356.89	436.75	368	86	4	1.7		33000	356.88	435.94	381	85										
16:08:22	40.52855	106.9830	34354	358.19	436.83	380	87	4	1.7		33000	358.25	436.06	381	85										
16:08:34	40.52979	106.9554	34351	359.45	436.90	391	88	4	1.7		33000	359.56	436.06	382	88										
16:08:46	40.53075	106.9273	34325	360.74	436.95	379	88	4	1.7		33000	360.75	436.13	382	87										
16:08:58	40.53165	106.8989	34321	362.04	437.00	378	87	4	1.7		33000	362.13	436.13	383	89										
16:09:10	40.53286	106.8707	34321	363.33	437.06	376	87	4	1.7		33000	363.31	436.19	384	88										
16:09:22	40.53548	106.8430	34379	364.60	437.21	368	88	4	3.6		33000	364.56	436.25	383	87	330									
16:09:34	40.53535	106.8154	34554	365.86	437.20	384	86	4	1.7		33000	365.69	436.44	382	83										
16:09:46	40.53721	106.7873	34338	367.14	437.31	380	86	4	1.7		33000	367.06	436.56	381	84										
16:09:58	40.53866	106.7590	34335	368.44	437.39	384	87	4	1.7		33000	368.31	436.56	380	88										
16:10:10	40.53966	106.7313	34357	369.71	437.45	396	88	4	1.7		33000	369.75	436.63	380	88										
16:10:22	40.54042	106.7033	34366	370.99	437.49	396	89	4	1.7		33000	370.88	436.69	380	87										
16:10:34	40.54110	106.6752	34391	372.27	437.53	389	88	4	1.7		33000	372.25	436.75	381	87										
16:10:46	40.54204	106.6473	34416	373.55	437.58	389	87	4	1.7		33000	373.38	436.81	382	87										
16:10:58	40.54326	106.6198	34449	374.80	437.65	380	86	4	1.7		33000	374.75	436.94	382	85										
16:11:10	40.54473	106.5922	34478	376.07	437.74	377	86	4	1.7		33000	376.06	436.88	383	91										
16:11:22	40.54614	106.5648	34510	377.32	437.82	389	86	4	1.7		33000	377.44	436.94	384	88				80						
16:11:34	40.54741	106.5365	34543	378.61	437.89	384	87	4	1.7		33000	378.75	437.13	385	84		-18								
16:11:46	40.54847	106.5087	34528	379.89	437.96	368	88	4	1.7		33000	379.56	437.25	385	82										
16:11:58	40.54937	106.4804	34545	381.18	438.01	399	87	4	3.7		33000	381.19	437.19	384	89										
16:12:10	40.55037	106.4522	34551	382.47	438.07	388	88	4	1.7		33000	382.44	437.19	383	90										
16:12:22	40.55088	106.4248	34595	383.73	438.10	374	90	4	1.7		33000	383.81	437.25	383	88										
16:12:34	40.55080	106.3962	34600	385.03	438.10	371	92	4	1.7		33000	384.94	437.25	383	89										
16:12:46	40.55017	106.3694	34606	386.26	438.06	371	92	4	1.7		33000	386.19	437.19	382	92										
16:12:58	40.54957	106.3417	34618	387.53	438.03	377	91	4	1.7		33000	387.69	437.13	383	92										
16:13:10	40.54917	106.3137	34643	388.81	438.01	386	90	4	3.7		33000	388.88	437.19	383	89										
16:13:22	40.54918	106.2851	34610	390.12	438.01	386	89	4	1.7		33000	390.00	437.19	383	90										
16:13:34	40.54951	106.2568	34469	391.41	438.03	386	89	4	1.7		32900	391.44	437.13	383	92										
16:13:46	40.54988	106.2289	34269	392.69	438.06	369	89	4	1.7		32600	392.56	437.31	382	84										
16:13:58	40.55023	106.2019	33792	393.92	438.08	383	89	4	1.7		32000	393.75	437.38	380	86										
16:14:10	40.55065	106.1740	33142	395.20	438.11	394	88	4	1.7		31300	395.19	437.31	380	91	320									
16:14:22	40.55107	106.1457	32310	396.49	438.14	383	89	4	1.7		30500	396.50	437.31	379	90			280							
16:14:34	40.55148	106.1170	31391	397.81	438.17	410	91	3	2.1		29600	397.88	437.25	380	92				78						
16:15:34	40.54896	105.9658	26504	404.72	438.05	426	93	4	1.7		24900	404.75	437.19	380	91	270	0	300	80				445	59	23
16:15:46	40.54773	105.9343	25886	406.16	437.99	426	93	4	1.7		24300	406.31	437.06	385	93	250		303							
16:15:58	40.54637	105.9024	25302	407.62	437.91	416	94	4	1.7		23800	407.75	436.94	392	95		3						438	49	29
16:16:10	40.54470	105.8715	24817	409.04	437.82	422	94	4	1.7		23400	409.06	436.88	398	93	230			80						
16:16:22	40.54286	105.8412	24400	410.42	437.72	425	96	4	1.7		23000	410.56	436.75	405	94				80						
16:16:34	40.54048	105.8111	23997	411.80	437.59	414	102	4	1.7		23000	411.75	436.81	408	89		4								
16:16:46	40.53581	105.7821	23538	413.13	437.32	403	106	4	1.7		22400	412.44	436.44	410	103										
16:16:58	40.52923	105.7536	22986	414.44	436.93	405	107	4	1.7		21900	413.88	436.13	411	103	220									
16:17:10	40.52204	105.7251	22291	415.75	436.51	407	110	4	1.7		20800	415.81	435.38	411	109				100						
16:17:22	40.51416	105.6971	21468	417.03	436.05	424	113	4	3.3		20100	417.19	435.06	411	105		9								
16:17:34	40.50483	105.6690	20716	418.32	435.51	421	118	3	2.7		19600	418.38	434.38	411	115	200		300					407	9	53
16:17:46	40.49351	105.6419	20164	419.56	434.84	411	125	4	3.7		19200	418.81	434.00	409	126		11		105						
16:17:58	40.48043	105.6181	19750	420.66	434.06	408	128	4	3.7		19100	420.00	433.25	407	123										
16:18:10	40.46617	105.5954	19516	421.71	433.22	372	133	4	3.7		19100	421.50	431.88	404	130										
16:18:22	40.45189	105.5754	19631	422.64	432.38	370	134	4	3.7		19100	422.44	431.13	400	129										
16:18:34	40.43771	105.5567	19709	423.50	431.53	379	135	4	3.7		19100	423.44	430.38	397	128							8 nm early			
16:18:46	40.42309	105.5385	19722	424.35	430.66	367	137	4	3.8		19100	423.75	429.88	393	142										







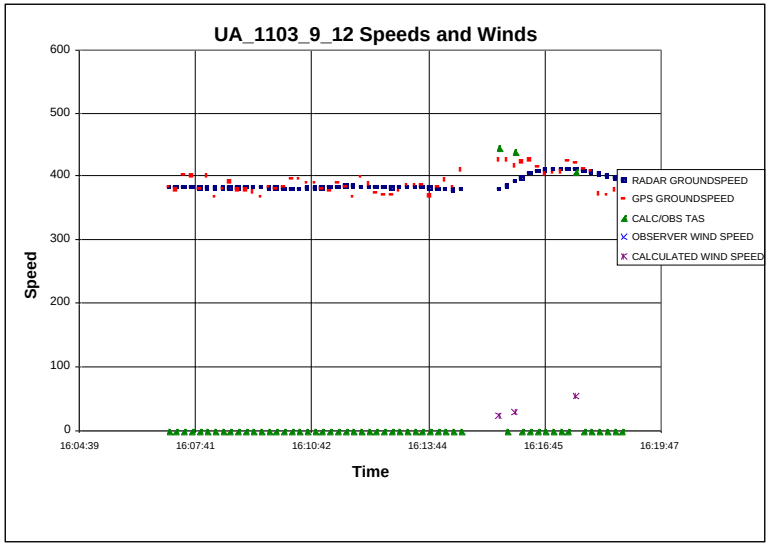
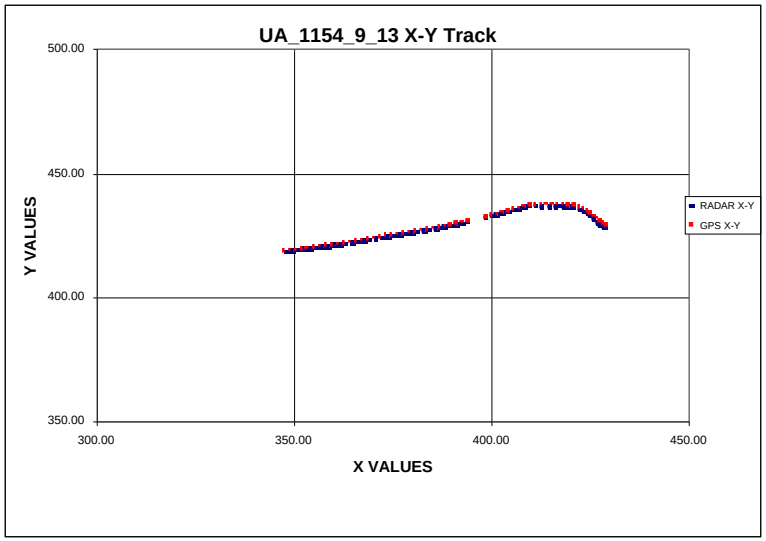
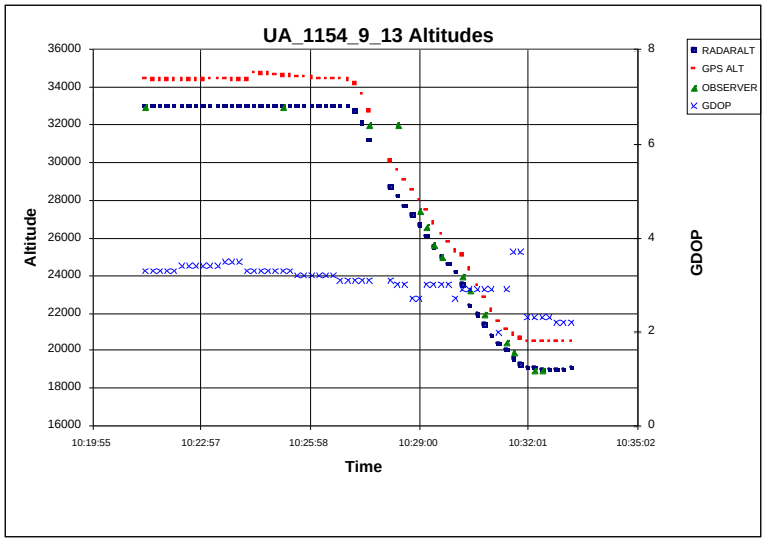


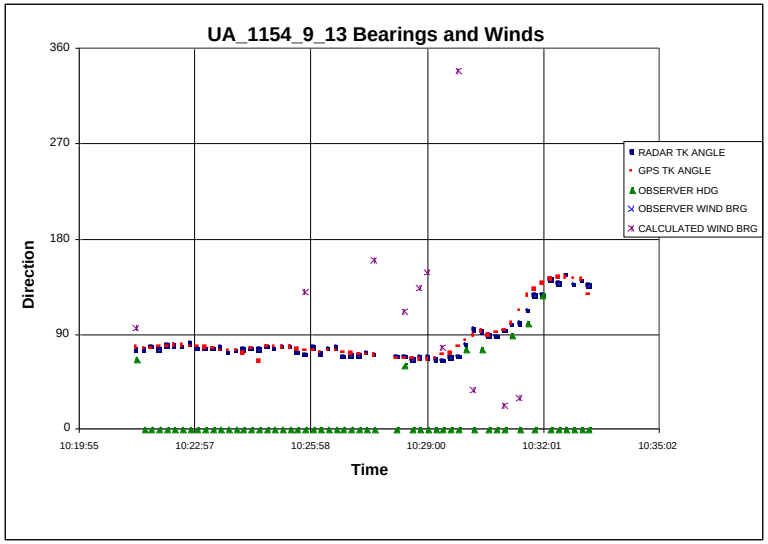
Figure A.22 Graphic Results for Case UA_1103_9_12

Table A.23 Tabular Results for Case UA_1154_9_13

UA_1154_9_13	|<---			GPS	DATA				---\>|	<---	RADAR	DATA		---\>|	<---				OBSERVER	DATA				---\>|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
10:21:24	40.22702	107.2164	34440	347.35	418.83	456	77	4	3.3	33000	348.19	418.50	460	75	330	-13	315	67			t/d wt 148.0	491	95	36
10:21:36	40.23333	107.1829	34430	348.90	419.20	456	76	4	3.3	33000	349.63	418.88	460	75										
10:21:48	40.23967	107.1506	34415	350.38	419.56	482	76	4	3.3	33000	351.19	419.19	460	78										
10:22:00	40.24630	107.1167	34409	351.94	419.95	476	78	4	3.3	33000	352.75	419.63	460	75										
10:22:12	40.25194	107.0850	34405	353.40	420.28	462	78	4	3.3	33000	354.19	419.88	460	79										
10:22:24	40.25745	107.0515	34403	354.95	420.60	460	79	4	3.4	33000	355.75	420.19	460	79										
10:22:36	40.26268	107.0186	34403	356.46	420.90	476	79	4	3.4	33000	357.38	420.56	460	78							got clrnc 1 40 e ekr			
10:22:48	40.26772	106.9845	34420	358.03	421.19	465	78	4	3.4	33000	358.88	420.75	461	81										
10:23:00	40.27288	106.9521	34439	359.51	421.50	467	78	4	3.4	33000	360.31	421.19	462	76										
10:23:12	40.27856	106.9184	34457	361.06	421.83	471	77	4	3.4	33000	361.88	421.56	462	76										
10:23:24	40.28427	106.8851	34468	362.59	422.16	468	76	4	3.4	33000	363.13	421.88	463	76							t/d 78 e ekr			
10:23:36	40.29081	106.8513	34454	364.16	422.55	452	74	4	3.5	33000	364.81	422.25	463	77										
10:23:48	40.29785	106.8193	34436	365.62	422.96	466	74	4	3.5	33000	366.31	422.75	463	73										
10:24:00	40.30523	106.7874	34421	367.09	423.40	476	74	4	3.5	33000	367.81	423.19	463	74										
10:24:12	40.31293	106.7542	34413	368.61	423.85	492	72	4	3.3	33000	369.31	423.56	464	75										
10:24:24	40.32183	106.7205	34787	370.16	424.39	466	76	4	3.3	33000	370.81	423.94	464	76										
10:24:36	40.32812	106.6884	34754	371.64	424.76	519	64	4	3.3	33000	372.44	424.38	464	75										
10:24:48	40.33609	106.6546	34709	373.19	425.23	463	78	4	3.3	33000	374.00	424.69	464	78										
10:25:00	40.34007	106.6210	34668	374.73	425.47	455	78	4	3.3	33000	375.50	425.06	465	76										
10:25:12	40.34554	106.5883	34645	376.23	425.79	467	77	4	3.3	33000	377.00	425.38	465	78	330									
10:25:24	40.35126	106.5551	34613	377.75	426.14	465	77	4	3.3	33000	378.56	425.69	466	78										
10:25:36	40.35732	106.5220	34579	379.27	426.50	470	75	4	3.2	33000	379.94	426.19	466	73										
10:25:48	40.36396	106.4896	34557	380.76	426.90	472	74	4	3.2	33000	381.38	426.69	467	71								495	129	38
10:26:00	40.37110	106.4565	34519	382.28	427.32	469	74	4	3.2	33000	383.06	427.00	467	77										
10:26:12	40.37833	106.4239	34483	383.77	427.76	486	73	4	3.2	33000	384.44	427.50	468	72										
10:26:24	40.38569	106.3918	34479	385.25	428.20	467	74	4	3.2	33000	386.13	427.88	468	76										
10:26:36	40.39305	106.3585	34472	386.77	428.64	460	74	4	3.2	33000	387.50	428.19	469	77										
10:26:48	40.40059	106.3251	34461	388.30	429.10	471	73	4	3.1	33000	388.19	428.50	469	69										
10:27:00	40.40808	106.2933	34422	389.76	429.55	462	72	4	3.1	33000	389.63	429.00	469	70										
10:27:12	40.41602	106.2609	34195	391.24	430.03	466	71	4	3.1	32700	391.13	429.56	469	70			320							
10:27:24	40.42423	106.2287	33604	392.72	430.52	467	71	4	3.1	32100	392.63	430.00	468	73										
10:27:36	40.43251	106.1975	32709	394.15	431.02	485	70	4	3.1	31200	394.06	430.50	468	71	320							490	160	68
10:28:12	40.46085	106.0995	30096	398.63	432.74	468	67	4	3.1	28700	398.56	432.31	468	69							clrnc 2			
10:28:24	40.47080	106.0678	29576	400.08	433.34	453	67	4	3.0	28200	400.06	432.88	468	69	320		310	60				490	111	49
10:28:36	40.48037	106.0378	29090	401.45	433.92	456	67	4	3.0	27700	401.38	433.50	468	66			310							
10:28:48	40.49052	106.0062	28551	402.89	434.54	462	66	3	2.7	27200	402.81	434.06	468	68								480	133	43
10:29:00	40.50057	105.9756	28032	404.29	435.15	468	66	3	2.7	26700	404.38	434.69	468	68	275	0						475	148	40
10:29:12	40.51055	105.9453	27483	405.67	435.75	450	67	4	3.0	26100	405.69	435.31	467	66	266		315							
10:29:24	40.52027	105.9150	26771	407.06	436.34	438	71	4	3.0	25500	407.00	435.94	467	65	257							463	77	25
10:29:36	40.52833	105.8852	26230	408.42	436.84	437	72	4	3.0	25000	408.38	436.44	466	68	250									
10:29:48	40.53495	105.8559	25768	409.75	437.24	448	78	4	3.0	24600	409.69	436.94	465	69			315					443	339	52
10:30:00	40.53940	105.8241	25334	411.21	437.52	429	84	3	2.7	24200	411.19	437.06	463	80				75						
10:30:12	40.54144	105.7936	25088	412.60	437.65	416	89	4	2.9	23500	412.50	436.81	461	94	240		312					435	37	29
10:30:24	40.54170	105.7628	24381	414.01	437.68	407	92	4	2.9	22400	414.69	436.75	457	92	232			76						
10:30:36	40.54120	105.7328	23469	415.38	437.66	421	89	4	2.9	21900	416.06	436.81	453	89			310							
10:30:48	40.54120	105.7030	22803	416.75	437.67	421	91	4	2.9	21400	417.44	436.88	448	88	220									
10:31:00	40.54037	105.6723	22155	418.15	437.64	409	93	4	2.9	20800	418.19	436.81	443	93			310					430	23	51
10:31:12	40.53848	105.6415	21554	419.56	437.53	410	100	4	2.0	20400	419.38	436.56	438	99				90						
10:31:24	40.53399	105.6133	21137	420.85	437.28	407	112	4	2.9	20100	420.69	436.31	433	100	205							426	29	80
10:31:36	40.52550	105.5856	20849	422.12	436.78	385	126	3	3.7	19600	422.50	435.38	427	112	199		312	100						
10:31:48	40.51329	105.5633	20669	423.15	436.06	403	132	3	3.7	19300	423.44	434.50	421	126			310							
10:32:00	40.49896	105.5411	20502	424.18	435.21	413	138	3	2.3	19100	424.50	433.69	416	127				126						
10:32:12	40.48213	105.5211	20501	425.11	434.21	402	141	3	2.3	19100	424.81	432.94	410	141	190									
10:32:24	40.46450	105.5028	20500	425.95	433.16	387	143	3	2.3	19000	425.75	431.94	406	138	190						tomsn -8			
10:32:36	40.44655	105.4855	20501	426.76	432.10	378	143	3	2.3	19000	426.69	430.38	401	146			310							
10:32:48	40.42922	105.4688	20501	427.53	431.07	373	142	3	2.2	19000	427.56	429.56	397	137										
10:33:00	40.41371	105.4530	20501	428.27	430.14	349	141	3	2.2	19000	428.31	428.63	393	140										
10:33:12	40.39835	105.4362	20502	429.05	429.23	335	127	3	2.2	19100	428.75	428.19	389	136										







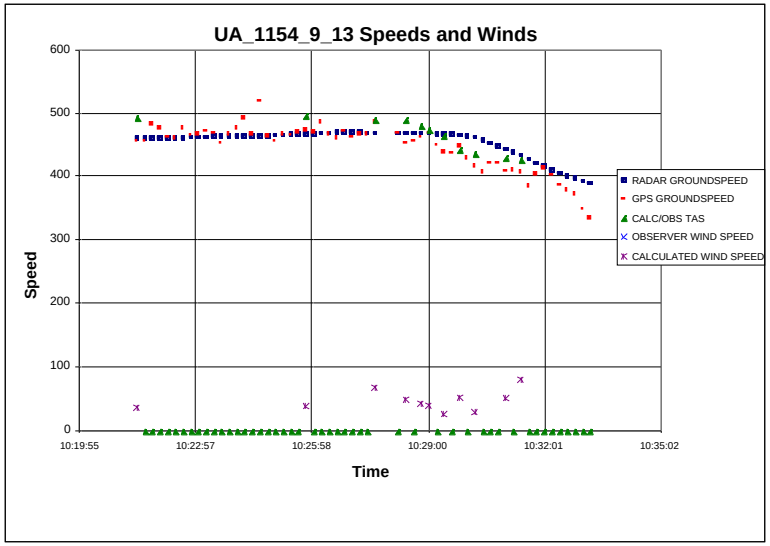
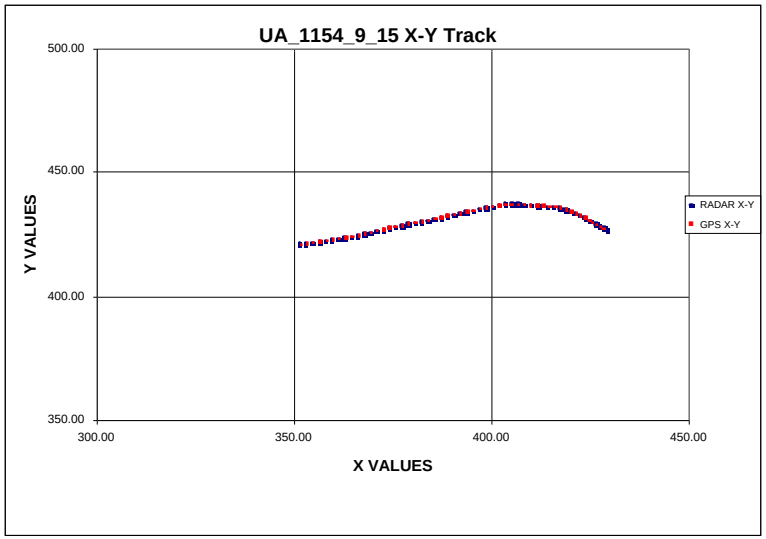
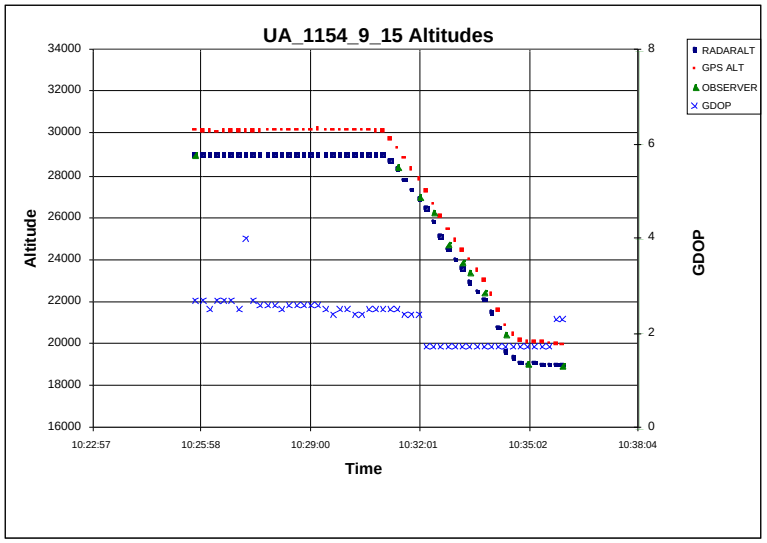


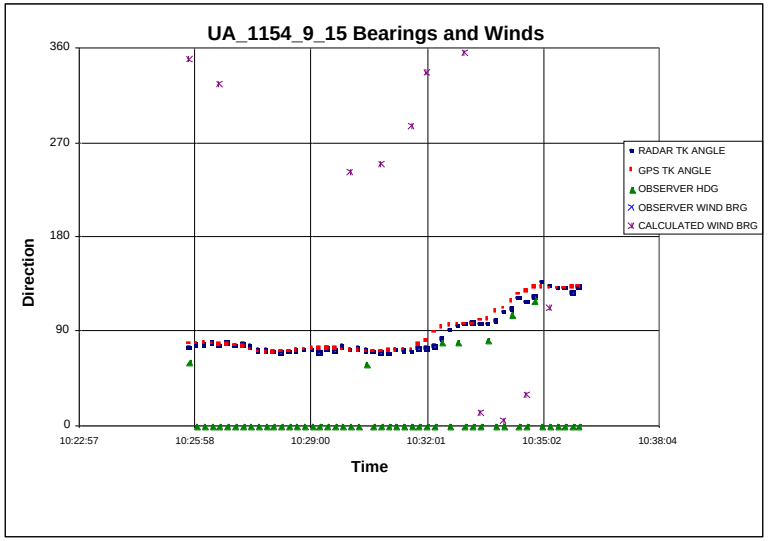
Figure A.23 Graphic Results for Case UA_1154_9_13

Table A.24 Tabular Results for Case UA_1154_9_15

UA_1154_9_15	|<---			GPS	DATA				---\>|	<---	RADAR	DATA		---\>|	<---				OBSERVER	DATA				---\>|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
10:25:48	40.26303	107.1178	30155	351.90	420.95	501	78	4	2.7	29000	351.63	421.00	508	74	290	-7	311	61			temp is TAT	506	350	51
10:26:00	40.26907	107.0826	30121	353.52	421.30	503	78	4	2.7	29000	353.13	421.31	505	77										
10:26:12	40.27482	107.0476	30110	355.13	421.64	500	79	3	2.5	29000	354.75	421.69	503	77										
10:26:24	40.28075	107.0103	30092	356.85	421.98	507	78	4	2.7	29000	356.56	422.00	500	79										
10:26:36	40.28650	106.9749	30093	358.48	422.32	500	77	4	2.7	29000	358.19	422.44	498	76								486	326	45
10:26:48	40.29281	106.9395	30099	360.10	422.69	506	77	4	2.7	29000	359.69	422.69	496	79										
10:27:00	40.29932	106.9044	30105	361.72	423.07	505	76	3	2.5	29000	361.31	423.13	495	76										
10:27:12	40.30611	106.8694	30114	363.32	423.46	509	75	3	4.0	29000	363.00	423.50	494	77							83 miles e of ekr 320kt descent			
10:27:24	40.31415	106.8330	30107	365.00	423.94	505	72	4	2.7	29000	364.56	423.94	493	75										
10:27:36	40.32329	106.7987	30127	366.57	424.49	521	70	4	2.6	29000	366.25	424.56	492	71										
10:27:48	40.33291	106.7647	30150	368.14	425.06	500	69	4	2.6	29000	367.88	425.13	492	71										
10:28:00	40.34316	106.7300	30180	369.73	425.66	525	69	4	2.6	29000	369.44	425.69	492	70										
10:28:12	40.35320	106.6954	30170	371.32	426.26	508	70	3	2.5	29000	371.00	426.31	492	69										
10:28:24	40.36331	106.6597	30170	372.96	426.87	515	70	4	2.6	29000	372.63	426.88	492	70										
10:28:36	40.37272	106.6254	30177	374.53	427.43	511	71	4	2.6	29000	374.25	427.44	492	71										
10:28:48	40.38208	106.5905	30173	376.13	427.98	497	72	4	2.6	29000	375.81	427.94	493	72										
10:29:00	40.39103	106.5557	30158	377.73	428.52	504	73	4	2.6	29000	377.63	428.50	494	72										
10:29:12	40.39985	106.5193	30187	379.40	429.04	524	73	4	2.6	29000	379.13	429.13	495	69										
10:29:24	40.40856	106.4826	30184	381.08	429.56	516	73	3	2.5	29000	380.88	429.63	496	73										
10:29:36	40.41693	106.4471	30156	382.71	430.07	533	73	3	2.4	29000	382.44	430.19	498	71			319							
10:29:48	40.42542	106.4116	30145	384.34	430.58	526	72	4	2.5	29000	384.00	430.56	498	75										
10:30:00	40.43451	106.3752	30165	386.00	431.12	536	71	4	2.5	29000	385.56	431.13	499	72								496	242	40
10:30:12	40.44350	106.3404	30160	387.59	431.67	510	71	3	2.4	29000	387.31	431.63	500	73										
10:30:24	40.45296	106.3051	30148	389.21	432.24	513	70	3	2.4	29000	389.00	432.25	501	71				59						
10:30:36	40.46289	106.2689	30142	390.87	432.84	502	70	4	2.5	29000	390.69	432.88	502	70										
10:30:48	40.47262	106.2336	30118	392.48	433.42	527	70	4	2.5	29000	392.25	433.50	504	69								500	250	27
10:31:00	40.48225	106.1985	30099	394.09	434.01	504	71	4	2.5	29000	393.75	434.13	504	68										
10:31:12	40.49169	106.1626	29758	395.73	434.58	510	71	4	2.5	28700	395.44	434.63	505	72		-2								
10:31:24	40.50068	106.1269	29311	397.36	435.12	519	72	4	2.5	28300	397.06	435.19	505	71	284									
10:31:36	40.50931	106.0918	28827	398.96	435.65	509	72	4	2.4	27800	398.75	435.81	506	70			321					481	286	34
10:31:48	40.51843	106.0568	28324	400.57	436.20	488	77	4	2.4	27300	400.38	436.25	506	73		0								
10:32:00	40.52553	106.0218	27842	402.17	436.63	498	81	4	2.4	26900	402.00	436.75	507	73	270		322					483	336	92
10:32:12	40.53037	105.9863	27290	403.79	436.93	487	89	4	1.7	26400	403.50	437.13	507	75										
10:32:24	40.53221	105.9516	26675	405.38	437.05	487	94	4	1.7	25800	405.19	437.25	506	83	263			80						
10:32:36	40.53061	105.9156	26021	407.02	436.96	481	96	4	1.7	25100	406.88	437.13	505	91										
10:32:48	40.52787	105.8806	25442	408.62	436.81	489	97	4	1.7	24500	408.38	436.94	503	95	247			80						
10:33:00	40.52459	105.8458	24917	410.22	436.63	467	97	4	1.7	24000	410.06	436.69	501	97			320					461	356	44
10:33:12	40.52146	105.8115	24440	411.79	436.45	452	97	4	1.7	23600	411.75	436.44	499	98	239		320							
10:33:24	40.51930	105.7779	24019	413.33	436.33	444	101	4	1.7	22900	414.13	436.19	496	97	234							453	12	79
10:33:36	40.51567	105.7455	23506	414.81	436.12	452	102	4	1.7	22500	415.69	436.00	493	97			318	81						
10:33:48	40.51298	105.7122	23027	416.34	435.98	452	109	4	1.7	22100	417.19	435.69	490	100	225									
10:34:00	40.50493	105.6810	22356	417.77	435.51	450	112	4	1.7	21500	417.81	435.44	486	108			310					432	5	155
10:34:12	40.49579	105.6522	21597	419.09	434.97	464	119	4	1.7	20800	419.06	434.94	482	111				105						
10:34:24	40.48288	105.6228	20869	420.45	434.21	456	125	4	1.7	19600	421.00	433.50	477	122	205		320							
10:34:36	40.46887	105.5969	20466	421.64	433.38	436	128	4	1.7	19300	422.25	432.88	473	118								433	29	89
10:34:48	40.45304	105.5713	20171	422.82	432.44	437	132	4	1.7	19100	423.50	432.00	469	123				120						
10:35:00	40.43669	105.5484	20095	423.88	431.47	408	132	4	1.7	19000	423.81	431.38	465	137	191		305							
10:35:12	40.42156	105.5266	20079	424.89	430.58	394	131	4	1.7	19100	424.88	430.44	460	133								400	112	6
10:35:24	40.40694	105.5054	20054	425.87	429.71	398	131	4	1.7	19000	426.44	429.13	456	131							speed discrtion			
10:35:36	40.39228	105.4837	20015	426.88	428.85	401	131	4	1.7	19000	427.38	428.31	451	131										
10:35:48	40.37752	105.4621	19991	427.87	427.97	404	132	3	2.3	19000	428.56	427.50	446	126										
10:35:57	40.36556	105.4452	19949	428.66	427.26	417	133	3	2.3	19000	429.27	426.75	442	132	190									







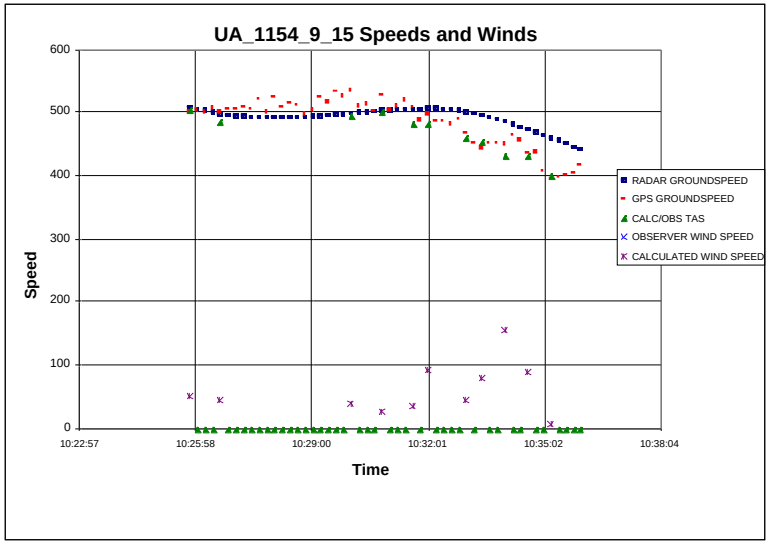
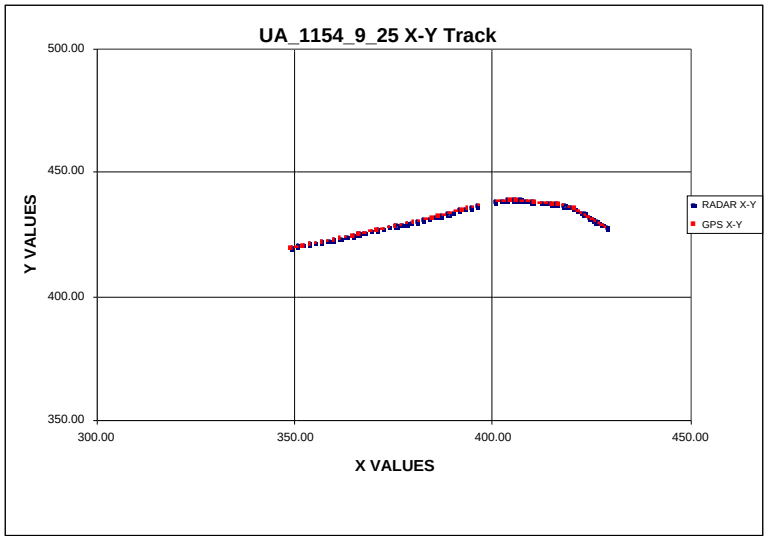
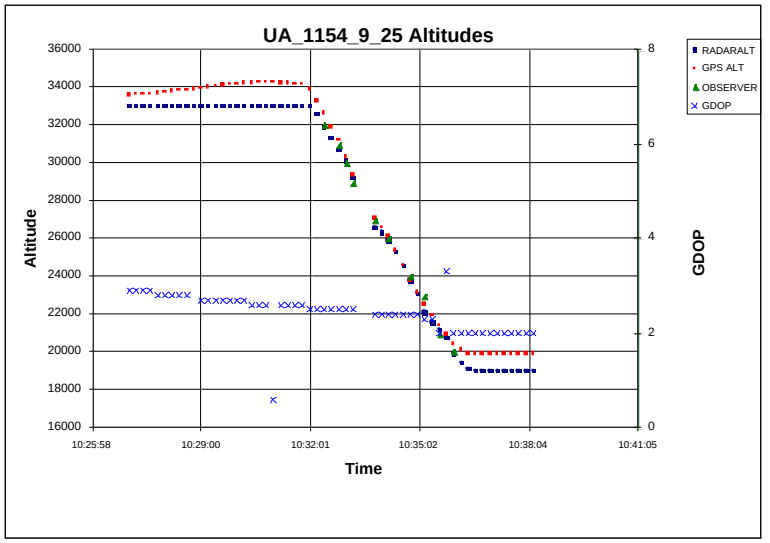


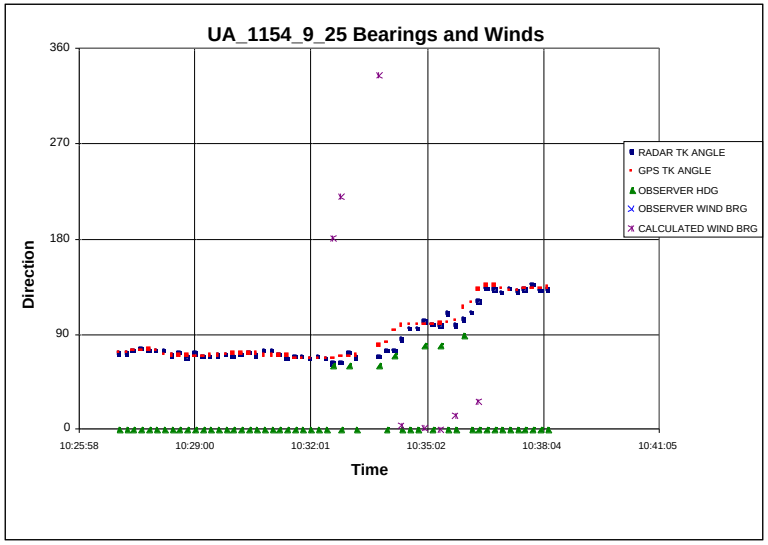
Figure A.24 Graphic Results for Case UA_1154_9_15

Table A.25 Tabular Results for Case UA_1154_9_25

UA_1154_9_25	|<---			GPS	DATA				---\>|	<---	RADAR	DATA		---\>|	<---				OBSERVER	DATA				---\>|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
10:26:59	40.24056	107.1790	33584	349.08	419.63	478	73	4	2.9	33000	349.25	419.69	471	72										
10:27:11	40.24878	107.1448	33606	350.65	420.11	484	73	4	2.9	33000	350.81	420.19	472	72										
10:27:23	40.25651	107.1122	33628	352.15	420.56	491	74	4	2.9	33000	352.38	420.63	472	74								471		
10:27:35	40.26444	107.0773	33650	353.76	421.02	502	74	4	2.9	33000	353.94	421.00	473	76		-18								
10:27:47	40.27155	107.0444	33691	355.28	421.44	497	75	4	2.8	33000	355.44	421.44	473	74										
10:27:59	40.27861	107.0112	33718	356.81	421.86	478	74	4	2.8	33000	357.00	421.88	474	74										
10:28:11	40.28676	106.9763	33764	358.41	422.33	481	71	4	2.8	33000	358.56	422.31	474	74										
10:28:23	40.29565	106.9427	33820	359.95	422.86	496	70	4	2.8	33000	359.94	422.88	474	70										
10:28:35	40.30499	106.9093	33860	361.49	423.41	493	70	4	2.8	33000	361.69	423.38	474	73										
10:28:47	40.31441	106.8757	33908	363.04	423.96	492	70	4	27.0	33000	363.13	424.00	475	68										
10:28:59	40.32390	106.8425	33945	364.56	424.53	491	69	4	2.7	33000	364.81	424.50	475	72										
10:29:11	40.33408	106.8075	34005	366.17	425.14	489	69	4	2.7	33000	366.31	425.13	476	69										
10:29:23	40.34372	106.7748	34056	367.68	425.71	507	70	4	2.7	33000	367.81	425.69	477	69										
10:29:35	40.35342	106.7411	34106	369.22	426.28	495	70	4	2.7	33000	369.44	426.25	478	70										
10:29:47	40.36261	106.7079	34148	370.75	426.83	491	71	4	2.7	33000	370.94	426.75	479	71										
10:29:59	40.37179	106.6732	34180	372.34	427.37	516	72	4	2.7	33000	372.50	427.38	480	69										
10:30:11	40.38034	106.6397	34208	373.88	427.89	492	72	4	2.7	33000	374.06	427.88	481	71										
10:30:23	40.38882	106.6058	34224	375.43	428.39	482	72	4	2.6	33000	375.63	428.31	482	73										
10:30:35	40.39745	106.5715	34246	377.00	428.91	495	72	4	2.6	33000	377.19	428.94	483	70										
10:30:47	40.40637	106.5366	34256	378.61	429.44	498	70	4	2.6	33000	378.63	429.31	484	74										
10:30:59	40.41547	106.5036	34246	380.12	429.98	497	70	4	0.6	33000	379.50	429.56	484	74										
10:31:11	40.42486	106.4702	34232	381.65	430.55	499	70	4	2.6	33000	381.06	430.13	485	71										
10:31:23	40.43469	106.4361	34208	383.21	431.13	484	70	4	2.6	33000	382.44	430.75	485	67										
10:31:35	40.44454	106.4028	34182	384.74	431.72	508	67	4	2.6	33000	384.13	431.38	485	69										
10:31:47	40.45543	106.3689	34182	386.29	432.38	498	67	4	2.6	33000	385.75	432.00	485	69										
10:31:59	40.46643	106.3354	33905	387.83	433.04	483	67	4	2.5	33000	387.13	432.63	485	67										
10:32:11	40.47693	106.3032	33269	389.29	433.67	483	67	4	2.5	32600	388.81	433.25	486	69										
10:32:23	40.48720	106.2714	32613	390.75	434.29	485	67	4	2.5	31900	390.13	433.81	486	67	320		300							
10:32:35	40.49784	106.2386	31910	392.25	434.94	476	67	4	2.5	31300	391.63	434.69	486	62		-15		60				464	181	31
10:32:47	40.50796	106.2064	31213	393.72	435.55	492	69	4	2.5	30700	393.00	435.38	486	63	310	-12	300					460	220	36
10:32:59	40.51777	106.1731	30301	395.25	436.14	478	69	4	2.5	30100	394.69	435.75	486	73	300			60						
10:33:11	40.52740	106.1404	29373	396.74	436.72	497	70	4	2.5	29200	396.19	436.44	486	68	290		310							
10:33:47	40.55350	106.0401	27029	401.32	438.31	484	79	4	2.4	26600	400.63	438.06	486	69	270	-1	320	60				471	335	71
10:33:59	40.55835	106.0066	26584	402.85	438.61	467	82	4	2.4	26300	402.31	438.50	486	74										
10:34:11	40.56267	105.9727	26102	404.40	438.87	472	93	4	2.4	25900	403.81	438.94	486	74	260		320	70						
10:34:23	40.56166	105.9397	25353	405.91	438.82	453	98	4	2.4	25300	405.44	438.94	485	85		-1						464	4	136
10:34:35	40.55776	105.9058	24561	407.46	438.60	450	99	4	2.4	24600	406.88	438.69	484	95										
10:34:47	40.55348	105.8719	23806	409.01	438.35	474	99	4	2.4	23800	408.44	438.56	482	95	240		320							
10:34:59	40.54909	105.8386	23141	410.54	438.10	453	99	4	2.4	23100	410.06	438.13	480	102		-2		80				449	1	65
10:35:11	40.54490	105.8060	22538	412.03	437.86	458	99	4	2.3	22100	412.50	437.81	478	99	230		320							
10:35:23	40.54087	105.7732	21952	413.53	437.62	447	100	4	2.3	21600	414.00	437.63	476	98		-4		80				441	0	69
10:35:35	40.53631	105.7407	21438	415.02	437.36	433	101	3	2.0	21200	414.69	437.31	474	109	210	4								
10:35:47	40.53165	105.7095	20966	416.45	437.10	432	103	4	3.3	20800	416.06	437.25	473	98		6	325					443	13	91
10:35:59	40.52673	105.6780	20438	417.90	436.82	432	115	3	2.0	19900	418.13	436.63	470	104	200			90						
10:36:11	40.51682	105.6496	20081	419.20	436.23	438	120	3	2.0	19400	419.50	436.06	467	110			320							
10:36:23	40.50438	105.6228	19891	420.43	435.50	430	132	3	2.0	19100	420.63	435.25	464	121		8						432	26	230
10:36:35	40.48858	105.6011	19891	421.44	434.56	418	136	3	2.0	19000	421.19	434.63	461	133										
10:36:47	40.47224	105.5813	19891	422.35	433.59	387	136	3	2.0	19000	422.19	433.75	457	132										
10:36:59	40.45699	105.5618	19891	423.26	432.68	361	133	3	2.0	19000	423.06	433.06	453	129										
10:37:11	40.44320	105.5423	19891	424.16	431.87	364	131	3	2.0	19000	424.44	431.69	447	133										
10:37:23	40.42972	105.5224	19890	425.08	431.07	348	131	3	2.0	19000	425.31	431.00	441	130										
10:37:35	40.41647	105.5034	19891	425.96	430.29	364	133	3	2.0	19000	426.19	430.19	433	132										
10:37:47	40.40289	105.4846	19891	426.83	429.48	353	133	3	2.0	19000	426.63	429.69	425	137										
10:37:59	40.38971	105.4667	19891	427.65	428.70	347	133	3	2.0	19000	427.56	428.94	417	131										
10:38:11	40.37657	105.4490	19891	428.48	427.92	350	134	3	2.0	19000	428.81	427.81	409	132										







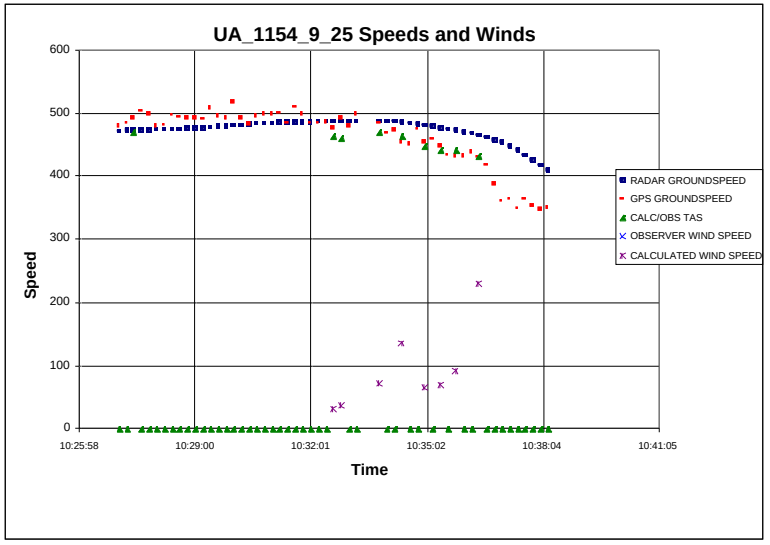
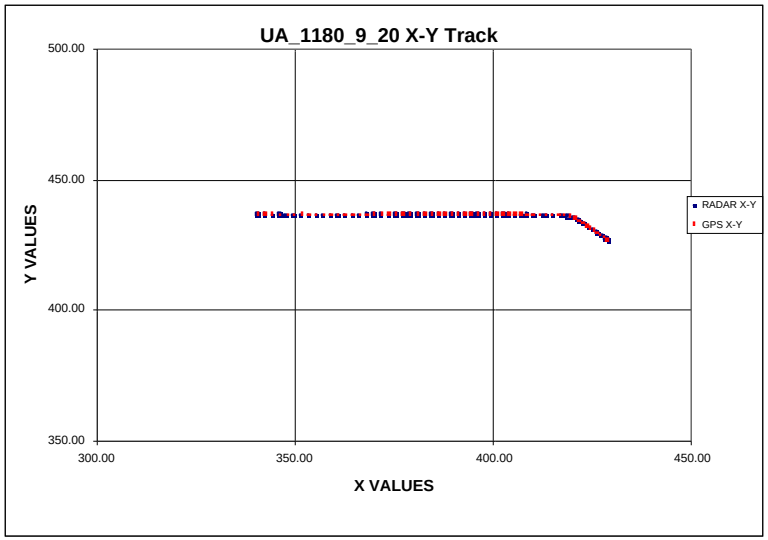
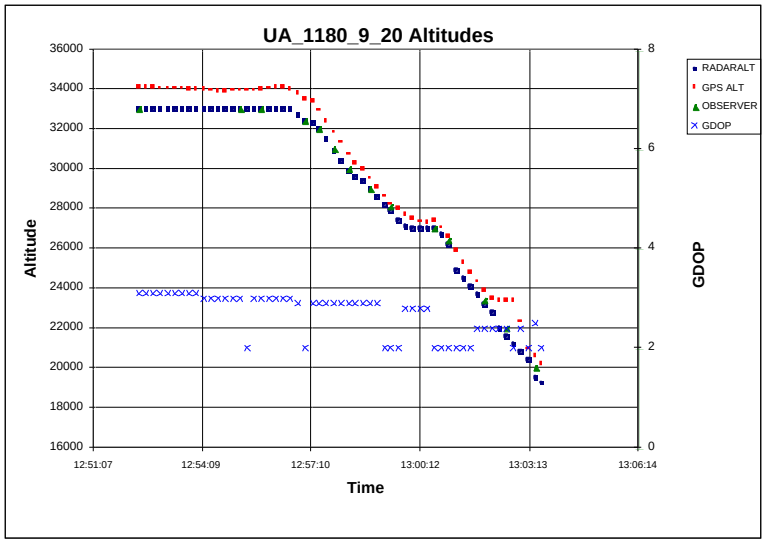


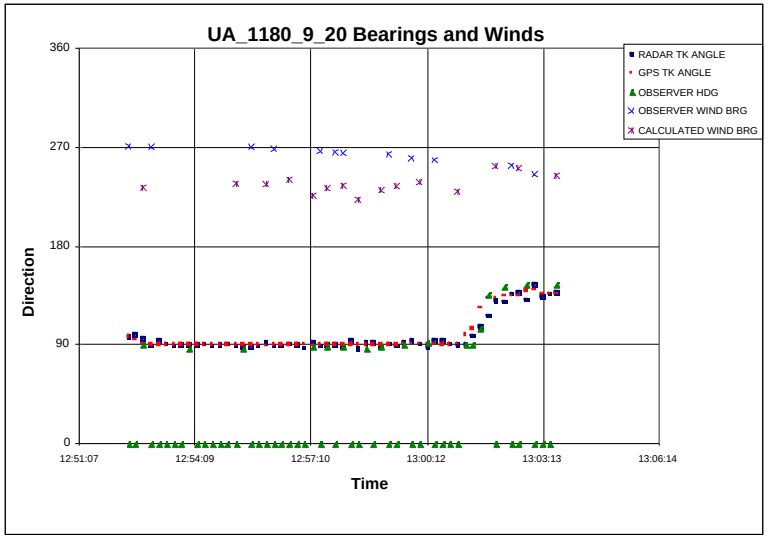
Table A.25 Graphic Results for Case UA_1154_9_25

Table A.26 Tabular Results for Case UA_1180_9_20

UA_1180_9_20	|<---			GPS	DATA					---> |	<---	RADAR	DATA			---> |	<---				OBSERVER	DATA				---> |
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP		R_ALT	R_X	R_Y	R_GS	R_TRK		OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
12:52:23	40.52579	107.3619	34105	340.85	436.81	556	97	4	3.1		33000	340.56	436.81	554	97		330		274		271	104	expext clearance	452		
12:52:35	40.52255	107.3216	34098	342.69	436.60	556	94	4	3.1		33000	342.38	436.50	554	99											
12:52:47	40.52076	107.2827	34078	344.47	436.47	550	91	4	3.1		33000	344.25	436.38	554	95					90.2				453	233	131
12:52:59	40.52064	107.2413	34049	346.37	436.45	560	90	4	3.1		33000	346.13	436.50	555	89						270	106				
12:53:12	40.52088	107.1978	34049	348.36	436.44	547	90	4	3.1		33000	347.75	436.38	555	93											
12:53:23	40.52097	107.1613	34046	350.03	436.43	545	90	4	3.1		33000	349.69	436.38	554	91											
12:53:35	40.52216	107.1217	34028	351.84	436.49	547	90	4	3.1		33000	351.44	436.44	553	89											
12:53:47	40.52119	107.0818	34010	353.66	436.42	554	90	4	3.1		33000	353.44	436.44	553	90											
12:53:59	40.52130	107.0415	34008	355.51	436.41	549	90	4	3.1		33000	355.50	436.44	553	90					86.8						
12:54:12	40.52136	107.0003	33978	357.39	436.41	550	90	4	3.0		33000	357.00	436.44	552	90											
12:54:23	40.52152	106.9611	33945	359.19	436.40	547	90	4	3.0		33000	358.94	436.38	552	91											
12:54:35	40.52170	106.9214	33914	361.00	436.40	570	90	4	3.0		33000	360.75	436.44	551	89											
12:54:47	40.52197	106.8822	33907	362.80	436.41	547	90	4	3.0		33000	362.63	436.44	550	90											
12:54:59	40.52232	106.8412	33933	364.67	436.43	536	90	4	3.0		33000	364.44	436.38	550	91											
12:55:12	40.52267	106.8000	33952	366.56	436.44	545	90	4	3.0		33000	366.13	436.44	549	89		330							449	237	119
12:55:23	40.52298	106.7623	33961	368.28	436.45	555	90	4	2.0		33000	368.06	436.50	549	88					86.3						
12:55:35	40.52321	106.7226	33971	370.10	436.46	547	90	4	3.0		33000	369.94	436.56	549	88						270	107				
12:55:47	40.52345	106.6813	33991	371.99	436.47	554	90	4	3.0		33000	371.69	436.56	549	89		330									
12:55:59	40.52365	106.6418	34040	373.80	436.48	542	89	4	3.0		33000	373.63	436.44	548	92									449	236	115
12:56:12	40.52387	106.6000	34092	375.71	436.49	561	90	4	3.0		33000	375.31	436.50	548	89						268	104				
12:56:23	40.52397	106.5622	34117	377.44	436.49	552	90	4	3.0		33000	377.31	436.56	548	89											
12:56:35	40.52408	106.5231	34025	379.23	436.50	548	90	4	3.0		33000	378.88	436.50	548	91									449	240	118
12:56:47	40.52418	106.4829	33791	381.07	436.50	521	90	4	2.9		32700	380.81	436.50	548	90											
12:56:59	40.52427	106.4436	33517	382.87	436.50	547	91	4	2.0		32400	382.63	436.63	547	87		324									
12:57:12	40.52394	106.4027	33418	384.74	436.49	510	89	4	2.9		32300	384.38	436.50	547	92					87.7				439	226	104
12:57:23	40.52428	106.3675	32937	386.35	436.51	492	90	4	2.9		32000	386.13	436.56	546	89		320				267	99				
12:57:35	40.52434	106.3310	32416	388.02	436.52	495	90	4	2.9		31500	387.75	436.56	545	90					88				417	232	106
12:57:47	40.52421	106.2938	31845	389.72	436.51	496	90	4	2.9		30900	389.56	436.56	544	90		310				266	100				
12:57:59	40.52398	106.2576	31355	391.38	436.50	500	90	4	2.9		30400	391.25	436.63	542	88					88.6	265	98		410	235	117
12:58:12	40.52393	106.2205	30769	393.07	436.50	494	90	4	2.9		29900	392.88	436.50	540	93		300									
12:58:23	40.52390	106.1860	30303	394.66	436.50	463	90	4	2.9		29600	394.44	436.69	537	86									406	222	92
12:58:35	40.52373	106.1516	29977	396.23	436.50	485	90	4	2.9		29400	396.06	436.56	534	92					86.4						
12:58:47	40.52357	106.1161	29526	397.85	436.50	473	90	4	2.9		29000	397.69	436.50	530	92		290									
12:58:59	40.52339	106.0819	29087	399.42	436.49	470	90	4	2.9		28600	399.31	436.63	526	88					89.3				392	230	109
12:59:12	40.52323	106.0465	28635	401.04	436.49	472	90	4	2.0		28200	400.81	436.56	522	91						264	86				
12:59:23	40.52308	106.0132	28271	402.56	436.49	472	90	4	2.0		27900	402.56	436.63	517	89		281							384	234	115
12:59:35	40.52293	105.9789	27985	404.13	436.49	461	91	4	2.0		27400	403.75	436.56	512	92					89.8						
12:59:47	40.52257	105.9451	27725	405.68	436.48	463	91	4	2.8		27100	405.50	436.44	506	93						260	88				
12:59:59	40.52206	105.9114	27478	407.22	436.46	469	91	4	2.8		27000	407.13	436.44	501	91									376	238	117
13:00:12	40.52135	105.8772	27335	408.78	436.42	448	91	4	2.8		27000	408.50	436.50	495	88					92.2						
13:00:23	40.52067	105.8443	27281	410.29	436.39	462	91	4	2.8		27000	410.19	436.38	490	93						258	88				
13:00:35	40.52016	105.8111	27409	411.81	436.37	458	90	4	2.0		27000	412.63	436.25	485	93		270									
13:00:47	40.51980	105.7757	27026	413.43	436.36	469	90	4	2.0		26700	413.38	436.25	481	91								leveled briefly			
13:00:59	40.51942	105.7414	26596	415.00	436.35	464	91	4	2.0		26200	414.88	436.25	477	90		264							383	229	120
13:01:12	40.51930	105.7028	25896	416.77	436.36	343	99	4	2.0		24900	417.25	436.25	474	90					90.5						
13:01:23	40.51655	105.6758	25322	418.00	436.20	440	104	4	2.0		24500	418.75	435.94	471	98					90.5						
13:01:35	40.50954	105.6443	24814	419.45	435.80	419	123	4	2.0		24100	420.13	435.44	468	106					104.4						
13:01:47	40.49742	105.6182	24335	420.65	435.08	416	132	3	2.4		23700	421.31	434.75	466	116					135						
13:01:59	40.48176	105.5957	23883	421.69	434.15	408	132	3	2.4		23200	421.69	434.06	462	130		234							368	252	100
13:02:12	40.46480	105.5725	23487	422.76	433.15	403	134	3	2.4		22800	422.69	433.25	458	129					143						
13:02:23	40.44962	105.5525	23412	423.69	432.25	402	134	3	2.4		22000	424.06	431.69	452	136						253	60				
13:02:35	40.43378	105.5318	23413	424.64	431.31	397	134	3	2.4		21600	424.94	430.75	446	137		220							359	250	134
13:02:47	40.41917	105.5127	23410	425.53	430.44	360	139	4	2.0		21200	425.94	429.94	439	131					145						
13:02:59	40.40335	105.4951	22336	426.34	429.50	349	140	3	2.4		20800	426.31	429.31	432	144						245	60				
13:03:12	40.38726	105.4780	20969	427.14	428.55	375	136	4	2.0		20400	427.19	428.63	425	133											
13:03:23	40.37279	105.4598	20595	427.98	427.69	367	136	3	2.5		19500	428.38	427.31	417	136		200									
13:03:34	40.35916	105.4431	20202	428.76	426.88	355	136	0	2.0		19241	429.08	426.56	410	137					144.1				336	244	114







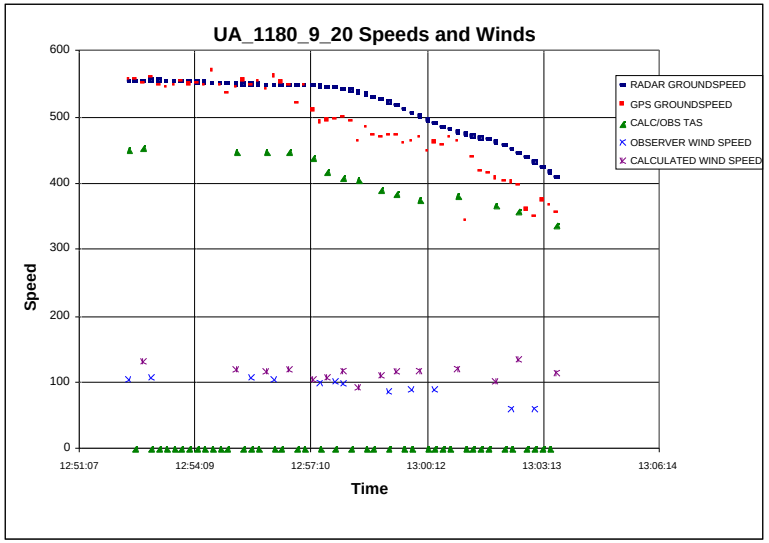
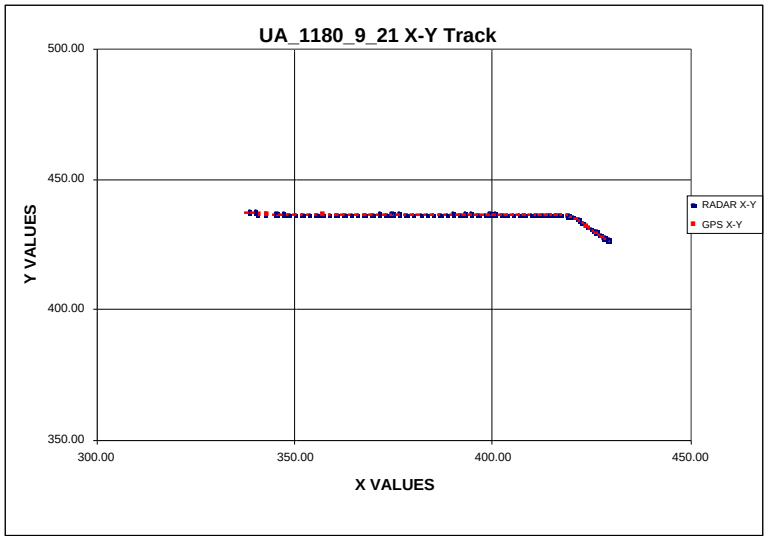
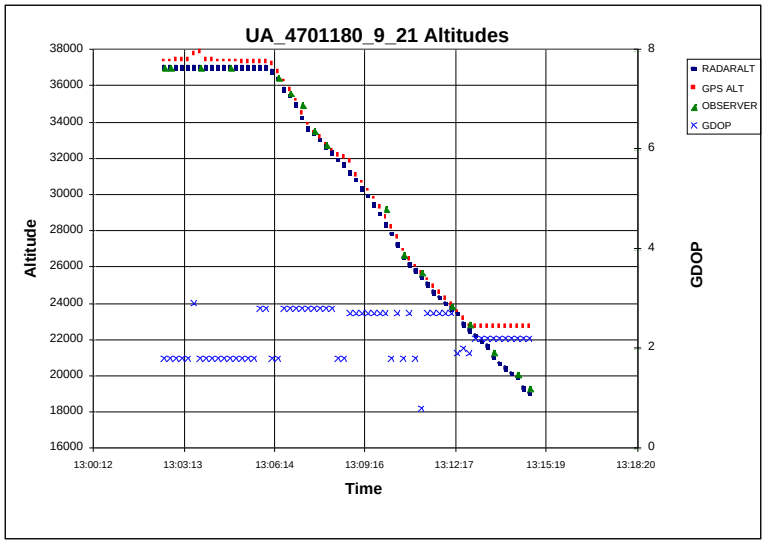


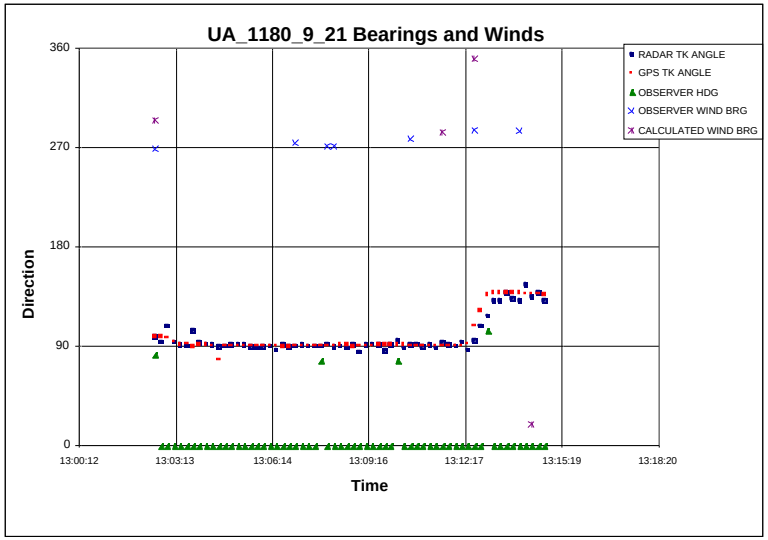
Figure A.26 Graphic Results for Case UA_1180_9_20

Table A.27 Tabular Results for Case UA_1180_9_21

UA_1180_9_21	|<---			GPS	DATA					---\>|	<---	RADAR	DATA			---\>|	<---				OBSERVER	DATA				---\>|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
13:02:33	40.53145	107.4263	37402	337.91	437.18	523	98	4	1.8	37000	338.69	437.31	518	98	370	-27	242	83	269	87	meal time	438	295	90
13:02:45	40.52795	107.3892	37419	339.61	436.95	524	98	4	1.8	37000	340.38	437.25	517	94	370									
13:02:57	40.52430	107.3502	37441	341.38	436.71	528	97	4	1.8	37000	340.69	436.44	516	108							5 to che			
13:03:09	40.52146	107.3151	37459	342.99	436.52	527	94	4	1.8	37000	342.88	436.81	516	94										
13:03:21	40.51992	107.2759	37470	344.78	436.42	509	91	4	1.8	37000	345.56	436.81	516	91							23 w frog 270 ua760			
13:03:33	40.51946	107.2371	37784	346.56	436.37	535	92	4	2.9	37000	347.44	436.81	516	90										
13:03:45	40.51927	107.1988	37911	348.31	436.35	519	89	4	1.8	37000	348.63	436.31	516	104	370		241							
13:03:57	40.51989	107.1602	37467	350.08	436.37	517	91	4	1.8	37000	350.25	436.38	515	93										
13:04:09	40.51984	107.1234	37455	351.76	436.35	540	91	4	1.8	37000	352.00	436.31	514	92										
13:04:21	40.51984	107.0857	37420	353.48	436.34	529	90	4	1.8	37000	353.88	436.31	513	91										
13:04:33	40.52066	107.0471	37405	355.25	436.38	539	78	4	1.8	37000	355.69	436.38	512	89							370 40 w frg 250 or 270			
13:04:45	40.52239	107.0078	37401	357.05	436.47	537	90	4	1.8	37000	357.19	436.38	510	90	370									
13:04:57	40.52003	106.9679	37378	358.88	436.32	520	90	4	1.8	37000	359.00	436.31	510	91							nrml 250 on dsct			
13:05:09	40.52014	106.9318	37363	360.53	436.32	555	90	4	1.8	37000	360.75	436.25	510	92										
13:05:21	40.52029	106.8939	37343	362.26	436.31	502	90	4	1.8	37000	362.69	436.25	509	91										
13:05:33	40.52046	106.8553	37350	364.03	436.32	501	90	4	1.8	37000	364.31	436.31	509	89										
13:05:45	40.52074	106.8168	37349	365.79	436.33	537	90	4	2.8	37000	366.06	436.38	509	88										
13:05:57	40.52102	106.7767	37322	367.63	436.34	534	90	4	2.8	37000	367.81	436.38	510	89										
13:06:09	40.52126	106.7402	37217	369.29	436.35	519	90	4	1.8	36800	369.63	436.38	511	90							hit vnav			
13:06:21	40.52152	106.7021	36814	371.04	436.36	523	90	4	1.8	36400	371.38	436.50	512	87	365						lv fl 370			
13:06:33	40.52184	106.6646	36278	372.75	436.37	521	89	4	2.8	35800	373.19	436.44	514	91			243							
13:06:45	40.52211	106.6261	35795	374.52	436.38	523	89	4	2.8	35400	374.75	436.50	515	89	356		250							
13:06:57	40.52247	106.5867	35178	376.32	436.40	527	90	4	2.8	34900	376.63	436.50	516	90					274	91				
13:07:09	40.52278	106.5511	34455	377.95	436.42	518	90	4	2.8	34200	378.31	436.44	517	91	350		251							
13:07:21	40.52293	106.5135	33865	379.67	436.43	506	90	4	2.8	33600	380.13	436.44	518	90										
13:07:33	40.52298	106.4756	33462	381.40	436.43	508	90	4	2.8	33300	381.94	436.44	519	90	335		258							
13:07:45	40.52304	106.4382	33142	383.12	436.43	504	90	4	2.8	33000	383.50	436.44	519	90				77						
13:07:57	40.52308	106.4001	32788	384.85	436.44	499	90	4	2.8	32600	385.13	436.38	519	92	328				272	90				
13:08:09	40.52304	106.3650	32472	386.46	436.43	500	90	4	2.8	32300	386.88	436.44	519	89			253		272	90				
13:08:21	40.52289	106.3294	32187	388.09	436.43	485	91	4	1.8	31900	388.50	436.44	518	90										
13:08:33	40.52245	106.2940	32060	389.71	436.40	497	91	4	1.8	31600	390.19	436.50	517	88										
13:08:45	40.52210	106.2584	31851	391.34	436.39	481	89	4	2.7	31200	391.81	436.44	516	91							2nd clr to xs tmsn at 190/250 and m			
13:08:57	40.52252	106.2230	31074	392.96	436.42	472	90	4	2.7	30800	393.13	436.63	514	85							spdd brake 50			
13:09:09	40.52239	106.1907	30679	394.44	436.41	454	90	4	2.7	30300	394.75	436.50	511	91							full spd brake			
13:09:21	40.52223	106.1570	30255	395.98	436.41	455	90	4	2.7	29900	396.44	436.44	508	92							full			
13:09:33	40.52201	106.1237	29809	397.51	436.40	457	91	4	2.7	29400	398.06	436.44	505	91										
13:09:45	40.52159	106.0911	29334	399.00	436.38	454	91	4	2.7	28900	399.31	436.56	501	86							too high			
13:09:57	40.52096	106.0581	28766	400.51	436.35	438	91	4	2.7	28300	400.63	436.50	497	91	292		248							
13:10:09	40.52037	106.0268	28237	401.94	436.32	444	91	4	1.8	27800	402.31	436.31	492	95				77						
13:10:21	40.51980	105.9954	27685	403.38	436.30	440	91	4	2.7	27200	403.63	436.44	487	88			250				spd brk off			
13:10:33	40.51937	105.9629	26931	404.86	436.28	446	90	4	1.8	26500	405.13	436.38	481	91	267				278	61				
13:10:45	40.51902	105.9305	26465	406.34	436.27	447	90	4	2.7	26100	406.75	436.31	475	92			265							
13:10:57	40.51873	105.8968	26085	407.89	436.26	438	90	4	1.8	25800	408.00	436.38	470	89							spd brk			
13:11:09	40.51844	105.8659	25698	409.30	436.25	418	90	4	0.8	25400	409.63	436.31	465	91	257		255							
13:11:21	40.51817	105.8356	25295	410.69	436.24	410	90	4	2.7	25000	410.94	436.38	459	88										
13:11:33	40.51792	105.8062	24912	412.04	436.24	416	90	4	2.7	24600	412.56	436.25	455	93		-19						363	284	55
13:11:45	40.51765	105.7760	24568	413.42	436.23	412	90	4	2.7	24300	413.88	436.25	450	91										
13:11:57	40.51737	105.7445	24237	414.86	436.23	403	90	4	2.7	24000	414.63	436.25	447	90							bck on path			
13:12:09	40.51722	105.7181	23914	416.07	436.23	385	90	4	2.7	23700	415.94	436.13	444	94	238						sht 7706			
13:12:21	40.51692	105.6901	23555	417.35	436.22	447	92	4	1.9	23400	417.13	436.25	440	87			247							
13:12:33	40.51459	105.6608	23164	418.69	436.09	391	108	3	2.0	22800	419.13	435.94	436	95					286	52		349	350	136
13:12:45	40.50749	105.6340	22752	419.92	435.68	404	122	3	1.9	22500	420.25	435.44	432	108	229									
13:12:57	40.49401	105.6097	22700	421.04	434.88	381	136	3	2.2	22200	421.44	434.75	427	117				105						
13:13:09	40.47929	105.5910	22700	421.91	434.01	380	138	3	2.2	21900	421.75	434.06	421	131							spd brk and back on profile			
13:13:21	40.46358	105.5725	22700	422.76	433.07	379	138	3	2.2	21600	422.69	433.25	415	131										
13:13:33	40.44799	105.5545	22699	423.60	432.15	370	138	3	2.2	21000	423.94	431.69	408	138	213						went up to 257 ias			
13:13:45	40.43278	105.5369	22700	424.41	431.24	368	138	3	2.2	20700	424.75	431.00	400	133										
13:13:57	40.41688	105.5185	22700	425.27	430.30	355	138	3	2.2	20400	425.69	430.19	393	131					285	39				
13:14:09	40.40286	105.5021	22699	426.02	429.47	371	137	3	2.2	20100	426.00	429.63	386	145		-12								
13:14:21	40.38763	105.4841	22700	426.86	428.56	361	137	3	2.2	19900	427.00	428.81	379	134	201		245					322	19	129
13:14:33	40.37303	105.4667	22700	427.67	427.70	352	137	3	2.2	19300	428.19	427.38	375	138							2.3 to tmsn			
13:14:44	40.35975	105.4509	22699	428.40	426.91	350	136	3	2.2	19028	429.04	426.75	371	131	193		242							







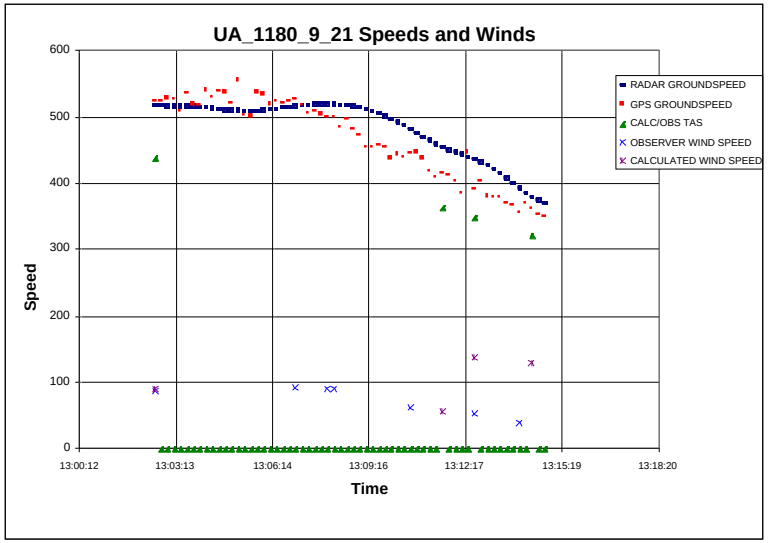
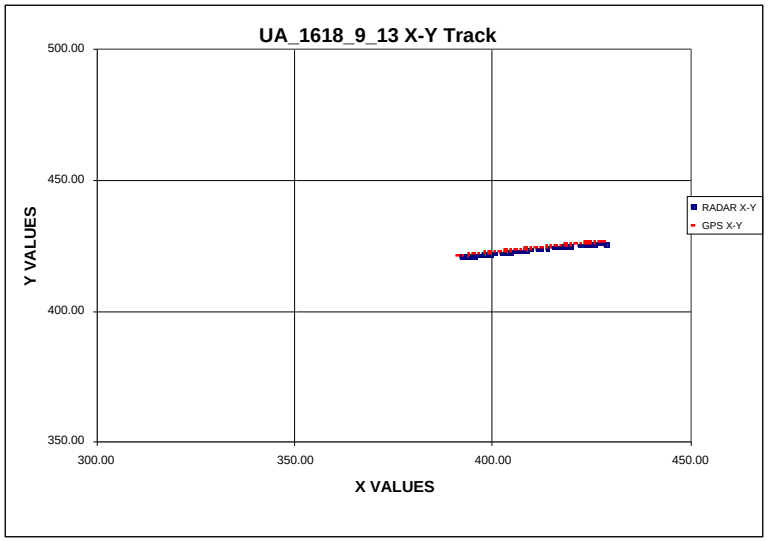
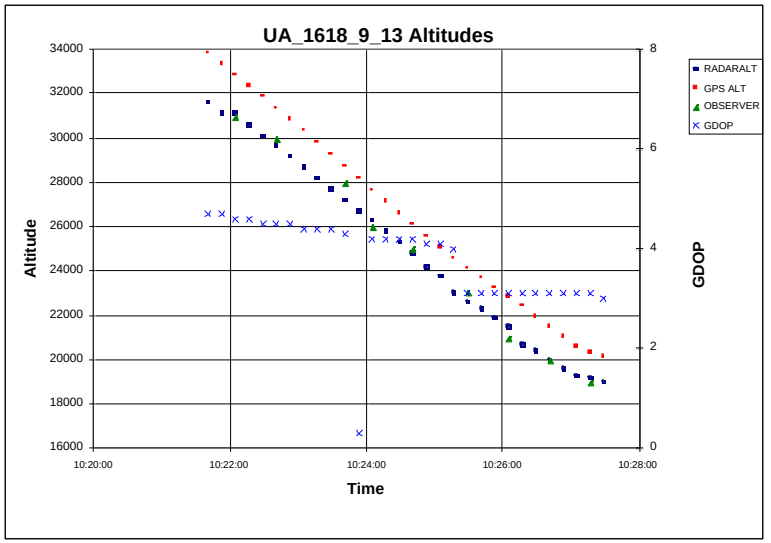


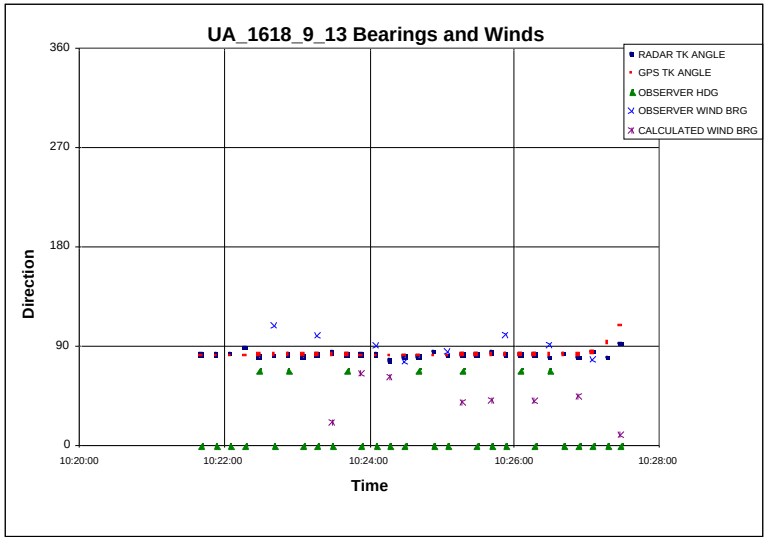
Figure A.27 Graphic Results for Case UA_1180_9_21

Table A.28 Tabular Results for Case UA_1618_9_13

UA_1618_9_13	|<---			GPS	DATA				---\>|	<---	RADAR	DATA		---\>|	<---				OBSERVER	DATA				---\>|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
10:21:41	40.26833	106.2597	33847	391.31	421.17	414	81	4	4.7	31600	392.06	420.63	425	82										
10:21:53	40.27177	106.2299	33377	392.69	421.38	416	81	4	4.7	31100	393.38	420.81	425	82										
10:22:05	40.27517	106.2004	32885	394.04	421.59	407	81	4	4.6	31100	394.88	421.00	425	83	310									
10:22:17	40.27856	106.1710	32383	395.39	421.80	390	81	4	4.6	30600	395.38	421.00	424	88								434		
10:22:29	40.28191	106.1410	31863	396.77	422.00	411	82	4	4.5	30100	396.75	421.31	423	80				69						
10:22:41	40.28505	106.1121	31353	398.09	422.19	400	82	4	4.5	29700	398.00	421.50	421	81	300				108	26				
10:22:53	40.28815	106.0833	30849	399.41	422.39	403	82	4	4.5	29200	399.44	421.69	420	82				69						
10:23:05	40.29127	106.0546	30339	400.73	422.58	386	82	4	4.4	28700	400.75	421.94	418	80										
10:23:17	40.29436	106.0260	29818	402.05	422.77	394	82	4	4.4	28200	402.19	422.13	417	82					99	23				
10:23:29	40.29746	105.9968	29279	403.39	422.96	409	82	4	4.4	27700	403.44	422.25	415	84								417	21	16
10:23:41	40.30034	105.9685	28751	404.68	423.14	391	82	4	4.3	27200	404.75	422.44	413	82	280			69						
10:23:53	40.30326	105.9403	28214	405.97	423.33	376	81	4	0.3	26700	406.06	422.63	411	82								412	65	37
10:24:05	40.30637	105.9124	27676	407.25	423.52	379	81	4	4.2	26300	407.38	422.81	410	82	260				90	20				
10:24:17	40.30968	105.8842	27149	408.55	423.73	387	81	4	4.2	25800	408.50	423.13	408	77								406	62	19
10:24:29	40.31296	105.8564	26629	409.82	423.93	390	81	4	4.2	25300	409.81	423.31	406	80					76	16				
10:24:41	40.31628	105.8283	26104	411.11	424.14	388	81	4	4.2	24800	411.13	423.56	404	80	250			69						
10:24:53	40.31956	105.8006	25595	412.38	424.34	370	81	4	4.1	24200	412.31	423.63	402	85										
10:25:05	40.32273	105.7731	25099	413.64	424.54	388	81	4	4.1	23800	413.69	423.88	400	81					85	14				
10:25:17	40.32573	105.7460	24612	414.88	424.74	383	82	4	4.0	23000	415.56	424.13	397	82				69				395	39	16
10:25:29	40.32855	105.7191	24135	416.12	424.92	378	82	4	3.1	22600	416.88	424.31	395	82	230									
10:25:41	40.33129	105.6921	23693	417.35	425.09	372	82	4	3.1	22300	418.13	424.44	393	84								387	41	19
10:25:53	40.33401	105.6653	23263	418.58	425.27	377	82	4	3.1	21900	418.56	424.50	391	82					100	12				
10:26:05	40.33674	105.6382	22838	419.82	425.44	370	82	4	3.1	21500	419.81	424.69	388	82	210			69						
10:26:17	40.33945	105.6115	22416	421.05	425.61	369	82	4	3.1	20700	421.69	424.94	385	82								382	40	16
10:26:29	40.34223	105.5849	21953	422.27	425.79	373	82	4	3.1	20400	422.88	425.19	383	79				69	91	12				
10:26:41	40.34496	105.5586	21487	423.47	425.97	361	82	4	3.1	20000	424.13	425.31	380	83	200									
10:26:53	40.34772	105.5322	21029	424.68	426.15	362	82	4	3.1	19600	424.69	425.44	378	79								378	44	19
10:27:05	40.35056	105.5057	20583	425.89	426.33	353	84	4	3.1	19300	425.94	425.50	375	85					78	10				
10:27:17	40.35319	105.4801	20337	427.07	426.50	351	93	4	3.1	19200	427.00	425.75	373	79	190									
10:27:28	40.35388	105.4568	20158	428.14	426.56	343	108	4	3.0	19020	428.52	425.41	369	92								360	9	169







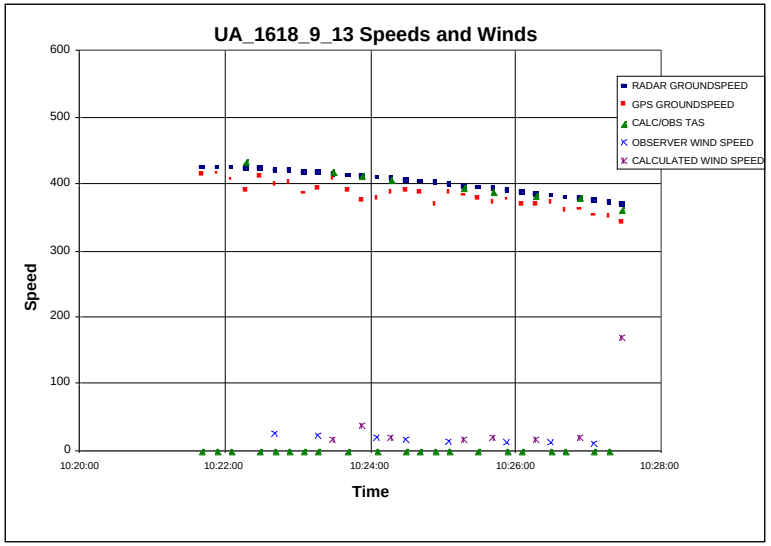
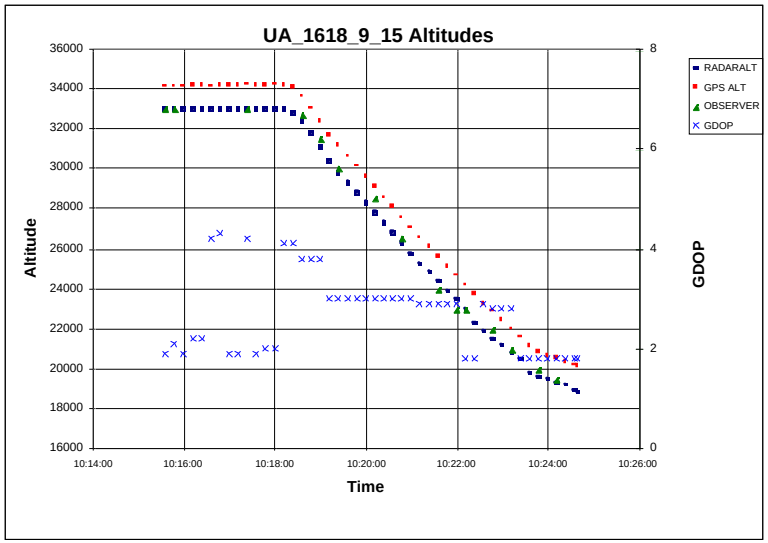
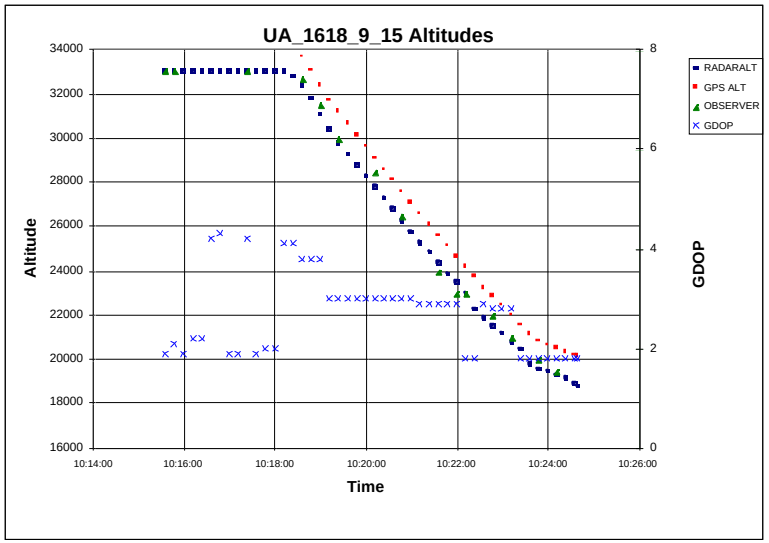


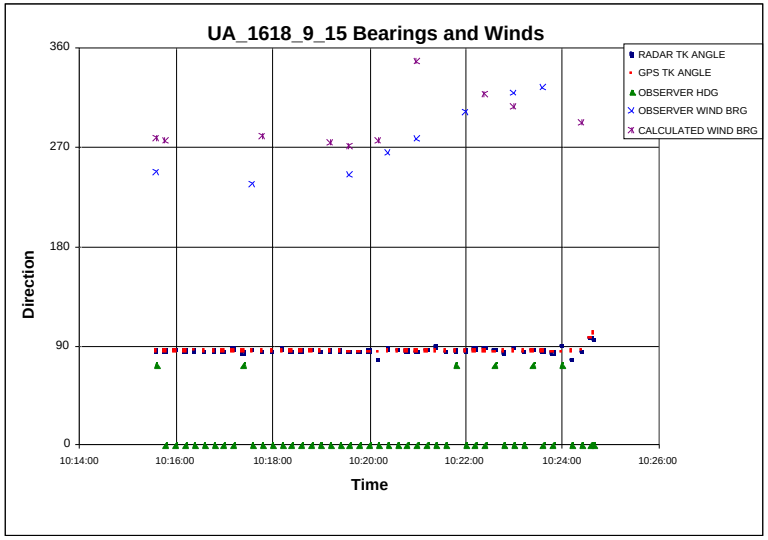
Figure A.28 Graphic Results for Case UA_1618_9_13

Table A.29 Tabular Results for Case UA_1618_9_15

UA_1618_9_15	|<---			GPS	DATA				---> |	<---	RADAR	DATA		---> |	<---				OBSERVER	DATA				---> |
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
10:15:35	40.25430	106.9488	34135	359.67	420.38	499	85	4	1.9	33000	359.63	420.50	479	85	330		273	72	248	31		448	279	52
10:15:47	40.25697	106.9135	34166	361.29	420.53	506	85	3	2.1	33000	361.13	420.63	479	85	330		271					445	276	62
10:15:59	40.25967	106.8775	34164	362.94	420.69	502	85	4	1.9	33000	362.81	420.75	479	86										
10:16:11	40.26248	106.8415	34205	364.59	420.85	494	85	3	2.2	33000	364.63	420.94	480	85										
10:16:23	40.26518	106.8054	34184	366.26	421.00	479	86	3	2.2	33000	366.13	421.06	480	85										
10:16:35	40.26754	106.7688	34178	367.94	421.14	487	85	4	4.2	33000	367.94	421.25	480	84										
10:16:47	40.26977	106.7335	34209	369.56	421.27	482	85	3	4.3	33000	369.56	421.38	481	85										
10:16:59	40.27213	106.6981	34207	371.18	421.40	503	85	4	1.9	33000	371.19	421.56	482	84										
10:17:11	40.27461	106.6615	34214	372.86	421.54	504	85	4	1.9	33000	372.88	421.63	483	87										
10:17:23	40.27712	106.6254	34233	374.52	421.70	486	85	3	4.2	33000	374.56	421.88	484	83	330			73						
10:17:35	40.27956	106.5893	34225	376.18	421.84	496	85	4	1.9	33000	376.13	421.94	485	86					237	36				
10:17:47	40.28196	106.5545	34225	377.78	421.98	488	85	4	2.0	33000	377.69	422.13	486	84			275					451	280	38
10:17:59	40.28442	106.5184	34234	379.43	422.13	494	85	4	2.0	33000	379.38	422.31	488	84										
10:18:11	40.28688	106.4834	34225	381.04	422.27	483	85	3	4.1	33000	381.00	422.38	488	87										
10:18:23	40.28944	106.4475	34114	382.69	422.43	500	85	3	4.1	32800	382.63	422.56	489	84										
10:18:35	40.29218	106.4118	33666	384.33	422.59	494	85	4	3.8	32400	384.19	422.69	489	85	327									
10:18:47	40.29468	106.3761	33065	385.97	422.74	493	85	4	3.8	31800	386.00	422.81	490	86										
10:18:59	40.29724	106.3406	32401	387.60	422.90	492	85	4	3.8	31100	387.56	423.00	490	84	315									
10:19:11	40.29989	106.3048	31716	389.24	423.06	485	85	4	3.0	30400	389.25	423.13	490	85			285					455	274	30
10:19:23	40.30255	106.2690	31205	390.89	423.22	487	85	4	3.0	29800	390.81	423.25	490	85	300									
10:19:35	40.30484	106.2344	30680	392.47	423.36	481	84	4	3.0	29300	392.44	423.44	490	84			292		245	30		454	271	27
10:19:47	40.30740	106.1994	30147	394.08	423.52	469	84	4	3.0	28800	394.19	423.63	490	84										
10:19:59	40.30993	106.1647	29631	395.67	423.68	484	84	4	3.0	28300	395.88	423.75	491	85										
10:20:11	40.31246	106.1299	29110	397.27	423.84	462	84	4	3.0	27800	397.13	424.13	491	77	285		293					445	276	16
10:20:23	40.31491	106.0953	28588	398.86	423.99	460	85	4	3.0	27300	398.88	424.06	491	87					265	27				
10:20:35	40.31701	106.0625	28114	400.36	424.12	454	85	4	3.0	26800	400.44	424.19	491	86										
10:20:47	40.31895	106.0291	27595	401.90	424.25	449	85	4	3.0	26300	401.94	424.31	490	85	265									
10:20:59	40.32080	105.9966	27088	403.38	424.36	433	85	4	3.0	25800	403.50	424.50	489	84			293		278	21		432	348	11
10:21:11	40.32272	105.9625	26583	404.95	424.49	440	85	4	2.9	25300	404.88	424.56	488	86										
10:21:23	40.32460	105.9302	26100	406.44	424.61	438	85	4	2.9	24900	406.44	424.56	486	89										
10:21:35	40.32642	105.8994	25624	407.84	424.73	432	85	4	2.9	24400	407.75	424.75	483	84	240									
10:21:47	40.32830	105.8687	25147	409.25	424.85	427	85	4	2.9	23900	409.31	424.88	479	85				73						
10:21:59	40.33023	105.8370	24657	410.70	424.97	415	85	4	2.9	23500	410.63	425.00	475	85	230				302	18				
10:22:11	40.33212	105.8064	24200	412.11	425.10	423	85	4	1.8	23000	412.44	425.06	472	87	230									
10:22:23	40.33389	105.7771	23750	413.45	425.21	408	85	4	1.8	22300	414.38	425.13	467	88			288					402	318	10
10:22:35	40.33566	105.7468	23224	414.84	425.33	412	84	4	2.9	21900	415.75	425.25	462	86				73						
10:22:47	40.33789	105.7168	22862	416.22	425.48	406	85	4	2.8	21500	417.13	425.44	457	83	220									
10:22:59	40.33985	105.6876	22442	417.55	425.60	396	85	4	2.8	21200	417.75	425.44	452	88			285		319	19		392	307	5
10:23:11	40.34176	105.6581	21994	418.91	425.73	402	85	4	2.8	20800	419.06	425.63	447	84	210									
10:23:23	40.34358	105.6295	21562	420.22	425.86	381	85	4	1.8	20500	420.38	425.69	441	86				73						
10:23:35	40.34535	105.6017	21160	421.50	425.97	412	85	4	1.8	19800	422.38	425.88	436	85					325	20				
10:23:47	40.34715	105.5733	20826	422.80	426.09	387	84	4	1.8	19600	423.63	426.06	430	83	200									
10:23:59	40.34892	105.5455	20654	424.07	426.21	375	84	4	1.8	19500	425.00	426.00	425	90				73						
10:24:11	40.35072	105.5180	20522	425.33	426.34	357	85	4	1.8	19300	425.56	426.19	419	77	195									
10:24:23	40.35209	105.4920	20352	426.52	426.43	362	86	4	1.8	19200	426.69	426.25	414	84			250					333	292	32
10:24:35	40.35321	105.4674	20210	427.65	426.51	348	97	4	1.8	18900	428.06	425.94	406	97										
10:24:38	40.35309	105.4605	20160	427.96	426.51	348	101	4	1.8	18799	428.44	425.95	404	95										







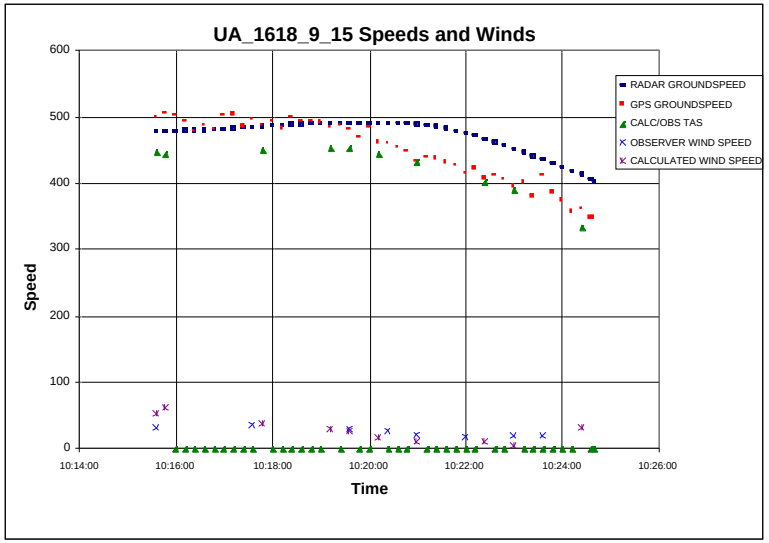
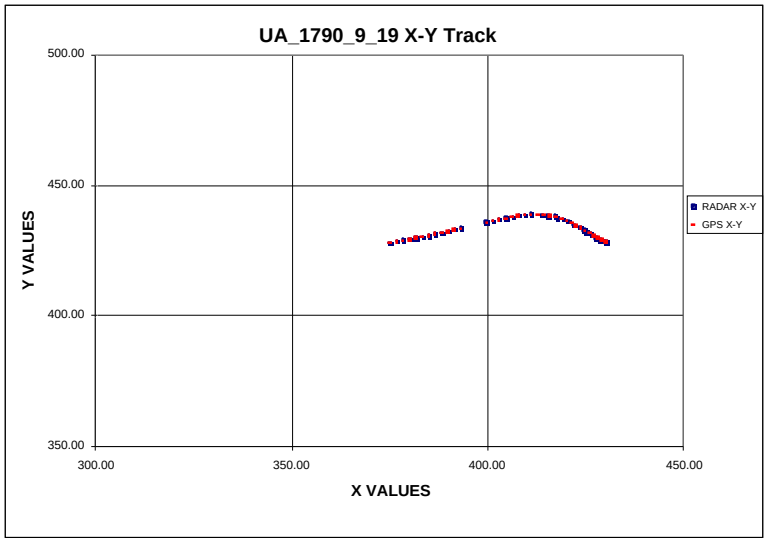
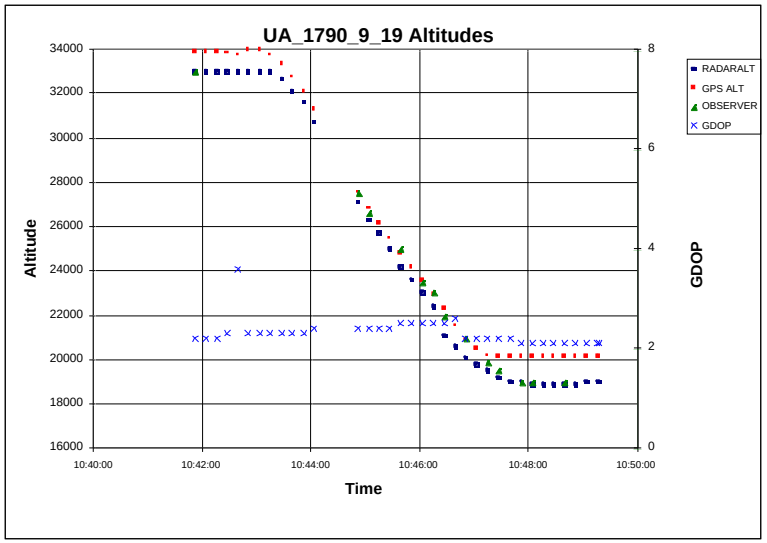


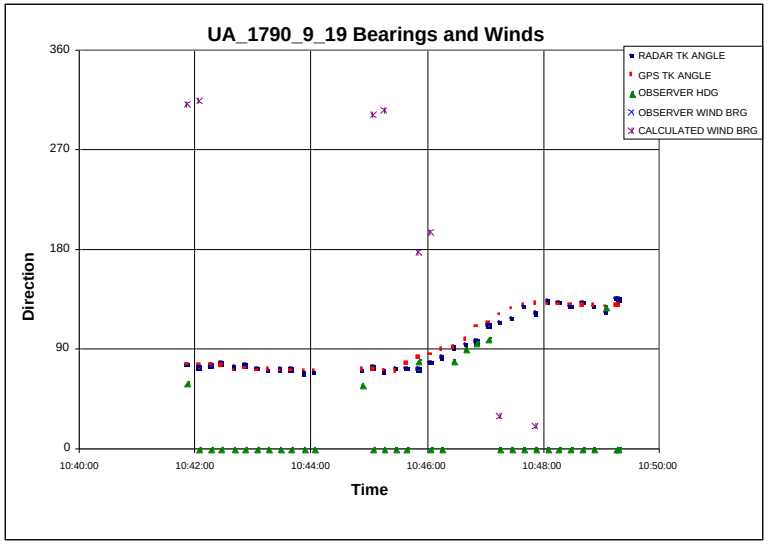
Figure A.29 Graphic Results for Case UA_1618_9_15

Table A.30 Tabular Results for Case UA_1790_9_19

UA_1790_9_19	|<---			GPS	DATA				---\>|	<---	RADAR	DATA		---\>|	<---				OBSERVER	DATA				---\>|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
10:41:52	40.38046	106.6084	33912	375.31	427.89	516	76	4	2.2	33000	375.25	427.94	500	76	330	-16	298	59			gnd spd 508	483	311	63
10:42:04	40.38737	106.5717	33903	376.99	428.30	513	76	4	2.2	33000	376.94	428.44	501	74							ekr +65	484	313	59
10:42:16	40.39421	106.5359	33901	378.64	428.71	522	76	4	2.2	33000	378.56	428.88	501	75										
10:42:27	40.40111	106.5008	33864	380.25	429.12	509	75	4	2.3	33000	380.25	429.25	501	77										
10:42:40	40.40848	106.4651	33797	381.88	429.56	518	71	4	3.6	33000	381.94	429.75	501	74										
10:42:51	40.41666	106.4301	33997	383.49	430.05	500	73	4	2.3	33000	383.56	430.19	501	75										
10:43:04	40.42520	106.3933	34020	385.18	430.57	519	71	4	2.3	33000	385.19	430.69	502	73										
10:43:15	40.43376	106.3590	33781	386.74	431.08	533	72	4	2.3	33000	386.75	431.25	502	71										
10:43:28	40.44262	106.3230	33350	388.39	431.62	512	71	4	2.3	32700	388.38	431.75	502	72										
10:43:39	40.45163	106.2883	32770	389.98	432.16	509	71	4	2.3	32100	390.13	432.31	503	72										
10:43:52	40.46087	106.2528	32127	391.61	432.72	522	71	4	2.3	31600	391.69	433.00	503	68										
10:44:03	40.47013	106.2176	31287	393.22	433.28	517	71	4	2.4	30700	393.31	433.63	504	69										
10:44:52	40.50715	106.0725	27562	399.85	435.52	526	72	4	2.4	27100	399.75	435.75	504	71	275		340	58						
10:45:04	40.51561	106.0372	26855	401.47	436.04	525	72	4	2.4	26300	401.44	436.19	504	74	266							504	301	32
10:45:15	40.52429	106.0020	26180	403.07	436.56	511	71	4	2.4	25700	403.06	436.81	505	70			342					500	305	20
10:45:27	40.53361	105.9665	25511	404.69	437.13	507	70	4	2.4	25000	404.81	437.31	506	73										
10:45:39	40.54362	105.9321	24820	406.27	437.74	501	77	4	2.5	24200	406.44	437.81	506	73	250		340							
10:45:51	40.55080	105.8969	24193	407.87	438.18	489	83	4	2.5	23600	408.00	438.31	506	72				80				487	178	66
10:46:03	40.55417	105.8614	23576	409.49	438.40	493	85	4	2.5	23000	409.56	438.56	507	78	235		340					475	196	56
10:46:15	40.55674	105.8249	22930	411.16	438.56	497	90	4	2.5	22400	411.06	438.69	506	83	230		340							
10:46:27	40.55679	105.7898	22280	412.77	438.57	480	92	4	2.5	21100	413.94	438.38	506	92	220			80						
10:46:40	40.55545	105.7526	21513	414.47	438.51	472	99	4	2.6	20600	415.50	438.25	505	94			340	90						
10:46:51	40.55055	105.7191	20917	416.00	438.23	463	110	3	2.2	20100	417.19	438.00	503	97	210			95						
10:47:03	40.54193	105.6867	20491	417.49	437.72	457	114	3	2.2	19800	417.81	437.44	501	111			345	100						
10:47:15	40.53123	105.6551	20163	418.94	437.09	449	121	3	2.2	19500	419.13	436.81	498	114	199							455	30	77
10:47:27	40.51735	105.6270	20134	420.24	436.28	445	127	3	2.2	19200	420.44	436.06	495	118	195		334							
10:47:40	40.50198	105.6012	20134	421.43	435.36	449	130	3	2.2	19000	422.06	434.56	489	128										
10:47:52	40.48545	105.5759	20133	422.59	434.39	456	131	3	2.1	19000	423.44	433.81	484	122	190							430	21	152
10:48:04	40.46893	105.5511	20133	423.74	433.41	445	130	3	2.1	18900	424.50	432.63	478	133	190						tomsn -10			
10:48:16	40.45248	105.5263	20133	424.88	432.43	436	130	3	2.1	18900	425.06	432.13	473	132			335							
10:48:28	40.43631	105.5021	20133	426.01	431.47	419	130	3	2.1	18900	426.25	431.25	468	128			320							
10:48:40	40.42106	105.4788	20134	427.08	430.57	405	129	3	2.1	18900	427.69	429.88	462	132	190		305							
10:48:52	40.40677	105.4565	20134	428.11	429.73	394	129	3	2.1	18900	428.69	429.13	456	128			290							
10:49:04	40.39314	105.4348	20134	429.12	428.92	376	128	3	2.1	19000	429.94	428.38	450	123			280	128						
10:49:16	40.38010	105.4136	20134	430.10	428.15	363	129	3	2.1	19000	430.19	428.06	443	136			260							
10:49:18	40.37717	105.4089	20134	430.32	427.98	370	129	3	2.1	19000	430.42	427.87	442	135										







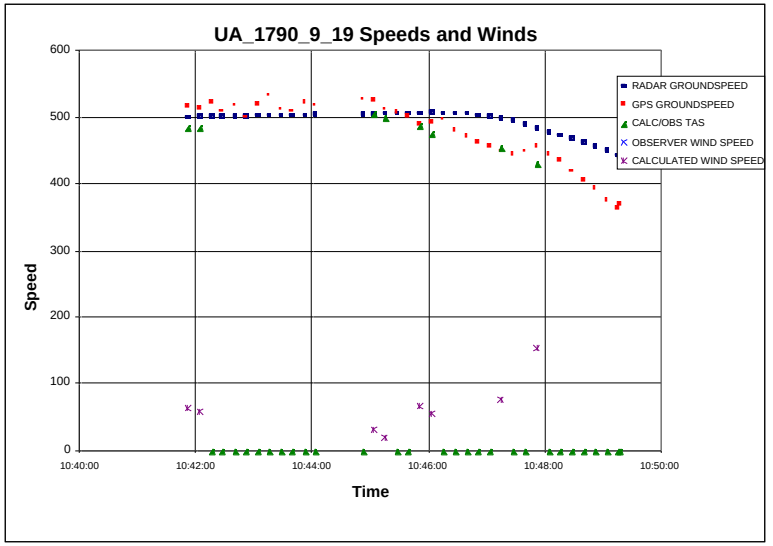
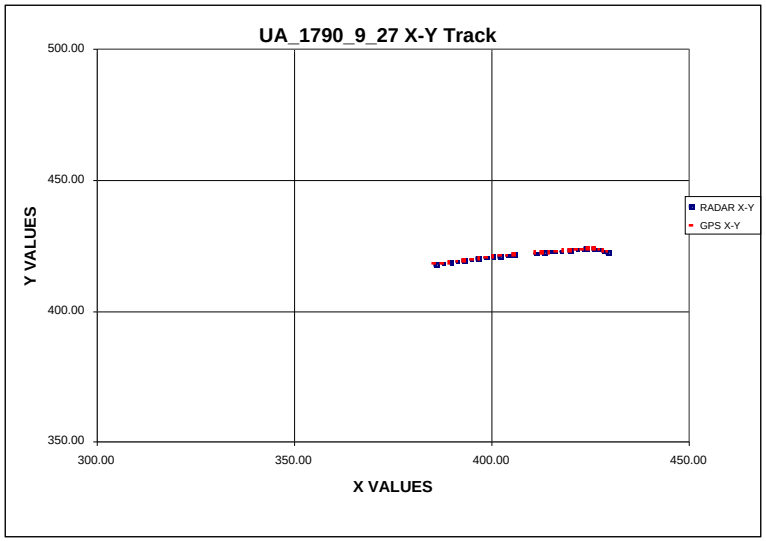
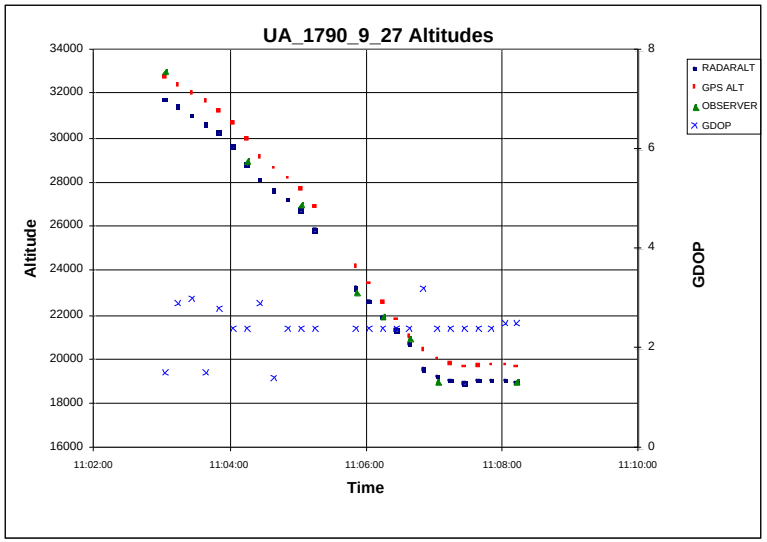


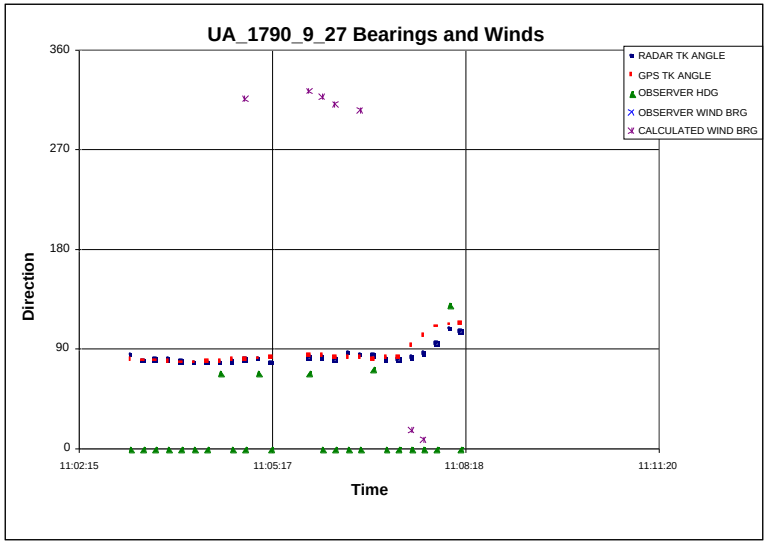
Figure A.30 Graphic Results for Case UA-1790_9_19

Table A.31 Tabular Results for Case UA_1790_9_27

UA_1790_9_27	|<---			GPS	DATA				--->|	<---	RADAR	DATA		--->|	<---				OBSERVER	DATA				--->|
TOD	GPS_LAT	GPS_LON	GPS_ALT	GPS_X	GPS_Y	GPS_GS	GPS_TRK	G_SATS	GDOP	R_ALT	R_X	R_Y	R_GS	R_TRK	OBS_ALT	OBS_OAT	OBS_IAS	OBS_HDG	OBS_WBRG	OBS_WMAG	OBS_CMT	C/O_TAS	CALC_WBRG	CALC_WMAG
11:03:03	40.21502	106.3813	32732	385.73	417.97	567	81	4	1.5	31700	386.06	417.94	558	85	330									
11:03:15	40.21973	106.3398	32379	387.64	418.25	566	80	4	2.9	31400	387.94	418.31	559	80										
11:03:27	40.22485	106.2993	32029	389.50	418.56	554	80	4	3.0	31000	389.81	418.63	561	81										
11:03:39	40.23030	106.2584	31648	391.38	418.89	561	79	4	1.5	30600	391.50	418.88	561	81										
11:03:51	40.23624	106.2169	31224	393.29	419.26	556	78	4	2.8	30200	393.25	419.25	560	79										
11:04:03	40.24254	106.1773	30680	395.11	419.64	558	78	4	2.4	29600	395.06	419.63	558	78								485		
11:04:15	40.24876	106.1390	29932	396.87	420.02	552	79	4	2.4	28800	396.81	420.00	556	78	290									
11:04:27	40.25464	106.0992	29157	398.69	420.38	546	79	4	2.9	28100	398.75	420.44	554	78				68						
11:04:39	40.26031	106.0602	28653	400.48	420.72	567	81	4	1.4	27600	400.50	420.75	553	79										
11:04:51	40.26520	106.0195	28212	402.35	421.02	535	81	4	2.4	27200	402.38	421.00	552	81								520	315	26
11:05:03	40.26966	105.9814	27684	404.10	421.30	533	82	4	2.4	26700	404.19	421.25	552	82	270			68						
11:05:15	40.27362	105.9428	26890	405.87	421.55	534	83	4	2.4	25800	405.81	421.63	551	78										
11:05:51	40.28330	105.8261	24186	411.22	422.16	521	84	4	2.4	23200	411.38	422.06	551	83	230			68				495	322	53
11:06:03	40.28580	105.7897	23422	412.89	422.33	534	84	4	2.4	22600	413.31	422.31	549	83								501	317	58
11:06:15	40.28849	105.7523	22572	414.61	422.50	519	83	4	2.4	21900	415.13	422.63	548	81	220							488	311	48
11:06:27	40.29171	105.7139	21808	416.37	422.71	504	83	4	2.4	21300	415.81	422.63	545	87										
11:06:39	40.29482	105.6767	21056	418.08	422.91	525	83	4	2.4	20700	417.56	422.81	543	85	210							486	305	54
11:06:51	40.29828	105.6386	20426	419.83	423.13	495	81	4	3.2	19500	420.00	423.06	539	84				72						
11:07:03	40.30186	105.6039	20005	421.42	423.36	466	83	4	2.4	19200	421.81	423.38	534	81	190									
11:07:15	40.30529	105.5698	19769	422.98	423.58	458	83	4	2.4	19000	423.44	423.63	529	81										
11:07:27	40.30850	105.5364	19652	424.51	423.79	403	93	4	2.4	18900	424.06	423.69	522	83								429	17	79
11:07:39	40.30622	105.5060	19678	425.91	423.67	389	102	4	2.4	19000	425.69	423.75	516	86								405	9	134
11:07:51	40.30095	105.4780	19748	427.20	423.37	390	110	4	2.4	19000	426.94	423.56	508	95										
11:08:03	40.29371	105.4537	19741	428.32	422.95	382	112	4	2.5	19000	428.56	422.75	490	109				130						
11:08:13	40.28670	105.4323	19654	429.31	422.54	376	113	4	2.5	18914	429.63	422.48	474	106	190									







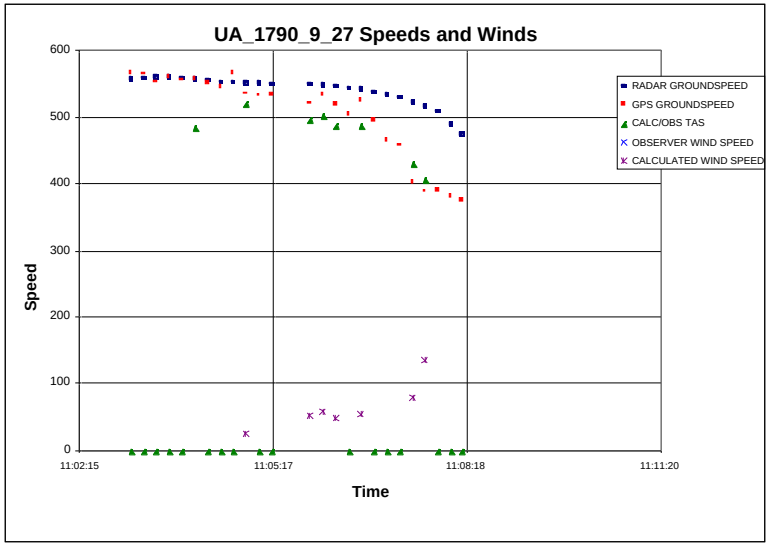


Figure A.31 Graphic Results for Case UA_1790_9_27