

Keystone Aerial Surveys

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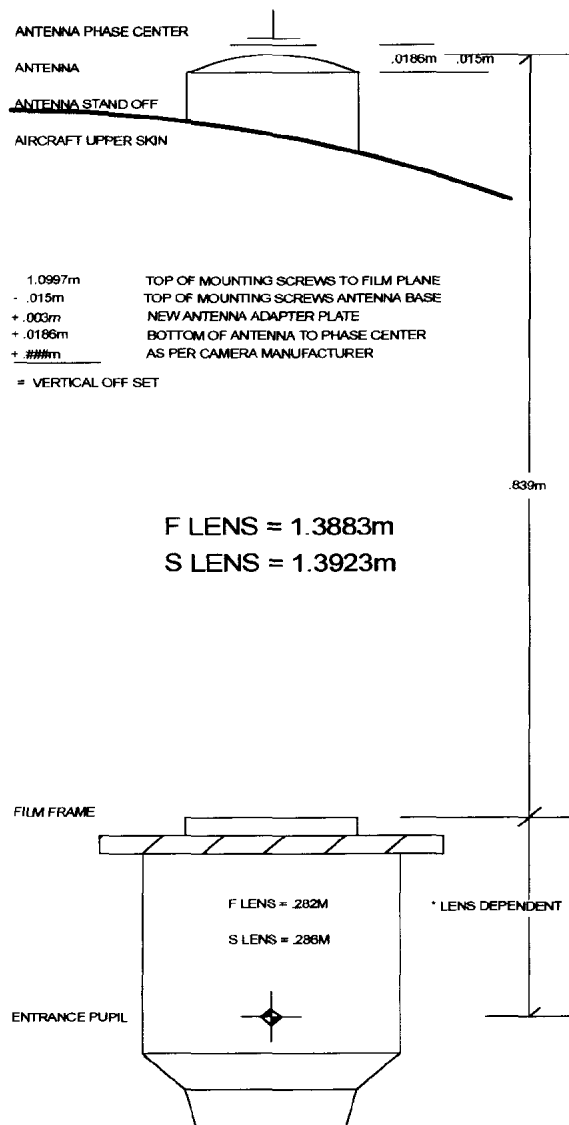
N411MD GPS ANTENNA INSTALLATION

In preparation for mounting the GPS antenna, the aircraft was flown in a normal photo configuration and attitude. At this point the stabilized camera mount was switched on and allowed to find level. The mount was then "caged" so the camera to aircraft orientation would be preserved. After returning to base the aircraft was placed on jacks. Jacking the aircraft to bring the camera 30sec spherical level back to a level indication reproduced the flight configuration.

A flash plate from this camera with the intersection of the fiducials marked was then placed on the camera film plane with the fiducial marks realigned to the camera. Using a vertical laser plumb a mark was then made on the aircraft upper skin to mark the location of the antenna phase center directly above the fiducial intersection.

A Sensor Systems FAA approved L1/L2 GPS antenna was installed at this location ensuring the phase center was horizontally placed at the predetermined location. While still on the jacks the antenna stand off was machined so the antenna base plate was also level and parallel to the camera film plane.

Before performing the survey to establish the physical relationship between the camera and antenna the previously described flight and orientation procedures were again performed. The physical survey was then conducted, please refer to the accompanying report.



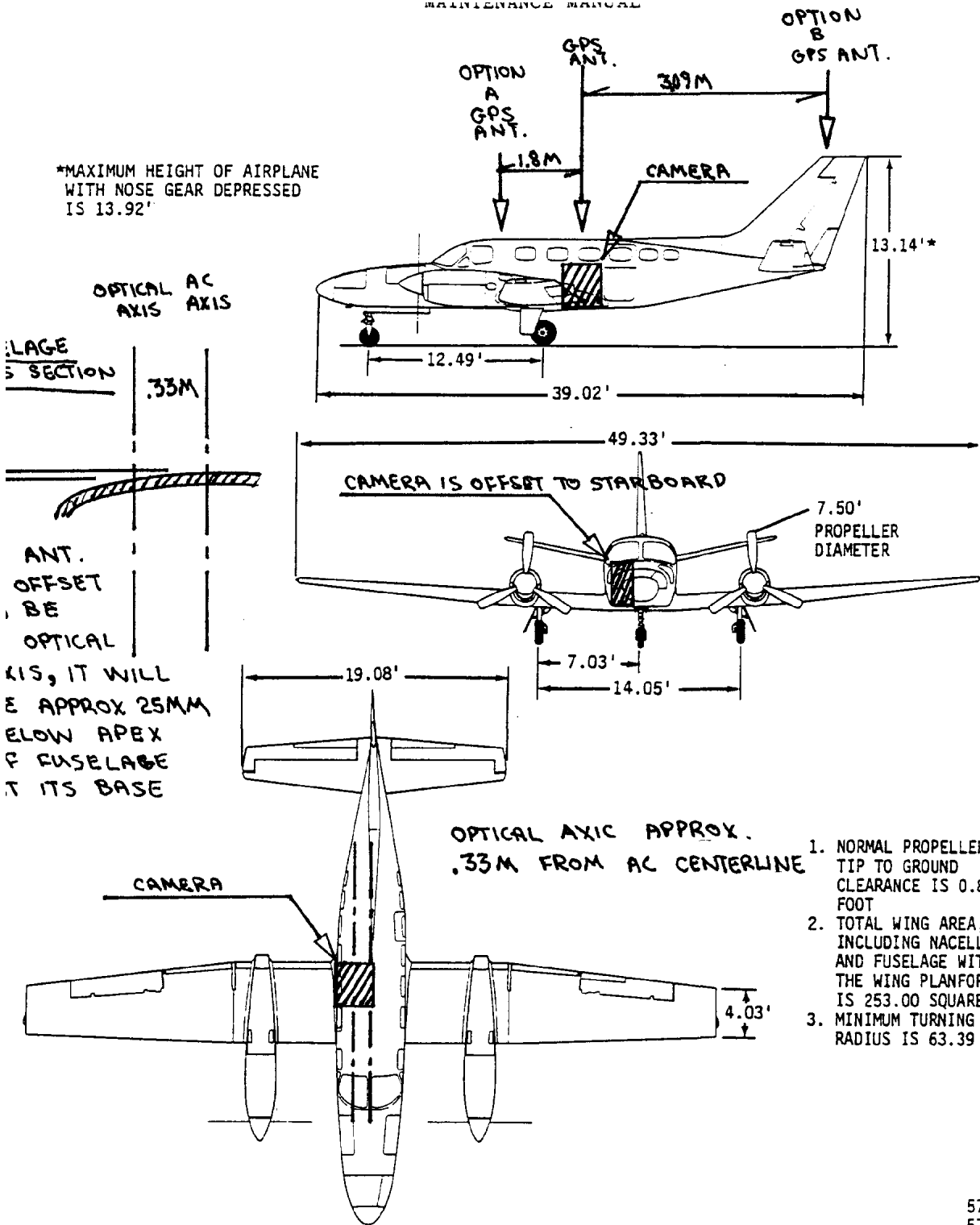
1117-9801 Keystone Aerial Surveys, Inc. 2-12-98 Observations
 Aircraft 441MD (Linear measurements in meters)

Pt #	Location	Delta Y	Delta X	Delta Z
201	Antenna 1, Set 1	0	0.0006	0.0016
202	Antenna 2, Set 1	0.0014	0.0004	0.0016
203	Antenna 3, Set 1	0.0010	0.0012	0.0013
204	Antenna 4, Set 1	0.0023	0.0003	0.0013
205	Computed Antenna Center	0.0003	0.0009	0.0014
211	Camera 1, Set 1	0.0014	0.0014	0.0009
212	Camera 2, Set 1	0.0038	0.0049	0.0020
213	Camera 3, Set 1	0.0011	0.0009	0.0006
214	Camera 4, Set 1	0.0004	0	0.0001
215	Computed Camera Center	0.0010	0.0014	0.0008
221	Nose	—	—	—
222	Tail	—	—	—
223	L Wing, Set 1	0.0005	0	0.0035
224	R Wing, Set 1	0.0046	0.0056	0.0039
225	Computed Center Aircraft	0.0020	0	—

1117-9801 KEYSTONE AERIAL SURVEY CO., 2-12-98 OBSERVATIONS
 AIRCRAFT 441MD (Linear measurements in meters)

PT #	Y	X	Z	Location
201	5.1975	0.4318	0.5902	Antenna 1, Set 1
202	5.1999	0.3914	0.5906	Antenna 2, Set 1
203	5.2828	0.3937	0.5890	Antenna 3, Set 1
204	5.2818	0.4345	0.5888	Antenna 4, Set 1
205	5.2403	0.4126	0.5897	Computed Antenna Center
211	5.1176	0.5122	-0.5087	Camera 1, Set 1
212	5.1193	0.3021	-0.5064	Camera 2, Set 1
213	5.3274	0.2968	-0.5093	Camera 3, Set 1
214	5.3279	0.5097	-0.5110	Camera 4, Set 1
215	5.2224	0.4047	-0.5089	Computed Camera Center
221	11.0585	0.0000	-0.6075	Nose
222	0.0000	0.0000	0.0000	Tail
223	6.6037	-7.4104	-0.2909	L Wing, Set 1
224	6.5930	7.4379	-0.3179	R Wing, Set 1
225	6.5984	0.0000		Computed Center Aircraft
229	0.0642	-0.0024	2.3655	Center Tail Antenna
301	5.1975	0.4324	0.5918	Antenna 1, Set 2
302	5.1985	0.3918	0.5922	Antenna 2, Set 2
303	5.2818	0.3949	0.5903	Antenna 3, Set 2
304	5.2795	0.4342	0.5901	Antenna 4, Set 2
305	5.2400	0.4135	0.5911	Computed Antenna Center
311	5.1162	0.5108	-0.5096	Camera 1, Set 2
312	5.1155	0.2972	-0.5084	Camera 2, Set 2
313	5.3263	0.2959	-0.5099	Camera 3, Set 2
314	5.3275	0.5097	-0.5109	Camera 4, Set 2
315	5.2214	0.4033	-0.5097	Computed Camera Center
321	11.0584	0.0000	-0.6048	Nose
322	0.0000	0.0000	0.0000	Tail
323	6.6032	-7.4104	-0.2870	L Wing, Set 2
324	6.5976	7.4323	-0.3214	R Wing, Set 2
325	6.6004	0.0000		Computed Aircraft Center

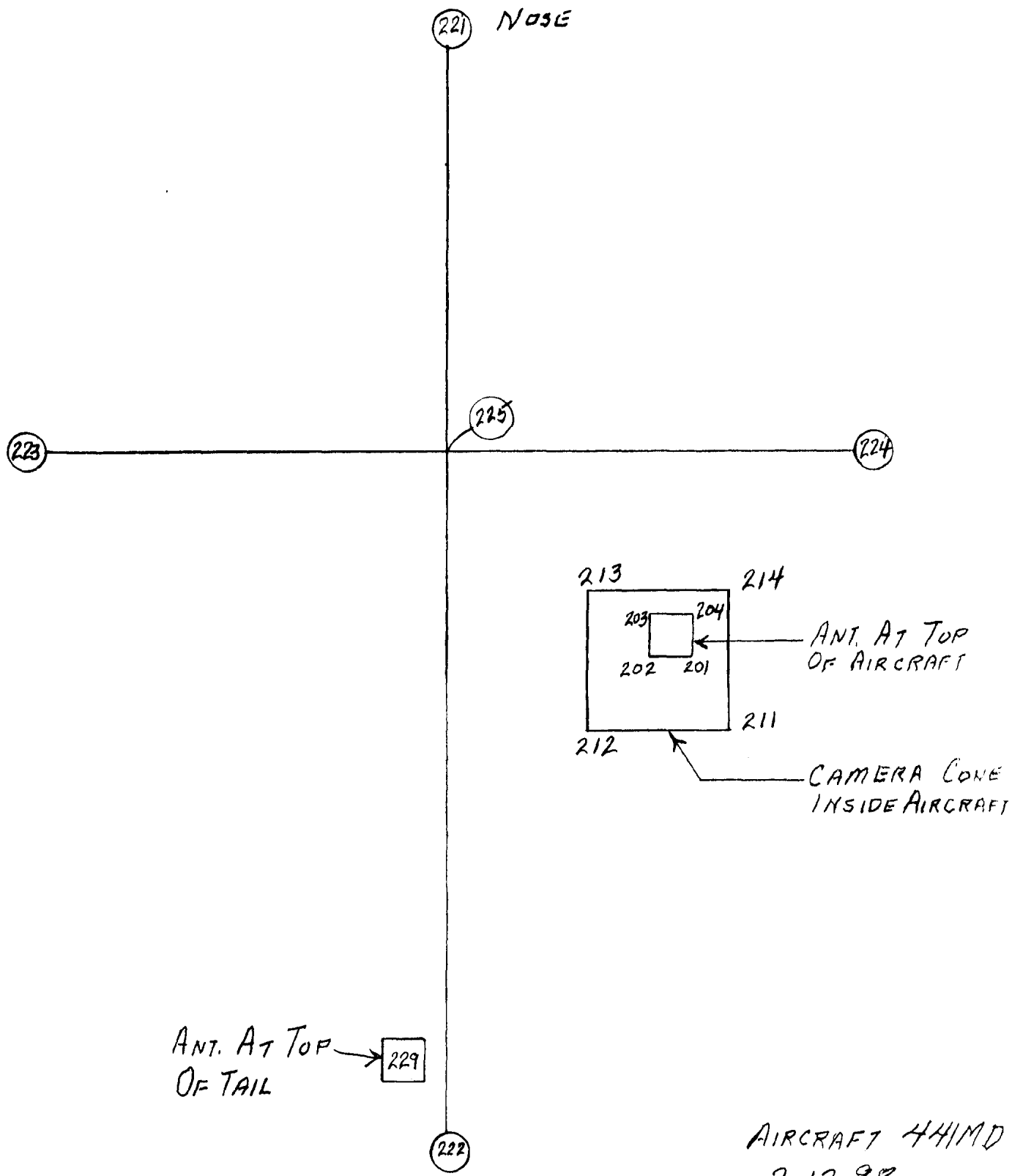
*MAXIMUM HEIGHT OF AIRPLANE WITH NOSE GEAR DEPRESSED IS 13.92'



1. NORMAL PROPELLER TIP TO GROUND CLEARANCE IS 0.85 FOOT
2. TOTAL WING AREA, INCLUDING NACELLES AND FUSELAGE WITHIN THE WING PLANFORM, IS 253.00 SQUARE FEET.
3. MINIMUM TURNING RADIUS IS 63.39 FEET.

57104004
57104005

Airplane Dimensions
Figure 1



AIRCRAFT 441MD
2-12-98

AIRCRAFT NOSE



$X = +0.0091\text{ m}$
 $Y = +0.0183\text{ m}$
 $Z = +1.0997\text{ m}$

NOT TO SCALE

ANTENNA CENTER



$\leftarrow X \rightarrow$

$\uparrow Y$

CAMERA CENTER



AIRCRAFT TAIL