ProMark200 RTK - comparing GLONASS and dual frequency GPS

The base station is a ProFlex500 connected to the Internet broadcasting RTCM3 RTK data. For details visit the base station at <u>http://72.215.9.254</u> and access the status screens with UserID: user and Password: pf500. The rover connected to the base using DirectIP to port 1001.



The base station antenna is mounted on a flag pole. It is a less than perfect location but the position is an average of several OPUS solutions.



In the photos that follow the rover pole is intentionally out of plumb. The wind was blowing hard enough to blow over an unattended pole. The reason for the photo is to illustrate the work environment at each RTK measurement. At each point in the project there are two RTK observations in the FAST Survey job file. The first uses the tracking mode set to GPS/GLONASSL1. The second measurement uses GPS L1/L2P. Each observation is configured to Store Fixed Only and to average 150 readings. Switching the tracking mode between each observation is not a suggested way to do RTK work. This was a special project done to evaluate the performance of the two selected methods with a minimum time and money budget.

Point number one in the FAST Survey job file is the base station location that was recorded using the Store button on the Ref tab in Monitor / Skyplot.

Each photo is followed by an Inverse report from FAST Survey that shows an Inverse from the RTK base station to the first measurement and a second Inverse from the first RTK observation on the point to the second measurement.

The base station is broadcasting coordinates relative to NAD83(CORS96). The FAST Survey job file uses the Oklahoma Coordinate System of 1983(CORS96), the US Survey Foot, and orthometric height computed using Geoid09.

Points 2 & 3 - a magic marker cross on the sidewalk



Pt1: N733455.5159 E2288052.1645 Z1072.3314 BASE Bearing: N16°20'59''W HDist: 34.452' SDist: 37.835' EDiff: -15.639' Slope: -45.39% -2.20:1 Pt2: N733488.5744 E2288042.4663 Z1056.6923 X Bearing: S71°23'03''E HDist: 0.025' SDist: 0.030' EDiff: 0.016' Slope: 64.70% 1.55:1 Pt3: N733488.5665 E2288042.4898 Z1056.7083 X Points 4 & 5 - a magic marker cross on the sidewalk



Pt1: N733455.5159 E2288052.1645 Z1072.3314 BASE Bearing: N10°59'56"EHDist: 63.848' SDist: 65.994' EDiff: -16.692' Slope: -26.14% -3.83:1 Pt4: N733518.1914 E2288064.3461 Z1055.6398 X Bearing: S89°46'16"W HDist: 0.018' SDist: 0.019' EDiff: 0.004' Slope: 23.87% 4.19:1 Pt5: N733518.1913 E2288064.3277 Z1055.6442 X

Points 6 & 7 - PK nail in asphalt parking lot



Pt1: N733455.5159 E2288052.1645 Z1072.3314 BASE Bearing: N28°43'51"W HDist: 1732.519' SDist: 1732.534' EDiff: -7.307' Slope: -0.42% -237.11:1 Pt6: N734974.7400 E2287219.3509 Z1065.0247 PK Bearing: S42°07'26"W HDist: 0.033' SDist: 0.035' EDiff: 0.009' Slope: 27.82% 3.59:1

Pt7: N734974.7154 E2287219.3286 Z1065.0339 PK Points 8 & 9 - PK nail in asphalt parking



Pt1: N733455.5159 E2288052.1645 Z1072.3314 BASE Bearing: N32°51'25''W HDist: 1599.527' SDist: 1599.564' EDiff: -10.865' Slope: -0.68% -147.22:1 Pt8: N734799.1612 E2287184.3491 Z1061.4666 PK Bearing: N1°23'32''W HDist: 0.019' SDist: 0.021' EDiff: 0.007' Slope: 36.20% 2.76:1 Pt9: N734799.1806 E2287184.3486 Z1061.4736 PK

Points 10 & 11 - PK nail in asphalt parking



Pt1: N733455.5159 E2288052.1645 Z1072.3314 BASE Bearing: N39°13'21"W HDist: 1764.897' SDist: 1764.900' EDiff: -3.386' Slope: -0.19% -521.18:1 Pt10: N734822.7739 E2286936.1603 Z1068.9451 PK Bearing: N69°35'40"EHDist: 0.005' SDist: 0.056' EDiff: -0.056' Slope: -1147.78% -0.09:1

Pt11: N734822.7756 E2286936.1649 Z1068.8889 PK Points 12 & 13 - PK nail in asphalt parking



Pt1: N733455.5159 E2288052.1645 Z1072.3314 BASE Bearing: N35°28'41"W HDist: 1921.415' SDist: 1921.417' EDiff: -2.962' Slope: -0.15% -648.60:1 Pt12: N735020.1962 E2286936.9915 Z1069.3690 PK Bearing: S36°52'03"W HDist: 0.009' SDist: 0.109' EDiff: -0.109' Slope: -1203.60% -0.08:1 Pt13: N735020.1889 E2286936.9860 Z1069.2599 PK

Points 14 & 15 - NGS brass cap in concrete



Pt1: N733455.5159 E2288052.1645 Z1072.3314 BASE Bearing: N68°54'00''W HDist: 3249.566' SDist: 3249.585' EDiff: 11.197' Slope: 0.34% 290.21:1 Pt14: N734625.3420 E2285020.4676 Z1083.5286 BRCAP Bearing: S24°48'57''E HDist: 0.024' SDist: 0.057' EDiff: -0.052' Slope: -221.39% -0.45:1

Pt15: N734625.3206 E2285020.4775 Z1083.4764 BRCAP Points 16 & 17 - MAG nail in asphalt parking



Pt1: N733455.5159 E2288052.1645 Z1072.3314 BASE Bearing: N64°40'53"W HDist: 6536.683' SDist: 6536.728' EDiff: -24.116' Slope: -0.37% -271.05:1 Pt16: N736250.9454 E2282143.3740 Z1048.2151 MAG Bearing: N34°32'34"W HDist: 0.027' SDist: 0.039' EDiff: -0.029' Slope: -105.81% -0.95:1 Pt17: N736250.9677 E2282143.3586 Z1048.1865 MAG

Points 18 & 19 - center of manhole lid



Pt1: N733455.5159 E2288052.1645 Z1072.3314 BASE Bearing: S1°10'21"W HDist: 16231.773' SDist: 16231.961' EDiff: -78.089' Slope: -0.48% -207.86:1 Pt18: N717227.1413 E2287720.0088 Z994.2424 SSMH Bearing: S22°59'38"W HDist: 0.053' SDist: 0.070' EDiff: 0.045' Slope: 85.68% 1.17:1

Pt19: N717227.0926 E2287719.9881 Z994.2877 SSMH Points 20 & 21 - MAG nail in street intersection



Pt1: N733455.5159 E2288052.1645 Z1072.3314 BASE Bearing: S3°51'28"W HDist: 31529.100' SDist: 31529.103' EDiff: 11.956' Slope: 0.04% 2637.02:1 Pt20: N701997.8604 E2285930.8270 Z1084.2877 MAG Bearing: N17°11'57"EHDist: 0.068' SDist: 0.134' EDiff: -0.116' Slope: -170.67% -0.59:1 Pt21: N701997.9253 E2285930.8470 Z1084.1718 MAG

For questions, comments, or corrections related to this document please contact <u>pstevenson@ashtech.com</u>

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