

Phase I Partially Constrained GPS Network Adjustment

2001 Geodetic Control Densification

of

Jefferson County, Kentucky



*GRW Aerial Surveys, Inc.
801 Corporate Drive
Lexington, Ky. 40503*

ADJUSTMENT STATISTICS SUMMARY
NETWORK = LOJIC_PHASE
TIME = Thu Oct 18 10:05:03 2001

ADJUSTMENT SUMMARY

Network Reference Factor = 1.04
Chi-Square Test ($\alpha = 95\%$) = PASS
Degrees of Freedom = 112.00

GPS OBSERVATIONS

Reference Factor = 1.04
r = 111.02

| | | | | | |
|--------------|----|--------------------|------|-----|------|
| GPS Solution | 1 | Reference Factor = | 0.71 | r = | 1.72 |
| GPS Solution | 2 | Reference Factor = | 1.38 | r = | 2.12 |
| GPS Solution | 3 | Reference Factor = | 0.93 | r = | 1.52 |
| GPS Solution | 4 | Reference Factor = | 1.15 | r = | 1.44 |
| GPS Solution | 5 | Reference Factor = | 1.09 | r = | 1.83 |
| GPS Solution | 6 | Reference Factor = | 0.57 | r = | 2.10 |
| GPS Solution | 7 | Reference Factor = | 1.48 | r = | 1.81 |
| GPS Solution | 8 | Reference Factor = | 1.17 | r = | 2.23 |
| GPS Solution | 9 | Reference Factor = | 0.36 | r = | 2.64 |
| GPS Solution | 10 | Reference Factor = | 1.67 | r = | 2.72 |
| GPS Solution | 11 | Reference Factor = | 0.48 | r = | 1.72 |
| GPS Solution | 12 | Reference Factor = | 0.30 | r = | 2.60 |
| GPS Solution | 13 | Reference Factor = | 0.87 | r = | 2.78 |
| GPS Solution | 14 | Reference Factor = | 0.70 | r = | 1.75 |
| GPS Solution | 15 | Reference Factor = | 1.49 | r = | 2.48 |
| GPS Solution | 16 | Reference Factor = | 0.30 | r = | 1.66 |
| GPS Solution | 17 | Reference Factor = | 1.47 | r = | 2.24 |
| GPS Solution | 18 | Reference Factor = | 0.75 | r = | 2.71 |
| GPS Solution | 19 | Reference Factor = | 0.66 | r = | 1.86 |
| GPS Solution | 20 | Reference Factor = | 0.57 | r = | 2.15 |
| GPS Solution | 21 | Reference Factor = | 1.07 | r = | 1.83 |
| GPS Solution | 22 | Reference Factor = | 0.91 | r = | 2.23 |
| GPS Solution | 23 | Reference Factor = | 1.48 | r = | 2.35 |
| GPS Solution | 24 | Reference Factor = | 0.83 | r = | 2.12 |
| GPS Solution | 25 | Reference Factor = | 1.37 | r = | 2.32 |
| GPS Solution | 26 | Reference Factor = | 1.70 | r = | 2.45 |
| GPS Solution | 27 | Reference Factor = | 1.12 | r = | 1.84 |
| GPS Solution | 28 | Reference Factor = | 0.95 | r = | 2.31 |
| GPS Solution | 29 | Reference Factor = | 1.70 | r = | 1.80 |
| GPS Solution | 30 | Reference Factor = | 0.48 | r = | 2.00 |
| GPS Solution | 31 | Reference Factor = | 0.59 | r = | 1.88 |
| GPS Solution | 32 | Reference Factor = | 0.25 | r = | 2.66 |
| GPS Solution | 33 | Reference Factor = | 0.45 | r = | 2.71 |
| GPS Solution | 34 | Reference Factor = | 1.22 | r = | 1.60 |
| GPS Solution | 35 | Reference Factor = | 0.85 | r = | 2.58 |
| GPS Solution | 36 | Reference Factor = | 0.27 | r = | 1.91 |
| GPS Solution | 37 | Reference Factor = | 1.04 | r = | 1.71 |
| GPS Solution | 38 | Reference Factor = | 0.95 | r = | 2.45 |
| GPS Solution | 39 | Reference Factor = | 0.48 | r = | 1.69 |
| GPS Solution | 40 | Reference Factor = | 2.28 | r = | 2.30 |
| GPS Solution | 41 | Reference Factor = | 0.73 | r = | 1.93 |
| GPS Solution | 42 | Reference Factor = | 0.25 | r = | 1.93 |
| GPS Solution | 43 | Reference Factor = | 0.91 | r = | 2.31 |
| GPS Solution | 44 | Reference Factor = | 0.33 | r = | 2.12 |
| GPS Solution | 45 | Reference Factor = | 1.27 | r = | 1.87 |
| GPS Solution | 46 | Reference Factor = | 0.50 | r = | 1.55 |
| GPS Solution | 47 | Reference Factor = | 0.32 | r = | 2.03 |
| GPS Solution | 48 | Reference Factor = | 1.73 | r = | 2.45 |
| GPS Solution | 49 | Reference Factor = | 0.79 | r = | 1.69 |
| GPS Solution | 50 | Reference Factor = | 0.60 | r = | 1.98 |
| GPS Solution | 51 | Reference Factor = | 0.65 | r = | 1.33 |
| GPS Solution | 52 | Reference Factor = | 1.62 | r = | 2.33 |
| GPS Solution | 53 | Reference Factor = | 0.35 | r = | 2.68 |

GEOID MODEL

Reference Factor = 1.00

r = 0.98

Geoid Heights: Reference Factor = 1.00 r = 0.98
Delta Geoid Heights: Reference Factor = 1.00 r = 0.00

WEIGHTING STRATEGIES:

GPS OBSERVATIONS:

Scalar Weighting Strategy:
User-Defined Scalar Set Applied Globally = 4.05

No summation weighting strategy was used

Station Error Strategy:

H.I. error = 0.0080
Tribrach error = 0.0030

GEOID MODEL:

Scalar Weighting Strategy:
User-Defined Scalar Set Applied Globally = 0.38

No summation weighting strategy was used

Results of adjusted Geoid model:

Noise in vertical GPS observations: 0.00199654
Variance of geoid model: 0.02933762
Use of correlated Residual Geoid Model may improve geoid heights

COORDINATE ADJUSTMENT SUMMARY
 NETWORK = LOJIC_PHASE
 TIME = Thu Oct 18 10:05:03 2001

Datum = NAD-83
 Coordinate System = 1983 State Plane Lambert
 Zone = Kentucky North

Network Adjustment Constraints:
 2 fixed coordinates in y
 2 fixed coordinates in x
 4 fixed coordinates in h

| POINT | NAME | OLD COORDS | ADJUST | NEW COORDS | 1.96 μ |
|-------|-----------|-------------|---------|-------------|------------|
| 1 | 31 K ECC | | | | |
| | Y= | 55213.4431 | +0.0000 | 55213.4431 | 0.010036m |
| | X= | 371332.9362 | +0.0000 | 371332.9362 | 0.009950m |
| | ELL HT= | 102.8653 | +0.0000 | 102.8652 | 0.148886m |
| | ORTHO HT= | 136.0858 | +0.0000 | 136.0858 | 0.095825m |
| | GEOID HT= | -33.2205 | +0.0000 | -33.2206 | 0.170849m |
| 2 | 48978ECC | | | | |
| | Y= | 59655.0782 | +0.0000 | 59655.0782 | 0.009688m |
| | X= | 403901.4440 | +0.0000 | 403901.4440 | 0.008652m |
| | ELL HT= | 115.8894 | +0.0002 | 115.8896 | 0.168157m |
| | ORTHO HT= | 149.5780 | +0.0000 | 149.5780 | FIXED |
| | GEOID HT= | -33.6886 | +0.0002 | -33.6884 | 0.168157m |
| 3 | BOWMANRS | | | | |
| | Y= | 81239.4270 | +0.0000 | 81239.4270 | 0.008714m |
| | X= | 376047.9460 | +0.0000 | 376047.9460 | 0.006904m |
| | ELL HT= | 130.4693 | +0.0000 | 130.4693 | 0.143793m |
| | ORTHO HT= | 163.7774 | +0.0000 | 163.7774 | 0.088487m |
| | GEOID HT= | -33.3081 | +0.0000 | -33.3081 | 0.171077m |
| 4 | EDWARD 2 | | | | |
| | Y= | 88306.8767 | +0.0000 | 88306.8767 | FIXED |
| | X= | 355090.4548 | +0.0000 | 355090.4548 | FIXED |
| | ELL HT= | 246.2973 | -0.0001 | 246.2972 | 0.167519m |
| | ORTHO HT= | 279.5300 | +0.0000 | 279.5300 | FIXED |
| | GEOID HT= | -33.2327 | -0.0001 | -33.2328 | 0.167519m |
| 5 | GOSHENRM | | | | |
| | Y= | 101602.2209 | +0.0000 | 101602.2209 | 0.011557m |
| | X= | 385229.9300 | +0.0000 | 385229.9300 | 0.009383m |
| | ELL HT= | 184.4245 | +0.0001 | 184.4245 | 0.191093m |
| | ORTHO HT= | 217.8761 | +0.0000 | 217.8761 | 0.128074m |
| | GEOID HT= | -33.4516 | +0.0000 | -33.4516 | 0.170490m |
| 6 | H 323ECC | | | | |
| | Y= | 78678.6186 | +0.0000 | 78678.6186 | 0.010198m |
| | X= | 356540.1059 | +0.0000 | 356540.1059 | 0.008490m |
| | ELL HT= | 98.2634 | -0.0001 | 98.2633 | 0.154256m |
| | ORTHO HT= | 131.4373 | +0.0000 | 131.4373 | 0.070745m |
| | GEOID HT= | -33.1739 | -0.0001 | -33.1740 | 0.170794m |
| 7 | HORRODS | | | | |
| | Y= | 106000.5476 | +0.0000 | 106000.5476 | 0.010034m |
| | X= | 395410.3348 | +0.0000 | 395410.3348 | 0.009150m |
| | ELL HT= | 210.3036 | +0.0001 | 210.3038 | 0.212236m |
| | ORTHO HT= | 243.8199 | +0.0001 | 243.8199 | 0.150007m |
| | GEOID HT= | -33.5163 | +0.0001 | -33.5162 | 0.169619m |
| 8 | I64 L 21 | | | | |
| | Y= | 80065.0560 | +0.0000 | 80065.0560 | FIXED |
| | X= | 399827.7670 | +0.0000 | 399827.7670 | FIXED |
| | ELL HT= | 194.9307 | +0.0001 | 194.9308 | 0.163030m |
| | ORTHO HT= | 228.3170 | +0.0000 | 228.3170 | FIXED |
| | GEOID HT= | -33.3863 | +0.0001 | -33.3862 | 0.163030m |
| 9 | J 334ECC | | | | |
| | Y= | 56766.7331 | +0.0000 | 56766.7331 | 0.011465m |

| | | | | | |
|-------------|-----------|-------------|---------|-------------|-----------|
| | X= | 351062.8415 | +0.0000 | 351062.8415 | 0.011190m |
| | ELL HT= | 101.6936 | -0.0002 | 101.6934 | 0.167383m |
| | ORTHO HT= | 134.6370 | +0.0000 | 134.6370 | FIXED |
| | GEOID HT= | -32.9434 | -0.0002 | -32.9436 | 0.167383m |
| 10 KY 05 | | | | | |
| | Y= | 78221.3076 | +0.0000 | 78221.3076 | 0.007520m |
| | X= | 369684.0695 | +0.0000 | 369684.0695 | 0.006332m |
| | ELL HT= | 115.8691 | +0.0000 | 115.8691 | 0.141235m |
| | ORTHO HT= | 149.1422 | +0.0000 | 149.1422 | 0.084733m |
| | GEOID HT= | -33.2731 | +0.0000 | -33.2732 | 0.171253m |
| 11 KY 13 | | | | | |
| | Y= | 44892.9628 | +0.0000 | 44892.9628 | 0.010556m |
| | X= | 384287.9998 | +0.0000 | 384287.9998 | 0.011208m |
| | ELL HT= | 173.9327 | +0.0000 | 173.9327 | 0.171094m |
| | ORTHO HT= | 207.3599 | +0.0000 | 207.3599 | 0.117623m |
| | GEOID HT= | -33.4272 | +0.0000 | -33.4272 | 0.171192m |
| 12 lou1 | | | | | |
| | Y= | 57164.6198 | +0.0000 | 57164.6198 | 0.010370m |
| | X= | 407896.3059 | +0.0000 | 407896.3059 | 0.009195m |
| | ELL HT= | 192.2176 | +0.0002 | 192.2178 | 0.178763m |
| | ORTHO HT= | 225.9561 | +0.0000 | 225.9562 | 0.061174m |
| | GEOID HT= | -33.7385 | +0.0002 | -33.7383 | 0.168934m |
| 13 LOUSBASE | | | | | |
| | Y= | 73453.7458 | +0.0000 | 73453.7458 | 0.009935m |
| | X= | 361270.4664 | +0.0000 | 361270.4664 | 0.008696m |
| | ELL HT= | 110.1379 | -0.0001 | 110.1378 | 0.144980m |
| | ORTHO HT= | 143.3125 | +0.0000 | 143.3125 | 0.079466m |
| | GEOID HT= | -33.1746 | -0.0001 | -33.1747 | 0.171230m |
| 14 SDF A | | | | | |
| | Y= | 76368.0347 | +0.0000 | 76368.0347 | 0.008673m |
| | X= | 370090.2435 | +0.0000 | 370090.2435 | 0.007539m |
| | ELL HT= | 112.6894 | +0.0000 | 112.6894 | 0.139793m |
| | ORTHO HT= | 145.9530 | +0.0000 | 145.9530 | 0.086206m |
| | GEOID HT= | -33.2636 | +0.0000 | -33.2636 | 0.171238m |
| 15 SDF E | | | | | |
| | Y= | 77418.1111 | +0.0000 | 77418.1111 | 0.008555m |
| | X= | 369817.1907 | +0.0000 | 369817.1907 | 0.007431m |
| | ELL HT= | 115.8063 | +0.0000 | 115.8063 | 0.140782m |
| | ORTHO HT= | 149.0748 | +0.0000 | 149.0748 | 0.085682m |
| | GEOID HT= | -33.2685 | +0.0000 | -33.2685 | 0.171249m |
| 16 SNOW RMA | | | | | |
| | Y= | 45556.3154 | +0.0000 | 45556.3154 | 0.012985m |
| | X= | 345917.9192 | +0.0000 | 345917.9192 | 0.013431m |
| | ELL HT= | 240.2349 | -0.0002 | 240.2347 | 0.196678m |
| | ORTHO HT= | 272.9978 | +0.0000 | 272.9978 | 0.105204m |
| | GEOID HT= | -32.7630 | -0.0002 | -32.7631 | 0.168809m |
| 17 X 349 | | | | | |
| | Y= | 88643.3766 | +0.0000 | 88643.3766 | 0.010871m |
| | X= | 374714.3760 | +0.0000 | 374714.3760 | 0.008095m |
| | ELL HT= | 98.8491 | +0.0000 | 98.8491 | 0.156487m |
| | ORTHO HT= | 132.2060 | +0.0000 | 132.2061 | 0.093236m |
| | GEOID HT= | -33.3570 | +0.0000 | -33.3570 | 0.171198m |

OBSERVATION ADJUSTMENT SUMMARY
 NETWORK = LOJIC_PHASE
 TIME = Thu Oct 18 10:05:04 2001

OBSERVATION ADJUSTMENT (Tau = 3.54)

GPS Parameter Group 1 GPS Observations
 Azimuth rotation = -0.0447 seconds 1.96Å = 0.0479 seconds
 Deflection in latitude = +0.1742 seconds 1.96Å = 0.8361 seconds
 Deflection in longitude = +0.0137 seconds 1.96Å = 0.6866 seconds
 Network scale = 1.000000094053 1.96Å = 0.000000188947

| OBS# | BLK#/ REF# | TYPE | BACKSIGHT/ INSTRUMENT/ FORESIGHT | UDVC/ UDPG/ SBNT | OBSERVED/ ADJUSTED/ RESIDUAL | 1.96Å/ 1.96Å/ 1.96Å | TAU |
|------|---------------|-------|--|------------------------|------------------------------------|---------------------------|------|
| 1 | 1 | hgoid | --- | --- | -33.2280m | 0.1713m | 0.34 |
| | 1 | | 31 K ECC | --- | -33.2206m | 0.1708m | |
| | | | --- | 1 | +0.007419m | 0.0122m | |
| 2 | 1 | hgoid | --- | --- | -33.6647m | 0.1713m | 0.40 |
| | 2 | | 48978ECC | --- | -33.6884m | 0.1682m | |
| | | | --- | 1 | -0.023653m | 0.0326m | |
| 3 | 1 | hgoid | --- | --- | -33.3118m | 0.1713m | 0.24 |
| | 3 | | BOWMANRS | --- | -33.3081m | 0.1711m | |
| | | | --- | 1 | +0.003686m | 0.0084m | |
| 4 | 1 | hgoid | --- | --- | -33.2217m | 0.1713m | 0.17 |
| | 4 | | EDWARD 2 | --- | -33.2328m | 0.1675m | |
| | | | --- | 1 | -0.011090m | 0.0357m | |
| 5 | 1 | hgoid | --- | --- | -33.4569m | 0.1713m | 0.18 |
| | 5 | | GOSHENRM | --- | -33.4516m | 0.1705m | |
| | | | --- | 1 | +0.005316m | 0.0165m | |
| 6 | 1 | hgoid | --- | --- | -33.1739m | 0.1713m | 0.00 |
| | 6 | | H 323ECC | --- | -33.1740m | 0.1708m | |
| | | | --- | 1 | -0.000091m | 0.0129m | |
| 7 | 1 | hgoid | --- | --- | -33.5233m | 0.1713m | 0.17 |
| | 7 | | HORRODS | --- | -33.5162m | 0.1696m | |
| | | | --- | 1 | +0.007152m | 0.0238m | |
| 8 | 1 | hgoid | --- | --- | -33.4038m | 0.1713m | 0.19 |
| | 8 | | I64 L 21 | --- | -33.3862m | 0.1630m | |
| | | | --- | 1 | +0.017639m | 0.0525m | |
| 9 | 1 | hgoid | --- | --- | -32.9687m | 0.1713m | 0.38 |
| | 9 | | J 334ECC | --- | -32.9436m | 0.1674m | |
| | | | --- | 1 | +0.025142m | 0.0363m | |
| 10 | 1 | hgoid | --- | --- | -33.2756m | 0.1713m | 0.42 |
| | 10 | | KY 05 | --- | -33.2732m | 0.1713m | |
| | | | --- | 1 | +0.002402m | 0.0032m | |
| 11 | 1 | hgoid | --- | --- | -33.4235m | 0.1713m | 0.36 |
| | 11 | | KY 13 | --- | -33.4272m | 0.1712m | |
| | | | --- | 1 | -0.003640m | 0.0056m | |
| 12 | 1 | hgoid | --- | --- | -33.7168m | 0.1713m | 0.42 |
| | 12 | | lou1 | --- | -33.7383m | 0.1689m | |
| | | | --- | 1 | -0.021505m | 0.0283m | |
| 13 | 1 | hgoid | --- | --- | -33.1795m | 0.1713m | 0.62 |
| | 13 | | LOUSBASE | --- | -33.1747m | 0.1712m | |
| | | | --- | 1 | +0.004780m | 0.0042m | |
| 14 | 1 | hgoid | --- | --- | -33.2668m | 0.1713m | 0.46 |
| | 14 | | SDF A | --- | -33.2636m | 0.1712m | |
| | | | --- | 1 | +0.003208m | 0.0039m | |
| 15 | 1 | hgoid | --- | --- | -33.2712m | 0.1713m | 0.45 |
| | 15 | | SDF E | --- | -33.2685m | 0.1712m | |
| | | | --- | 1 | +0.002752m | 0.0034m | |
| 16 | 1 | hgoid | --- | --- | -32.7839m | 0.1713m | 0.40 |
| | 16 | | SNOW RMA | --- | -32.7631m | 0.1688m | |
| | | | --- | 1 | +0.020788m | 0.0290m | |
| 17 | 1 | hgoid | --- | --- | -33.3588m | 0.1713m | 0.19 |
| | 17 | | X 349 | --- | -33.3570m | 0.1712m | |
| | | | --- | 1 | +0.001850m | 0.0054m | |
| 18 | 1 | gpsaz | --- | --- | 39°03'28.2854" | 0.2364" | 0.01 |
| | 1 | | X 349 | --- | 39°03'28.2812" | 0.1446" | |
| | | | GOSHENRM | 1 | -0.004152" | 0.1870" | |
| 19 | 1 | gpsht | --- | --- | +85.5902m | 0.0467m | 0.06 |
| | 1 | | X 349 | --- | +85.5858m | 0.0281m | |
| | | | GOSHENRM | 1 | -0.004345m | 0.0372m | |
| 20 | 1 | gpsds | --- | --- | 16688.5686m | 0.0192m | 0.27 |
| | 1 | | X 349 | --- | 16688.5761m | 0.0113m | |
| | | | GOSHENRM | 1 | +0.007488m | 0.0156m | |

Observs.log

| | | | | | | | |
|----|----|----------|-----|-----|-----------------|---------|------|
| 21 | 2 | gpsaz | -*- | -*- | 301056'24.4537" | 0.5849" | 0.36 |
| | 1 | lou1 | -*- | -*- | 301056'24.1311" | 0.3073" | |
| | | 48978ECC | | 1 | -0.322539" | 0.4976" | |
| 22 | 2 | gpsht | -*- | -*- | -76.2993m | 0.0318m | 0.55 |
| | 1 | lou1 | -*- | -*- | -76.3259m | 0.0169m | |
| | | 48978ECC | | 1 | -0.026568m | 0.0269m | |
| 23 | 2 | gpsds | -*- | -*- | 4707.5786m | 0.0122m | 0.07 |
| | 1 | lou1 | -*- | -*- | 4707.5800m | 0.0064m | |
| | | 48978ECC | | 1 | +0.001341m | 0.0104m | |
| 24 | 3 | gpsaz | -*- | -*- | 170035'20.7933" | 2.3399" | 0.31 |
| | 1 | KY 05 | -*- | -*- | 170035'21.7482" | 1.6079" | |
| | | SDF E | | 1 | +0.954935" | 1.7000" | |
| 25 | 3 | gpsht | -*- | -*- | -0.0543m | 0.0243m | 0.29 |
| | 1 | KY 05 | -*- | -*- | -0.0635m | 0.0170m | |
| | | SDF E | | 1 | -0.009227m | 0.0174m | |
| 26 | 3 | gpsds | -*- | -*- | 814.1547m | 0.0095m | 0.10 |
| | 1 | KY 05 | -*- | -*- | 814.1535m | 0.0069m | |
| | | SDF E | | 1 | -0.001164m | 0.0065m | |
| 27 | 4 | gpsaz | -*- | -*- | 270059'25.5419" | 0.0611" | 0.28 |
| | 1 | KY 13 | -*- | -*- | 270059'25.5627" | 0.0447" | |
| | | SNOW RMA | | 1 | +0.020847" | 0.0418" | |
| 28 | 4 | gpsht | -*- | -*- | +66.2892m | 0.0272m | 0.46 |
| | 1 | KY 13 | -*- | -*- | +66.3046m | 0.0198m | |
| | | SNOW RMA | | 1 | +0.015395m | 0.0187m | |
| 29 | 4 | gpsds | -*- | -*- | 38375.8187m | 0.0104m | 0.06 |
| | 1 | KY 13 | -*- | -*- | 38375.8179m | 0.0073m | |
| | | SNOW RMA | | 1 | -0.000785m | 0.0074m | |
| 30 | 5 | gpsaz | -*- | -*- | 266029'59.3740" | 0.0891" | 0.24 |
| | 1 | I64 L 21 | -*- | -*- | 266029'59.4035" | 0.0561" | |
| | | KY 05 | | 1 | +0.029502" | 0.0692" | |
| 31 | 5 | gpsht | -*- | -*- | -79.0540m | 0.0320m | 0.17 |
| | 1 | I64 L 21 | -*- | -*- | -79.0616m | 0.0195m | |
| | | KY 05 | | 1 | -0.007609m | 0.0253m | |
| 32 | 5 | gpsds | -*- | -*- | 30200.0282m | 0.0109m | 0.40 |
| | 1 | I64 L 21 | -*- | -*- | 30200.0344m | 0.0068m | |
| | | KY 05 | | 1 | +0.006188m | 0.0085m | |
| 33 | 6 | gpsaz | -*- | -*- | 355054'03.1543" | 0.1203" | 0.06 |
| | 1 | 31 K ECC | -*- | -*- | 355054'03.1439" | 0.0648" | |
| | | KY 05 | | 1 | -0.010479" | 0.1013" | |
| 34 | 6 | gpsht | -*- | -*- | +13.0373m | 0.0415m | 0.21 |
| | 1 | 31 K ECC | -*- | -*- | +13.0234m | 0.0205m | |
| | | KY 05 | | 1 | -0.013914m | 0.0361m | |
| 35 | 6 | gpsds | -*- | -*- | 23066.8701m | 0.0170m | 0.16 |
| | 1 | 31 K ECC | -*- | -*- | 23066.8743m | 0.0087m | |
| | | KY 05 | | 1 | +0.004181m | 0.0145m | |
| 36 | 7 | gpsaz | -*- | -*- | 246011'47.0772" | 0.1151" | 0.14 |
| | 1 | GOSHENRM | -*- | -*- | 246011'47.0543" | 0.0736" | |
| | | EDWARD 2 | | 1 | -0.022865" | 0.0885" | |
| 37 | 7 | gpsht | -*- | -*- | +61.8959m | 0.0426m | 0.55 |
| | 1 | GOSHENRM | -*- | -*- | +61.8630m | 0.0267m | |
| | | EDWARD 2 | | 1 | -0.032887m | 0.0332m | |
| 38 | 7 | gpsds | -*- | -*- | 32941.6879m | 0.0151m | 0.32 |
| | 1 | GOSHENRM | -*- | -*- | 32941.6810m | 0.0095m | |
| | | EDWARD 2 | | 1 | -0.006890m | 0.0118m | |
| 39 | 8 | gpsaz | -*- | -*- | 168042'45.0571" | 0.1314" | 0.09 |
| | 1 | I64 L 21 | -*- | -*- | 168042'45.0397" | 0.0672" | |
| | | 48978ECC | | 1 | -0.017373" | 0.1129" | |
| 40 | 8 | gpsht | -*- | -*- | -79.0876m | 0.0401m | 0.46 |
| | 1 | I64 L 21 | -*- | -*- | -79.0587m | 0.0193m | |
| | | 48978ECC | | 1 | +0.028950m | 0.0352m | |
| 41 | 8 | gpsds | -*- | -*- | 20812.5382m | 0.0169m | 0.34 |
| | 1 | I64 L 21 | -*- | -*- | 20812.5472m | 0.0082m | |
| | | 48978ECC | | 1 | +0.008948m | 0.0148m | |
| 42 | 9 | gpsaz | -*- | -*- | 94022'55.1295" | 0.3041" | 0.01 |
| | 1 | J 334ECC | -*- | -*- | 94022'55.1231" | 0.0810" | |
| | | 31 K ECC | | 1 | -0.006392" | 0.2931" | |
| 43 | 9 | gpsht | -*- | -*- | +1.1646m | 0.0586m | 0.05 |
| | 1 | J 334ECC | -*- | -*- | +1.1695m | 0.0190m | |
| | | 31 K ECC | | 1 | +0.004897m | 0.0555m | |
| 44 | 9 | gpsds | -*- | -*- | 20329.5188m | 0.0184m | 0.15 |
| | 1 | J 334ECC | -*- | -*- | 20329.5236m | 0.0068m | |
| | | 31 K ECC | | 1 | +0.004766m | 0.0171m | |
| 45 | 10 | gpsaz | -*- | -*- | 266056'43.0823" | 0.1973" | 0.40 |
| | 1 | lou1 | -*- | -*- | 266056'43.2194" | 0.0473" | |
| | | 31 K ECC | | 1 | +0.137108" | 0.1916" | |

Observs.log

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|----|----|-------|----------|-----|-----------------|---------|------|
| 46 | 10 | gpsht | *** | *** | -89.4097m | 0.0656m | 0.51 |
| | 1 | | lou1 | *** | -89.3521m | 0.0191m | |
| | | | 31 K ECC | 1 | +0.057524m | 0.0628m | |
| 47 | 10 | gpsds | *** | *** | 36615.3778m | 0.0209m | 0.55 |
| | 1 | | lou1 | *** | 36615.3976m | 0.0068m | |
| | | | 31 K ECC | 1 | +0.019765m | 0.0197m | |
| 48 | 11 | gpsaz | *** | *** | 171026'15.8812" | 0.2717" | 0.19 |
| | 1 | | EDWARD 2 | *** | 171026'15.8103" | 0.1777" | |
| | | | H 323ECC | 1 | -0.070818" | 0.2056" | |
| 49 | 11 | gpsht | *** | *** | -148.0483m | 0.0365m | 0.13 |
| | 1 | | EDWARD 2 | *** | -148.0421m | 0.0241m | |
| | | | H 323ECC | 1 | +0.006269m | 0.0275m | |
| 50 | 11 | gpsds | *** | *** | 9736.7794m | 0.0164m | 0.03 |
| | 1 | | EDWARD 2 | *** | 9736.7788m | 0.0104m | |
| | | | H 323ECC | 1 | -0.000580m | 0.0126m | |
| 51 | 12 | gpsaz | *** | *** | 259023'29.8643" | 0.0894" | 0.13 |
| | 1 | | lou1 | *** | 259023'29.8443" | 0.0280" | |
| | | | SNOW RMA | 1 | -0.020048" | 0.0849" | |
| 52 | 12 | gpsht | *** | *** | +48.0169m | 0.0570m | 0.07 |
| | 1 | | lou1 | *** | +48.0106m | 0.0197m | |
| | | | SNOW RMA | 1 | -0.006314m | 0.0534m | |
| 53 | 12 | gpsds | *** | *** | 63056.1158m | 0.0181m | 0.04 |
| | 1 | | lou1 | *** | 63056.1171m | 0.0071m | |
| | | | SNOW RMA | 1 | +0.001302m | 0.0167m | |
| 54 | 13 | gpsaz | *** | *** | 69011'39.7745" | 0.3568" | 0.25 |
| | 1 | | SNOW RMA | *** | 69011'39.6124" | 0.0596" | |
| | | | 31 K ECC | 1 | -0.162041" | 0.3518" | |
| 55 | 13 | gpsht | *** | *** | -137.4073m | 0.0979m | 0.26 |
| | 1 | | SNOW RMA | *** | -137.3625m | 0.0189m | |
| | | | 31 K ECC | 1 | +0.044723m | 0.0961m | |
| 56 | 13 | gpsds | *** | *** | 27187.9104m | 0.0253m | 0.37 |
| | 1 | | SNOW RMA | *** | 27187.9265m | 0.0070m | |
| | | | 31 K ECC | 1 | +0.016074m | 0.0243m | |
| 57 | 14 | gpsaz | *** | *** | 349047'22.5959" | 0.3648" | 0.25 |
| | 1 | | BOWMANRS | *** | 349047'22.4696" | 0.2386" | |
| | | | X 349 | 1 | -0.126288" | 0.2759" | |
| 58 | 14 | gpsht | *** | *** | -31.6303m | 0.0433m | 0.26 |
| | 1 | | BOWMANRS | *** | -31.6138m | 0.0256m | |
| | | | X 349 | 1 | +0.016409m | 0.0350m | |
| 59 | 14 | gpsds | *** | *** | 7523.0951m | 0.0211m | 0.15 |
| | 1 | | BOWMANRS | *** | 7523.0904m | 0.0121m | |
| | | | X 349 | 1 | -0.004705m | 0.0173m | |
| 60 | 15 | gpsaz | *** | *** | 289015'26.1793" | 0.0889" | 0.07 |
| | 1 | | lou1 | *** | 289015'26.1898" | 0.0340" | |
| | | | LOUSBASE | 1 | +0.010458" | 0.0822" | |
| 61 | 15 | gpsht | *** | *** | -82.1114m | 0.0431m | 0.68 |
| | 1 | | lou1 | *** | -82.0636m | 0.0187m | |
| | | | LOUSBASE | 1 | +0.047756m | 0.0389m | |
| 62 | 15 | gpsds | *** | *** | 49389.3296m | 0.0166m | 0.33 |
| | 1 | | lou1 | *** | 49389.3205m | 0.0068m | |
| | | | LOUSBASE | 1 | -0.009112m | 0.0151m | |
| 63 | 16 | gpsaz | *** | *** | 204039'08.3934" | 0.1799" | 0.07 |
| | 1 | | J 334ECC | *** | 204039'08.3757" | 0.1187" | |
| | | | SNOW RMA | 1 | -0.017738" | 0.1352" | |
| 64 | 16 | gpsht | *** | *** | +138.5275m | 0.0288m | 0.12 |
| | 1 | | J 334ECC | *** | +138.5320m | 0.0190m | |
| | | | SNOW RMA | 1 | +0.004552m | 0.0216m | |
| 65 | 16 | gpsds | *** | *** | 12334.6544m | 0.0112m | 0.06 |
| | 1 | | J 334ECC | *** | 12334.6552m | 0.0077m | |
| | | | SNOW RMA | 1 | +0.000840m | 0.0082m | |
| 66 | 17 | gpsaz | *** | *** | 301056'24.0966" | 0.6387" | 0.03 |
| | 1 | | lou1 | *** | 301056'24.1311" | 0.3073" | |
| | | | 48978ECC | 1 | +0.034576" | 0.5599" | |
| 67 | 17 | gpsht | *** | *** | -76.3125m | 0.0358m | 0.23 |
| | 1 | | lou1 | *** | -76.3259m | 0.0169m | |
| | | | 48978ECC | 1 | -0.013391m | 0.0316m | |
| 68 | 17 | gpsds | *** | *** | 4707.5673m | 0.0127m | 0.64 |
| | 1 | | lou1 | *** | 4707.5800m | 0.0064m | |
| | | | 48978ECC | 1 | +0.012644m | 0.0109m | |
| 69 | 18 | gpsaz | *** | *** | 307005'10.9274" | 0.1524" | 0.31 |
| | 1 | | lou1 | *** | 307005'10.8439" | 0.0408" | |
| | | | BOWMANRS | 1 | -0.083483" | 0.1468" | |
| 70 | 18 | gpsht | *** | *** | -61.7390m | 0.0728m | 0.10 |
| | 1 | | lou1 | *** | -61.7264m | 0.0185m | |
| | | | BOWMANRS | 1 | +0.012626m | 0.0704m | |

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|----|----|-------|----------|-----|-----------------|---------|------|
| 71 | 18 | gpsds | --- | --- | 39923.8637m | 0.0267m | 0.06 |
| | 1 | | lou1 | --- | 39923.8608m | 0.0074m | |
| | | | BOWMANRS | 1 | -0.002861m | 0.0257m | |
| 72 | 19 | gpsaz | --- | --- | 350020'02.0762" | 0.1028" | 0.01 |
| | 1 | | I64 L 21 | --- | 350020'02.0771" | 0.0603" | |
| | | | HORRODS | 1 | +0.000923" | 0.0832" | |
| 73 | 19 | gpsht | --- | --- | +15.3803m | 0.0413m | 0.24 |
| | 1 | | I64 L 21 | --- | +15.3951m | 0.0228m | |
| | | | HORRODS | 1 | +0.014765m | 0.0345m | |
| 74 | 19 | gpsds | --- | --- | 26309.0003m | 0.0133m | 0.07 |
| | 1 | | I64 L 21 | --- | 26309.0015m | 0.0089m | |
| | | | HORRODS | 1 | +0.001237m | 0.0100m | |
| 75 | 20 | gpsaz | --- | --- | 94022'55.1333" | 0.1485" | 0.05 |
| | 1 | | J 334ECC | --- | 94022'55.1231" | 0.0810" | |
| | | | 31 K ECC | 1 | -0.010188" | 0.1244" | |
| 76 | 20 | gpsht | --- | --- | +1.1641m | 0.0370m | 0.09 |
| | 1 | | J 334ECC | --- | +1.1695m | 0.0190m | |
| | | | 31 K ECC | 1 | +0.005374m | 0.0318m | |
| 77 | 20 | gpsds | --- | --- | 20329.5186m | 0.0134m | 0.24 |
| | 1 | | J 334ECC | --- | 20329.5236m | 0.0068m | |
| | | | 31 K ECC | 1 | +0.005015m | 0.0115m | |
| 78 | 21 | gpsaz | --- | --- | 124038'53.2263" | 0.1660" | 0.19 |
| | 1 | | EDWARD 2 | --- | 124038'53.2721" | 0.1018" | |
| | | | KY 05 | 1 | +0.045758" | 0.1312" | |
| 79 | 21 | gpsht | --- | --- | -130.4143m | 0.0341m | 0.48 |
| | 1 | | EDWARD 2 | --- | -130.4374m | 0.0212m | |
| | | | KY 05 | 1 | -0.023074m | 0.0267m | |
| 80 | 21 | gpsds | --- | --- | 17739.5682m | 0.0133m | 0.11 |
| | 1 | | EDWARD 2 | --- | 17739.5703m | 0.0083m | |
| | | | KY 05 | 1 | +0.002107m | 0.0103m | |
| 81 | 22 | gpsaz | --- | --- | 272049'38.1515" | 0.1845" | 0.13 |
| | 1 | | I64 L 21 | --- | 272049'38.1129" | 0.0820" | |
| | | | BOWMANRS | 1 | -0.038609" | 0.1653" | |
| 82 | 22 | gpsht | --- | --- | -64.4563m | 0.0489m | 0.04 |
| | 1 | | I64 L 21 | --- | -64.4592m | 0.0216m | |
| | | | BOWMANRS | 1 | -0.002957m | 0.0439m | |
| 83 | 22 | gpsds | --- | --- | 23808.7963m | 0.0141m | 0.35 |
| | 1 | | I64 L 21 | --- | 23808.8039m | 0.0074m | |
| | | | BOWMANRS | 1 | +0.007551m | 0.0120m | |
| 84 | 23 | gpsaz | --- | --- | 298000'27.2564" | 0.0819" | 0.03 |
| | 1 | | lou1 | --- | 298000'27.2606" | 0.0361" | |
| | | | SDF E | 1 | +0.004242" | 0.0735" | |
| 85 | 23 | gpsht | --- | --- | -76.4326m | 0.0373m | 0.68 |
| | 1 | | lou1 | --- | -76.3922m | 0.0179m | |
| | | | SDF E | 1 | +0.040322m | 0.0328m | |
| 86 | 23 | gpsds | --- | --- | 43130.3130m | 0.0146m | 0.31 |
| | 1 | | lou1 | --- | 43130.3057m | 0.0067m | |
| | | | SDF E | 1 | -0.007299m | 0.0130m | |
| 87 | 24 | gpsaz | --- | --- | 308032'31.5641" | 0.2109" | 0.04 |
| | 1 | | KY 13 | --- | 308032'31.5759" | 0.1049" | |
| | | | 31 K ECC | 1 | +0.011786" | 0.1830" | |
| 88 | 24 | gpsht | --- | --- | -71.0387m | 0.0427m | 0.29 |
| | 1 | | KY 13 | --- | -71.0580m | 0.0210m | |
| | | | 31 K ECC | 1 | -0.019276m | 0.0372m | |
| 89 | 24 | gpsds | --- | --- | 16563.3894m | 0.0143m | 0.23 |
| | 1 | | KY 13 | --- | 16563.3945m | 0.0079m | |
| | | | 31 K ECC | 1 | +0.005058m | 0.0119m | |
| 90 | 25 | gpsaz | --- | --- | 313029'28.1351" | 0.0924" | 0.19 |
| | 1 | | lou1 | --- | 313029'28.1622" | 0.0445" | |
| | | | X 349 | 1 | +0.027086" | 0.0810" | |
| 91 | 25 | gpsht | --- | --- | -93.2957m | 0.0539m | 0.52 |
| | 1 | | lou1 | --- | -93.3402m | 0.0249m | |
| | | | X 349 | 1 | -0.044537m | 0.0478m | |
| 92 | 25 | gpsds | --- | --- | 45737.8821m | 0.0229m | 0.26 |
| | 1 | | lou1 | --- | 45737.8725m | 0.0107m | |
| | | | X 349 | 1 | -0.009552m | 0.0202m | |
| 93 | 26 | gpsaz | --- | --- | 307005'10.7752" | 0.1057" | 0.39 |
| | 1 | | lou1 | --- | 307005'10.8439" | 0.0408" | |
| | | | BOWMANRS | 1 | +0.068674" | 0.0975" | |
| 94 | 26 | gpsht | --- | --- | -61.7752m | 0.0421m | 0.72 |
| | 1 | | lou1 | --- | -61.7264m | 0.0185m | |
| | | | BOWMANRS | 1 | +0.048869m | 0.0378m | |
| 95 | 26 | gpsds | --- | --- | 39923.8658m | 0.0167m | 0.18 |
| | 1 | | lou1 | --- | 39923.8608m | 0.0074m | |
| | | | BOWMANRS | 1 | -0.005000m | 0.0150m | |

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|-----|----|-------|------------------------------|-------------------|--|-------------------------------|------|
| 96 | 27 | gpsaz | ***- 48978ECC HORRODS | ***- ***- 1 | 349037'04.0527" 349037'04.0090" -0.043727" | 0.0607" 0.0367" 0.0483" | 0.50 |
| 97 | 27 | gpsht | ***- 48978ECC HORRODS | ***- ***- 1 | +94.4619m +94.4538m -0.008123m | 0.0376m 0.0240m 0.0290m | 0.15 |
| 98 | 27 | gpsds | ***- 48978ECC HORRODS | ***- ***- 1 | 47116.8956m 47116.8958m +0.000217m | 0.0156m 0.0098m 0.0121m | 0.01 |
| 99 | 28 | gpsaz | ***- I64 L 21 HORRODS | ***- ***- 1 | 350020'02.0193" 350020'02.0771" +0.057856" | 0.1260" 0.0603" 0.1107" | 0.29 |
| 100 | 28 | gpsht | ***- I64 L 21 HORRODS | ***- ***- 1 | +15.4282m +15.3951m -0.033063m | 0.0489m 0.0228m 0.0433m | 0.42 |
| 101 | 28 | gpsds | ***- I64 L 21 HORRODS | ***- ***- 1 | 26308.9955m 26309.0015m +0.006048m | 0.0208m 0.0089m 0.0188m | 0.18 |
| 102 | 29 | gpsaz | ***- SDF E H 323ECC | ***- ***- 1 | 275025'23.9810" 275025'23.9221" -0.058884" | 0.2325" 0.1451" 0.1816" | 0.18 |
| 103 | 29 | gpsht | ***- SDF E H 323ECC | ***- ***- 1 | -17.5855m -17.5412m +0.044277m | 0.0416m 0.0237m 0.0343m | 0.72 |
| 104 | 29 | gpsds | ***- SDF E H 323ECC | ***- ***- 1 | 13336.7825m 13336.7871m +0.004642m | 0.0119m 0.0078m 0.0089m | 0.29 |
| 105 | 30 | gpsaz | ***- LOUSBASE SDF A | ***- ***- 1 | 71042'54.1836" 71042'54.2123" +0.028747" | 0.2554" 0.1499" 0.2067" | 0.08 |
| 106 | 30 | gpsht | ***- LOUSBASE SDF A | ***- ***- 1 | +2.5599m +2.5536m -0.006293m | 0.0315m 0.0167m 0.0267m | 0.13 |
| 107 | 30 | gpsds | ***- LOUSBASE SDF A | ***- ***- 1 | 9288.7890m 9288.7870m -0.002018m | 0.0103m 0.0061m 0.0082m | 0.14 |
| 108 | 31 | gpsaz | ***- BOWMANRS KY 05 | ***- ***- 1 | 244037'37.1626" 244037'37.0771" -0.085421" | 0.3671" 0.2296" 0.2864" | 0.17 |
| 109 | 31 | gpsht | ***- BOWMANRS KY 05 | ***- ***- 1 | -14.6130m -14.6024m +0.010580m | 0.0302m 0.0185m 0.0238m | 0.25 |
| 110 | 31 | gpsds | ***- BOWMANRS KY 05 | ***- ***- 1 | 7043.2930m 7043.2931m +0.000123m | 0.0122m 0.0071m 0.0099m | 0.01 |
| 111 | 32 | gpsaz | ***- lou1 J 334ECC | ***- ***- 1 | 269035'55.9396" 269035'55.9341" -0.005476" | 0.0981" 0.0280" 0.0940" | 0.03 |
| 112 | 32 | gpsht | ***- lou1 J 334ECC | ***- ***- 1 | -90.5226m -90.5215m +0.001148m | 0.0553m 0.0181m 0.0523m | 0.01 |
| 113 | 32 | gpsds | ***- lou1 J 334ECC | ***- ***- 1 | 56834.8593m 56834.8625m +0.003235m | 0.0177m 0.0063m 0.0166m | 0.11 |
| 114 | 33 | gpsaz | ***- lou1 I64 L 21 | ***- ***- 1 | 340035'27.7723" 340035'27.7257" -0.046625" | 0.1960" 0.0561" 0.1878" | 0.14 |
| 115 | 33 | gpsht | ***- lou1 I64 L 21 | ***- ***- 1 | +2.7396m +2.7328m -0.006817m | 0.0686m 0.0184m 0.0661m | 0.06 |
| 116 | 33 | gpsds | ***- lou1 I64 L 21 | ***- ***- 1 | 24280.2683m 24280.2678m -0.000474m | 0.0281m 0.0078m 0.0270m | 0.01 |
| 117 | 34 | gpsaz | ***- J 334ECC LOUSBASE | ***- ***- 1 | 31027'16.4260" 31027'16.4201" -0.005873" | 0.1116" 0.0766" 0.0812" | 0.04 |
| 118 | 34 | gpsht | ***- J 334ECC LOUSBASE | ***- ***- 1 | +8.4810m +8.4579m -0.023079m | 0.0306m 0.0202m 0.0231m | 0.55 |
| 119 | 34 | gpsds | ***- J 334ECC LOUSBASE | ***- ***- 1 | 19561.4923m 19561.4946m +0.002282m | 0.0114m 0.0080m 0.0082m | 0.15 |
| 120 | 35 | gpsaz | ***- lou1 I64 L 21 | ***- ***- 1 | 340035'27.7626" 340035'27.7257" -0.036933" | 0.1543" 0.0561" 0.1437" | 0.14 |

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|-----|----|-------|------------------|--------------|------------------------------------|--------------------|------|
| 121 | 35 | gpsht | ***- lou1 | ***- ***- | +2.7124m +2.7328m | 0.0537m 0.0184m | 0.22 |
| | 1 | | I64 L 21 | 1 | +0.020453m | 0.0504m | |
| 122 | 35 | gpsds | ***- lou1 | ***- ***- | 24280.2608m 24280.2678m | 0.0222m 0.0078m | 0.19 |
| | 1 | | I64 L 21 | 1 | +0.007092m | 0.0208m | |
| 123 | 36 | gpsaz | ***- SDF A | ***- ***- | 345025'26.7643" 345025'26.7069" | 1.6869" 1.0169" | 0.02 |
| | 1 | | SDF E | 1 | -0.057395" | 1.3459" | |
| 124 | 36 | gpsht | ***- SDF A | ***- ***- | +3.1137m +3.1178m | 0.0244m 0.0144m | 0.12 |
| | 1 | | SDF E | 1 | +0.004127m | 0.0196m | |
| 125 | 36 | gpsds | ***- SDF A | ***- ***- | 1084.9967m 1084.9971m | 0.0091m 0.0056m | 0.03 |
| | 1 | | SDF E | 1 | +0.000390m | 0.0072m | |
| 126 | 37 | gpsaz | ***- EDWARD 2 | ***- ***- | 89001'03.4612" 89001'03.3898" | 0.1841" 0.1218" | 0.29 |
| | 1 | | X 349 | 1 | -0.071395" | 0.1381" | |
| 127 | 37 | gpsht | ***- EDWARD 2 | ***- ***- | -147.4705m -147.4488m | 0.0391m 0.0251m | 0.40 |
| | 1 | | X 349 | 1 | +0.021681m | 0.0300m | |
| 128 | 37 | gpsds | ***- EDWARD 2 | ***- ***- | 19626.8061m 19626.8079m | 0.0134m 0.0088m | 0.10 |
| | 1 | | X 349 | 1 | +0.001853m | 0.0102m | |
| 129 | 38 | gpsaz | ***- lou1 | ***- ***- | 269035'55.9257" 269035'55.9341" | 0.0668" 0.0280" | 0.08 |
| | 1 | | J 334ECC | 1 | +0.008429" | 0.0607" | |
| 130 | 38 | gpsht | ***- lou1 | ***- ***- | -90.4903m -90.5215m | 0.0466m 0.0181m | 0.40 |
| | 1 | | J 334ECC | 1 | -0.031189m | 0.0429m | |
| 131 | 38 | gpsds | ***- lou1 | ***- ***- | 56834.8686m 56834.8625m | 0.0144m 0.0063m | 0.26 |
| | 1 | | J 334ECC | 1 | -0.006150m | 0.0130m | |
| 132 | 39 | gpsaz | ***- BOWMANRS | ***- ***- | 230043'42.1654" 230043'42.2192" | 0.3031" 0.2039" | 0.13 |
| | 1 | | SDF A | 1 | +0.053802" | 0.2242" | |
| 133 | 39 | gpsht | ***- BOWMANRS | ***- ***- | -17.7796m -17.7837m | 0.0284m 0.0188m | 0.11 |
| | 1 | | SDF A | 1 | -0.004149m | 0.0213m | |
| 134 | 39 | gpsds | ***- BOWMANRS | ***- ***- | 7695.7558m 7695.7581m | 0.0118m 0.0076m | 0.14 |
| | 1 | | SDF A | 1 | +0.002344m | 0.0090m | |
| 135 | 40 | gpsaz | ***- lou1 | ***- ***- | 292043'46.7030" 292043'46.6996" | 0.0728" 0.0339" | 0.03 |
| | 1 | | H 323ECC | 1 | -0.003380" | 0.0645" | |
| 136 | 40 | gpsht | ***- lou1 | ***- ***- | -93.8643m -93.9334m | 0.0450m 0.0224m | 0.98 |
| | 1 | | H 323ECC | 1 | -0.069108m | 0.0390m | |
| 137 | 40 | gpsds | ***- lou1 | ***- ***- | 55680.4586m 55680.4453m | 0.0171m 0.0080m | 0.49 |
| | 1 | | H 323ECC | 1 | -0.013322m | 0.0151m | |
| 138 | 41 | gpsaz | ***- KY 05 | ***- ***- | 240027'43.0433" 240027'43.0594" | 0.2687" 0.1598" | 0.04 |
| | 1 | | LOUSBASE | 1 | +0.016086" | 0.2160" | |
| 139 | 41 | gpsht | ***- KY 05 | ***- ***- | -5.7248m -5.7349m | 0.0302m 0.0185m | 0.23 |
| | 1 | | LOUSBASE | 1 | -0.010121m | 0.0239m | |
| 140 | 41 | gpsds | ***- KY 05 | ***- ***- | 9670.4853m 9670.4902m | 0.0126m 0.0073m | 0.26 |
| | 1 | | LOUSBASE | 1 | +0.004865m | 0.0103m | |
| 141 | 42 | gpsaz | ***- SDF E | ***- ***- | 165025'26.6238" 165025'26.7069" | 1.7231" 1.0169" | 0.03 |
| | 1 | | SDF A | 1 | +0.083049" | 1.3910" | |
| 142 | 42 | gpsht | ***- SDF E | ***- ***- | -3.1139m -3.1178m | 0.0240m 0.0144m | 0.11 |
| | 1 | | SDF A | 1 | -0.003913m | 0.0192m | |
| 143 | 42 | gpsds | ***- SDF E | ***- ***- | 1084.9969m 1084.9971m | 0.0092m 0.0056m | 0.01 |
| | 1 | | SDF A | 1 | +0.000182m | 0.0074m | |
| 144 | 43 | gpsaz | ***- 48978ECC | ***- ***- | 262014'02.4172" 262014'02.4039" | 0.1117" 0.0545" | 0.08 |
| | 1 | | 31 K ECC | 1 | -0.013286" | 0.0976" | |
| 145 | 43 | gpsht | ***- 48978ECC | ***- ***- | -13.0014m -13.0263m | 0.0435m 0.0200m | 0.36 |
| | 1 | | 31 K ECC | 1 | -0.024866m | 0.0386m | |

| | | | | | | | |
|-----|----|-------|----------|-----|-----------------|---------|------|
| 146 | 43 | gpsds | --- | --- | 32869.9832m | 0.0157m | 0.14 |
| | 1 | | 48978ECC | --- | 32869.9866m | 0.0071m | |
| | | | 31 K ECC | 1 | +0.003405m | 0.0139m | |
| 147 | 44 | gpsaz | --- | --- | 251042'54.2714" | 0.2812" | 0.14 |
| | 1 | | SDF A | --- | 251042'54.2121" | 0.1499" | |
| | | | LOUSBASE | 1 | -0.059328" | 0.2379" | |
| 148 | 44 | gpsht | --- | --- | -2.5554m | 0.0297m | 0.04 |
| | 1 | | SDF A | --- | -2.5536m | 0.0167m | |
| | | | LOUSBASE | 1 | +0.001799m | 0.0245m | |
| 149 | 44 | gpsds | --- | --- | 9288.7856m | 0.0119m | 0.08 |
| | 1 | | SDF A | --- | 9288.7870m | 0.0061m | |
| | | | LOUSBASE | 1 | +0.001468m | 0.0102m | |
| 150 | 45 | gpsaz | --- | --- | 12006'35.0848" | 0.0687" | 0.29 |
| | 1 | | SNOW RMA | --- | 12006'35.0551" | 0.0401" | |
| | | | EDWARD 2 | 1 | -0.029716" | 0.0558" | |
| 151 | 45 | gpsht | --- | --- | +6.0681m | 0.0370m | 0.57 |
| | 1 | | SNOW RMA | --- | +6.0982m | 0.0227m | |
| | | | EDWARD 2 | 1 | +0.030102m | 0.0292m | |
| 152 | 45 | gpsds | --- | --- | 43723.5176m | 0.0166m | 0.13 |
| | 1 | | SNOW RMA | --- | 43723.5206m | 0.0100m | |
| | | | EDWARD 2 | 1 | +0.003011m | 0.0132m | |
| 153 | 46 | gpsaz | --- | --- | 203050'12.5993" | 0.0590" | 0.01 |
| | 1 | | I64 L 21 | --- | 203050'12.5982" | 0.0398" | |
| | | | KY 13 | 1 | -0.001110" | 0.0435" | |
| 154 | 46 | gpsht | --- | --- | -21.0337m | 0.0280m | 0.19 |
| | 1 | | I64 L 21 | --- | -21.0270m | 0.0198m | |
| | | | KY 13 | 1 | +0.006701m | 0.0198m | |
| 155 | 46 | gpsds | --- | --- | 38452.0604m | 0.0118m | 0.14 |
| | 1 | | I64 L 21 | --- | 38452.0583m | 0.0083m | |
| | | | KY 13 | 1 | -0.002056m | 0.0084m | |
| 156 | 47 | gpsaz | --- | --- | 249011'39.5927" | 0.1037" | 0.12 |
| | 1 | | 31 K ECC | --- | 249011'39.6117" | 0.0595" | |
| | | | SNOW RMA | 1 | +0.018992" | 0.0849" | |
| 157 | 47 | gpsht | --- | --- | +137.3674m | 0.0344m | 0.09 |
| | 1 | | 31 K ECC | --- | +137.3626m | 0.0189m | |
| | | | SNOW RMA | 1 | -0.004866m | 0.0287m | |
| 158 | 47 | gpsds | --- | --- | 27187.9255m | 0.0126m | 0.05 |
| | 1 | | 31 K ECC | --- | 27187.9265m | 0.0070m | |
| | | | SNOW RMA | 1 | +0.000967m | 0.0105m | |
| 159 | 48 | gpsaz | --- | --- | 332058'30.4506" | 0.0935" | 0.17 |
| | 1 | | lou1 | --- | 332058'30.4766" | 0.0395" | |
| | | | GOSHENRM | 1 | +0.026018" | 0.0847" | |
| 160 | 48 | gpsht | --- | --- | -7.7058m | 0.0621m | 0.48 |
| | 1 | | lou1 | --- | -7.7544m | 0.0264m | |
| | | | GOSHENRM | 1 | -0.048603m | 0.0562m | |
| 161 | 48 | gpsds | --- | --- | 49884.5405m | 0.0268m | 0.44 |
| | 1 | | lou1 | --- | 49884.5211m | 0.0115m | |
| | | | GOSHENRM | 1 | -0.019415m | 0.0242m | |
| 162 | 49 | gpsaz | --- | --- | 194002'04.2121" | 0.1069" | 0.30 |
| | 1 | | H 323ECC | --- | 194002'04.1688" | 0.0712" | |
| | | | J 334ECC | 1 | -0.043325" | 0.0797" | |
| 163 | 49 | gpsht | --- | --- | +3.4199m | 0.0363m | 0.16 |
| | 1 | | H 323ECC | --- | +3.4118m | 0.0230m | |
| | | | J 334ECC | 1 | -0.008079m | 0.0280m | |
| 164 | 49 | gpsds | --- | --- | 22586.0889m | 0.0139m | 0.19 |
| | 1 | | H 323ECC | --- | 22586.0853m | 0.0092m | |
| | | | J 334ECC | 1 | -0.003641m | 0.0105m | |
| 165 | 50 | gpsaz | --- | --- | 233001'58.5147" | 0.1203" | 0.27 |
| | 1 | | 48978ECC | --- | 233001'58.5624" | 0.0695" | |
| | | | KY 13 | 1 | +0.047664" | 0.0982" | |
| 166 | 50 | gpsht | --- | --- | +58.0345m | 0.0390m | 0.05 |
| | 1 | | 48978ECC | --- | +58.0317m | 0.0209m | |
| | | | KY 13 | 1 | -0.002837m | 0.0328m | |
| 167 | 50 | gpsds | --- | --- | 24548.0620m | 0.0146m | 0.01 |
| | 1 | | 48978ECC | --- | 24548.0622m | 0.0081m | |
| | | | KY 13 | 1 | +0.000254m | 0.0122m | |
| 168 | 51 | gpsaz | --- | --- | 66038'01.5543" | 0.2854" | 0.21 |
| | 1 | | GOSHENRM | --- | 66038'01.6249" | 0.2129" | |
| | | | HORRODS | 1 | +0.070585" | 0.1900" | |
| 169 | 51 | gpsht | --- | --- | +25.8749m | 0.0381m | 0.16 |
| | 1 | | GOSHENRM | --- | +25.8824m | 0.0276m | |
| | | | HORRODS | 1 | +0.007440m | 0.0263m | |
| 170 | 51 | gpsds | --- | --- | 11089.9010m | 0.0137m | 0.10 |
| | 1 | | GOSHENRM | --- | 11089.9027m | 0.0099m | |
| | | | HORRODS | 1 | +0.001715m | 0.0095m | |

| | | | | | | |
|-----|----|-------|---------------|-----------------|---------|------|
| 171 | 52 | gpsaz | ***- ***- | 296ø55'41.0253" | 0.0794" | 0.20 |
| | 1 | | lou1 ***- | 296ø55'41.0505" | 0.0363" | |
| | | | SDF A 1 | +0.025185" | 0.0706" | |
| 172 | 52 | gpsht | ***- ***- | -79.5496m | 0.0363m | 0.69 |
| | 1 | | lou1 ***- | -79.5101m | 0.0174m | |
| | | | SDF A 1 | +0.039557m | 0.0319m | |
| 173 | 52 | gpsds | ***- ***- | 42403.6620m | 0.0140m | 0.38 |
| | 1 | | lou1 ***- | 42403.6534m | 0.0065m | |
| | | | SDF A 1 | -0.008609m | 0.0124m | |
| 174 | 53 | gpsaz | ***- ***- | 262ø14'02.3473" | 0.2170" | 0.15 |
| | 1 | | 48978ECC ***- | 262ø14'02.4039" | 0.0545" | |
| | | | 31 K ECC 1 | +0.056602" | 0.2101" | |
| 175 | 53 | gpsht | ***- ***- | -13.0296m | 0.0657m | 0.03 |
| | 1 | | 48978ECC ***- | -13.0263m | 0.0200m | |
| | | | 31 K ECC 1 | +0.003311m | 0.0625m | |
| 176 | 53 | gpsds | ***- ***- | 32869.9855m | 0.0209m | 0.03 |
| | 1 | | 48978ECC ***- | 32869.9866m | 0.0071m | |
| | | | 31 K ECC 1 | +0.001180m | 0.0196m | |

SUMMARY OF COVARIANCES
 NETWORK = LOJIC_PHASE
 TIME = Thu Oct 18 10:05:04 2001

Definition of precision $(E \times S)\hat{y} = C\hat{y} + P\hat{y}$:

Horizontal:

Precision (P) expressed as: ratio
 Propagated linear error (E): U.S.
 (standard error of adjusted horizontal distance)
 Scalar (S) on propagated linear error: 1.0000
 Constant error term (C): 0.0000

3-Dimensional:

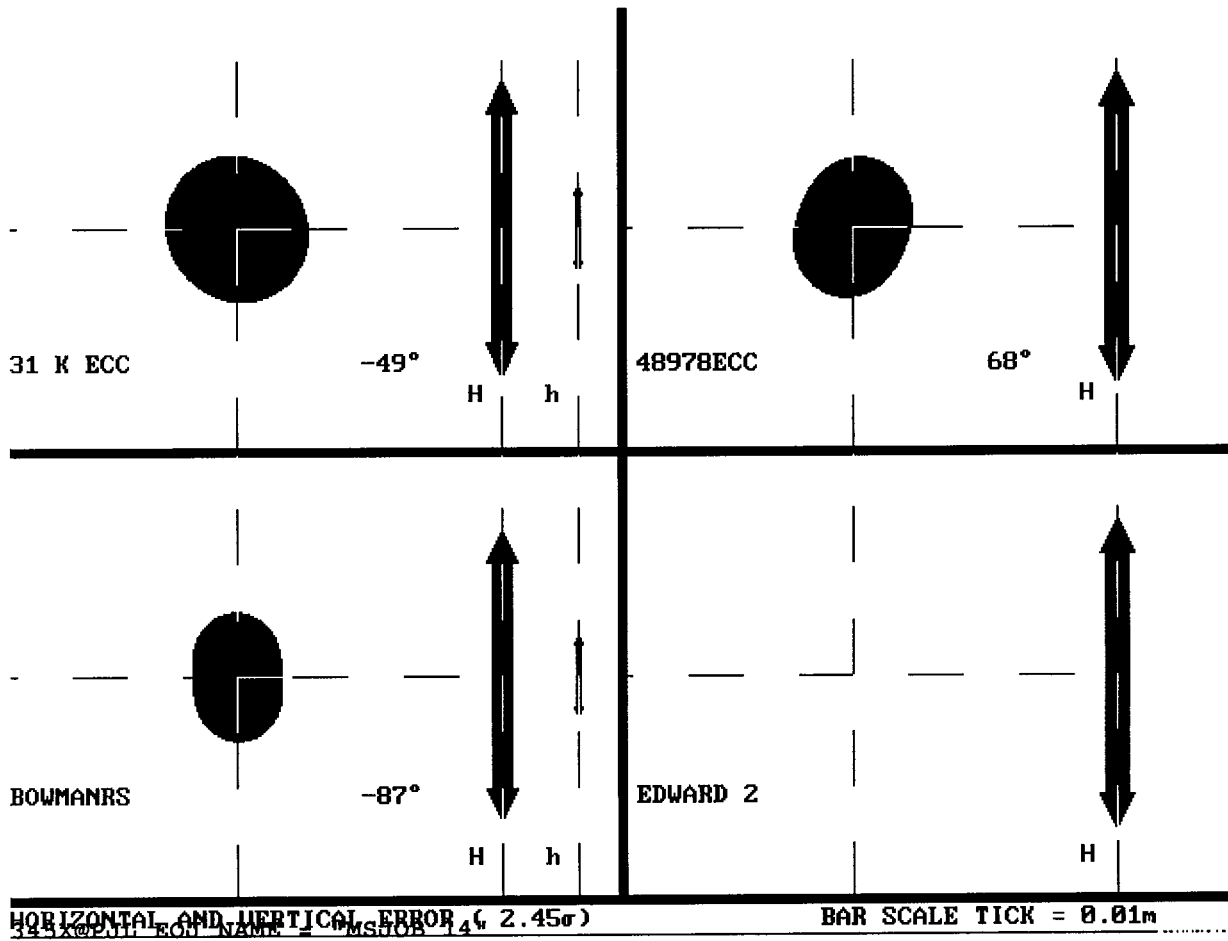
Precision (P) expressed as: ratio
 Propagated linear error (E): U.S.
 (standard error of adjusted slope distance)
 Scalar (S) on propagated linear error: 1.0000
 Constant error term (C): 0.0000
 Using orthometric height errors

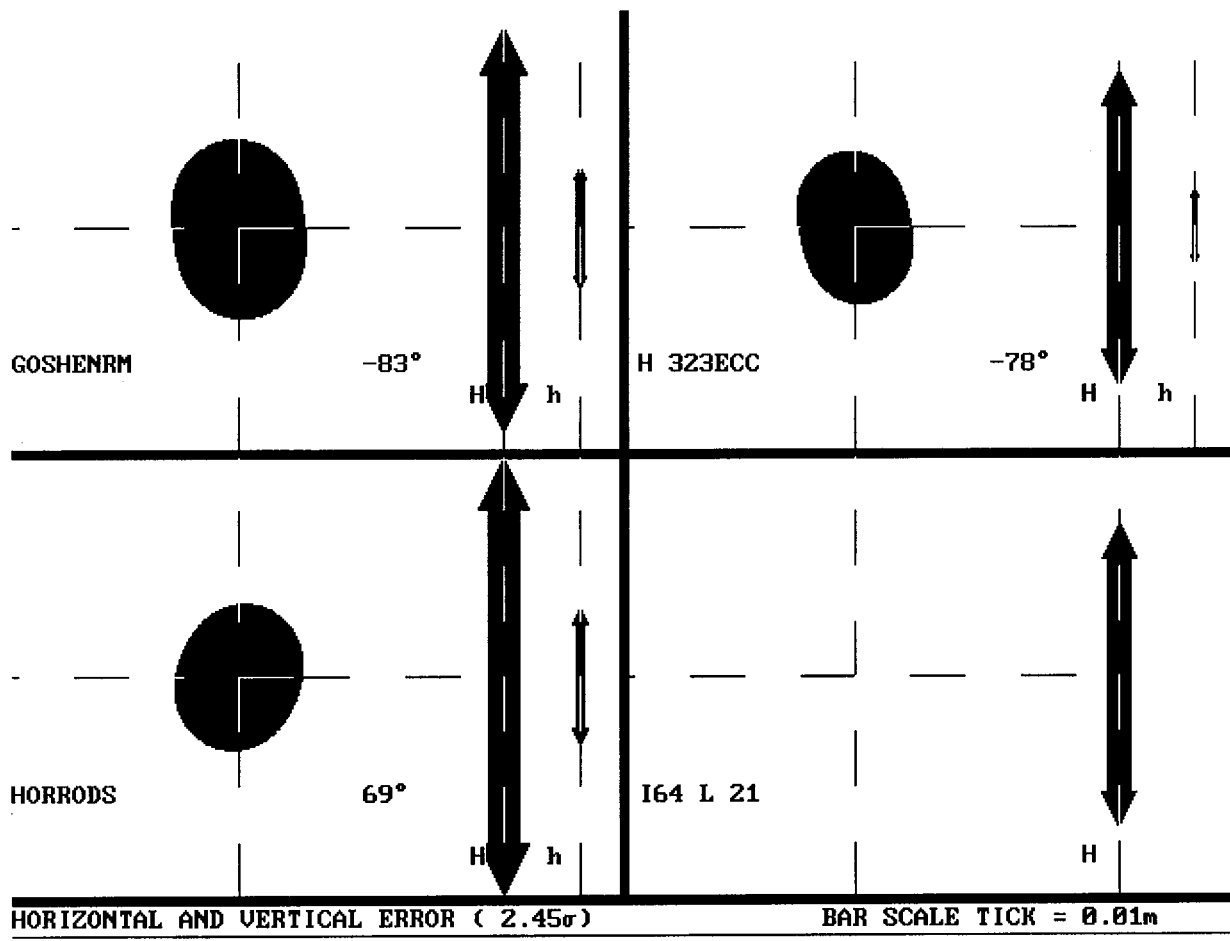
| FROM/ TO | AZIMUTH/ DELTA H | 1.96 $\hat{\sigma}$ 1.96 $\hat{\sigma}$ | DISTANCE/ DELTA h | 1.96 $\hat{\sigma}$ 1.96 $\hat{\sigma}$ | HOR PREC/ 3-D PREC |
|----------------------|--------------------------------------|--|--------------------------|--|--------------------------|
| 31 K ECC 48978ECC | 82 \emptyset 14'02" +13.0244m | 0.07" 0.1114m | 32869.984m +13.4922m | 0.0089m 0.0958m | 1: 7221824 1: 7221824 |
| 31 K ECC J 334ECC | 274 \emptyset 22'55" -1.1718m | 0.09" 0.0694m | 20329.522m -1.4488m | 0.0075m 0.0958m | 1: 5280921 1: 5280921 |
| 31 K ECC KY 05 | 355 \emptyset 54'03" +13.0038m | 0.08" 0.0946m | 23066.872m +13.0564m | 0.0097m 0.1098m | 1: 4643306 1: 4643306 |
| 31 K ECC KY 13 | 128 \emptyset 32'32" +71.0674m | 0.11" 0.0627m | 16563.393m +71.2740m | 0.0082m 0.1015m | 1: 3964468 1: 3964468 |
| 31 K ECC lou1 | 86 \emptyset 56'43" +89.3526m | 0.07" 0.1234m | 36615.394m +89.8703m | 0.0096m 0.1098m | 1: 7500285 1: 7500285 |
| 31 K ECC SNOW RMA | 249 \emptyset 11'40" +137.3694m | 0.07" 0.0964m | 27187.924m +136.9120m | 0.0083m 0.1249m | 1: 6393835 1: 6393835 |
| 48978ECC HORRODS | 349 \emptyset 37'04" +94.4141m | 0.06" 0.1893m | 47116.892m +94.2419m | 0.0135m 0.1500m | 1: 6858113 1: 6858113 |
| 48978ECC I64 L 21 | 348 \emptyset 42'45" +79.0412m | 0.09" 0.0839m | 20812.545m -***- | 0.0094m -***- | 1: 4319192 1: 4319192 |
| 48978ECC KY 13 | 233 \emptyset 01'59" +58.0431m | 0.09" 0.0926m | 24548.060m +57.7819m | 0.0093m 0.1176m | 1: 5155155 1: 5155155 |
| 48978ECC lou1 | 121 \emptyset 56'24" +76.3282m | 0.32" 0.0243m | 4707.580m +76.3782m | 0.0066m 0.0612m | 1: 1402078 1: 1402078 |
| BOWMANRS I64 L 21 | 92 \emptyset 49'38" +64.4615m | 0.08" 0.0813m | 23808.802m +64.5396m | 0.0069m 0.0885m | 1: 6747602 1: 6747602 |
| BOWMANRS KY 05 | 244 \emptyset 37'37" -14.6002m | 0.23" 0.0310m | 7043.292m -14.6352m | 0.0072m 0.0675m | 1: 1917875 1: 1917875 |
| BOWMANRS lou1 | 127 \emptyset 05'11" +61.7485m | 0.06" 0.1424m | 39923.857m +62.1788m | 0.0105m 0.1094m | 1: 7461193 1: 7461193 |
| BOWMANRS SDF A | 230 \emptyset 43'42" -17.7799m | 0.21" 0.0340m | 7695.757m -17.8244m | 0.0077m 0.0707m | 1: 1950043 1: 1950043 |
| BOWMANRS X 349 | 349 \emptyset 47'23" -31.6202m | 0.24" 0.0392m | 7523.090m -31.5713m | 0.0121m 0.0744m | 1: 1219488 1: 1219488 |
| EDWARD 2 GOSHENRM | 66 \emptyset 11'47" -61.8726m | 0.07" 0.1188m | 32941.678m -61.6539m | 0.0095m 0.1281m | 1: 6766328 1: 6766328 |
| EDWARD 2 H 323ECC | 171 \emptyset 26'16" -148.0339m | 0.18" 0.0444m | 9736.778m -148.0927m | 0.0103m 0.0707m | 1: 1860930 1: 1860930 |
| EDWARD 2 | 124 \emptyset 38'53" | 0.08" | 17739.569m | 0.0069m | 1: 5061171 |

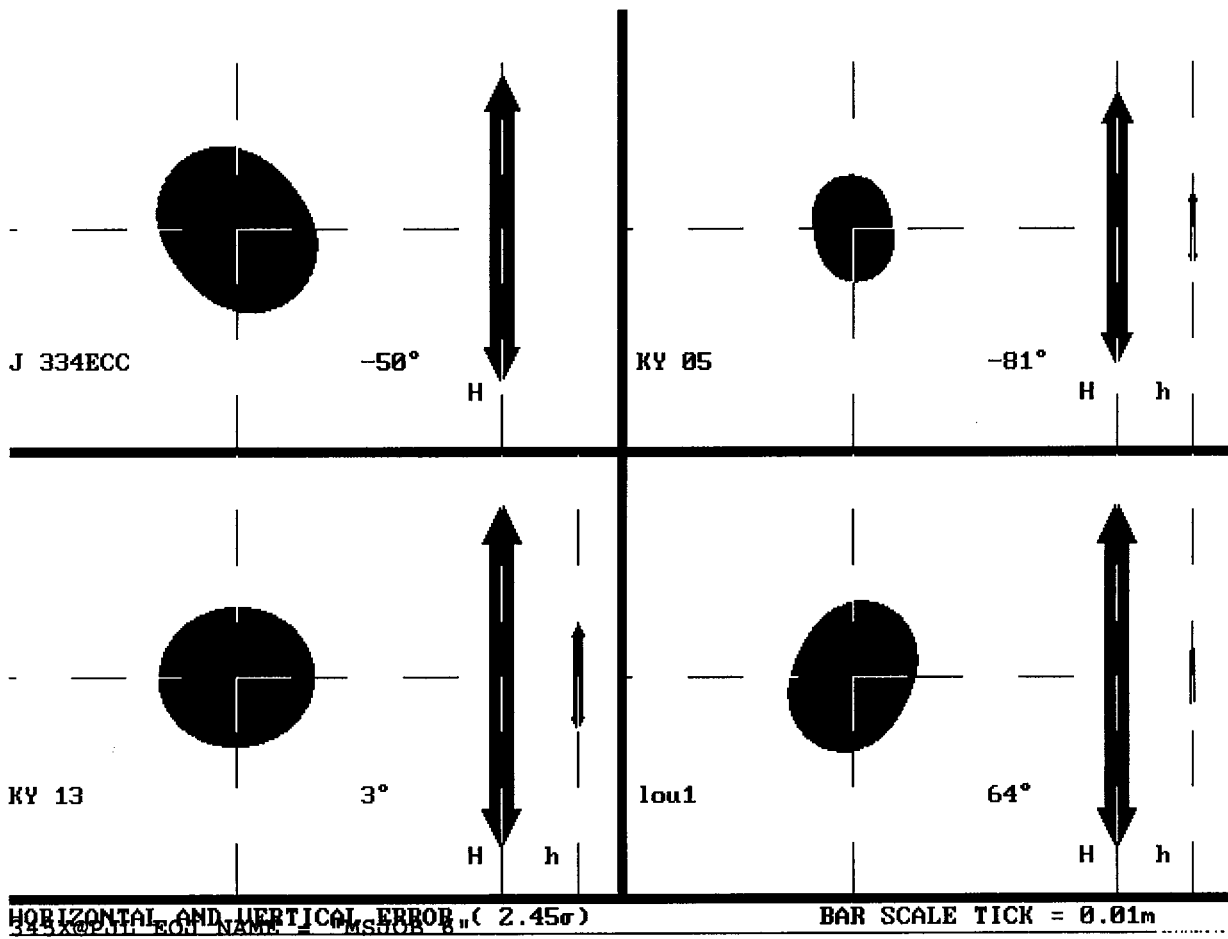
Covar.log

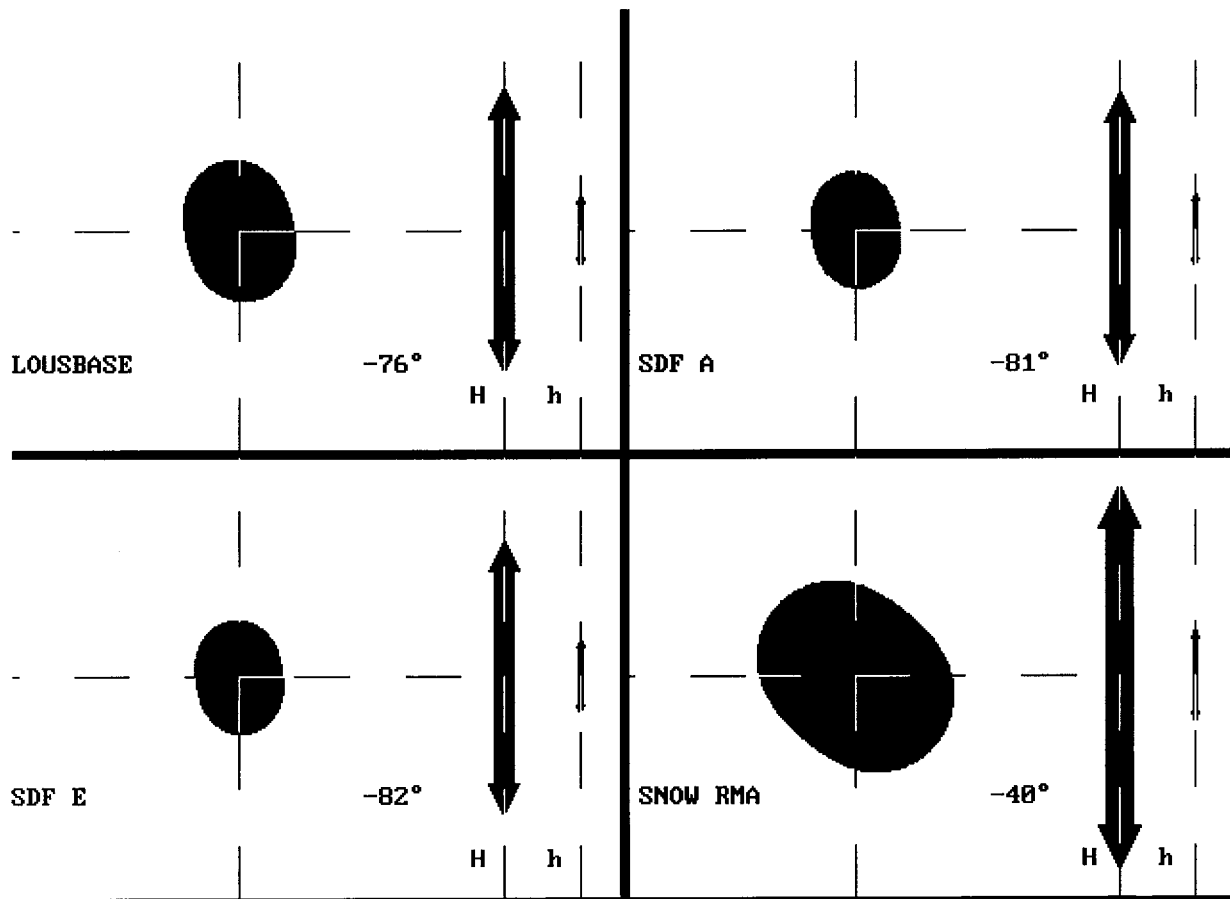
| | | | | | |
|----------------------|--------------------------|------------------|--------------------------|--------------------|--------------------------|
| KY 05 | -130.4281m | 0.0643m | -130.3878m | 0.0847m | 1: 5061171 |
| EDWARD 2 SNOW RMA | 192006'35" -6.0625m | 0.07" 0.1767m | 43723.517m -6.5322m | 0.0126m 0.1052m | 1: 6819921 1: 6819921 |
| EDWARD 2 X 349 | 89001'03" -147.4481m | 0.11" 0.0698m | 19626.806m -147.3239m | 0.0081m 0.0932m | 1: 4763256 1: 4763256 |
| GOSHENRM HORRODS | 66038'02" +25.8792m | 0.21" 0.0475m | 11089.902m +25.9438m | 0.0096m 0.0915m | 1: 2253011 1: 2253011 |
| GOSHENRM lou1 | 152058'31" +7.7933m | 0.06" 0.1937m | 49884.517m +8.0800m | 0.0143m 0.1452m | 1: 6814238 1: 6814238 |
| GOSHENRM X 349 | 219003'28" -85.5755m | 0.15" 0.0699m | 16688.575m -85.6701m | 0.0117m 0.1130m | 1: 2784185 1: 2784185 |
| H 323ECC J 334ECC | 194002'04" +3.4301m | 0.09" 0.0930m | 22586.083m +3.1997m | 0.0101m 0.0707m | 1: 4372075 1: 4372075 |
| H 323ECC lou1 | 112043'47" +93.9545m | 0.05" 0.1897m | 55680.440m +94.5189m | 0.0118m 0.0942m | 1: 9277088 1: 9277088 |
| H 323ECC SDF E | 95025'24" +17.5430m | 0.15" 0.0499m | 13336.786m +17.6375m | 0.0079m 0.0879m | 1: 3327814 1: 3327814 |
| HORRODS I64 L 21 | 170020'02" -15.3729m | 0.07" 0.1086m | 26308.999m -15.5029m | 0.0099m 0.1500m | 1: 5205848 1: 5205848 |
| I64 L 21 KY 05 | 266029'59" -79.0617m | 0.05" 0.1019m | 30200.032m -79.1748m | 0.0063m 0.0847m | 1: 9368106 1: 9368106 |
| I64 L 21 KY 13 | 203050'13" -20.9981m | 0.06" 0.1537m | 38452.055m -20.9571m | 0.0107m 0.1176m | 1: 7017399 1: 7017399 |
| I64 L 21 lou1 | 160035'28" -2.7130m | 0.08" 0.0967m | 24280.266m -2.3608m | 0.0098m 0.0612m | 1: 4856131 1: 4856131 |
| J 334ECC lou1 | 89035'56" +90.5244m | 0.05" 0.1890m | 56834.857m +91.3192m | 0.0119m 0.0612m | 1: 9340283 1: 9340283 |
| J 334ECC LOUSBASE | 31027'16" +8.4444m | 0.09" 0.0784m | 19561.493m +8.6755m | 0.0088m 0.0795m | 1: 4370345 1: 4370345 |
| J 334ECC SNOW RMA | 204039'08" +138.5412m | 0.13" 0.0538m | 12334.654m +138.3608m | 0.0080m 0.1052m | 1: 3023594 1: 3023594 |
| KY 05 LOUSBASE | 240027'43" -5.7313m | 0.17" 0.0389m | 9670.489m -5.8297m | 0.0075m 0.0767m | 1: 2528117 1: 2528117 |
| KY 05 SDF E | 170035'22" -0.0628m | 1.61" 0.0173m | 814.153m -0.0675m | 0.0069m 0.0288m | 1: 232054 1: 232054 |
| KY 13 SNOW RMA | 270059'26" +66.3020m | 0.06" 0.1284m | 38375.814m +65.6379m | 0.0091m 0.1283m | 1: 8231833 1: 8231833 |
| lou1 LOUSBASE | 289015'26" -82.0800m | 0.06" 0.1672m | 49389.316m -82.6436m | 0.0112m 0.1006m | 1: 8626756 1: 8626756 |
| lou1 SDF A | 296055'41" -79.5284m | 0.06" 0.1464m | 42403.649m -80.0032m | 0.0100m 0.1064m | 1: 8281533 1: 8281533 |
| lou1 SDF E | 298000'27" -76.4115m | 0.06" 0.1493m | 43130.302m -76.8814m | 0.0101m 0.1061m | 1: 8341579 1: 8341579 |
| lou1 SNOW RMA | 259023'30" +48.0169m | 0.05" 0.2137m | 63056.111m +47.0416m | 0.0132m 0.1191m | 1: 9340375 1: 9340375 |
| lou1 X 349 | 313029'28" -93.3687m | 0.06" 0.1668m | 45737.868m -93.7501m | 0.0125m 0.1140m | 1: 7168212 1: 7168212 |
| LOUSBASE SDF A | 71042'54" +2.5516m | 0.16" 0.0360m | 9288.786m +2.6405m | 0.0064m 0.0751m | 1: 2851204 1: 2851204 |
| SDF A | 345025'27" | 1.02" | 1084.997m | 0.0056m | 1: 379802 |

SDF E +3.1169m 0.0150m +3.1218m 0.0304m 1: 379802

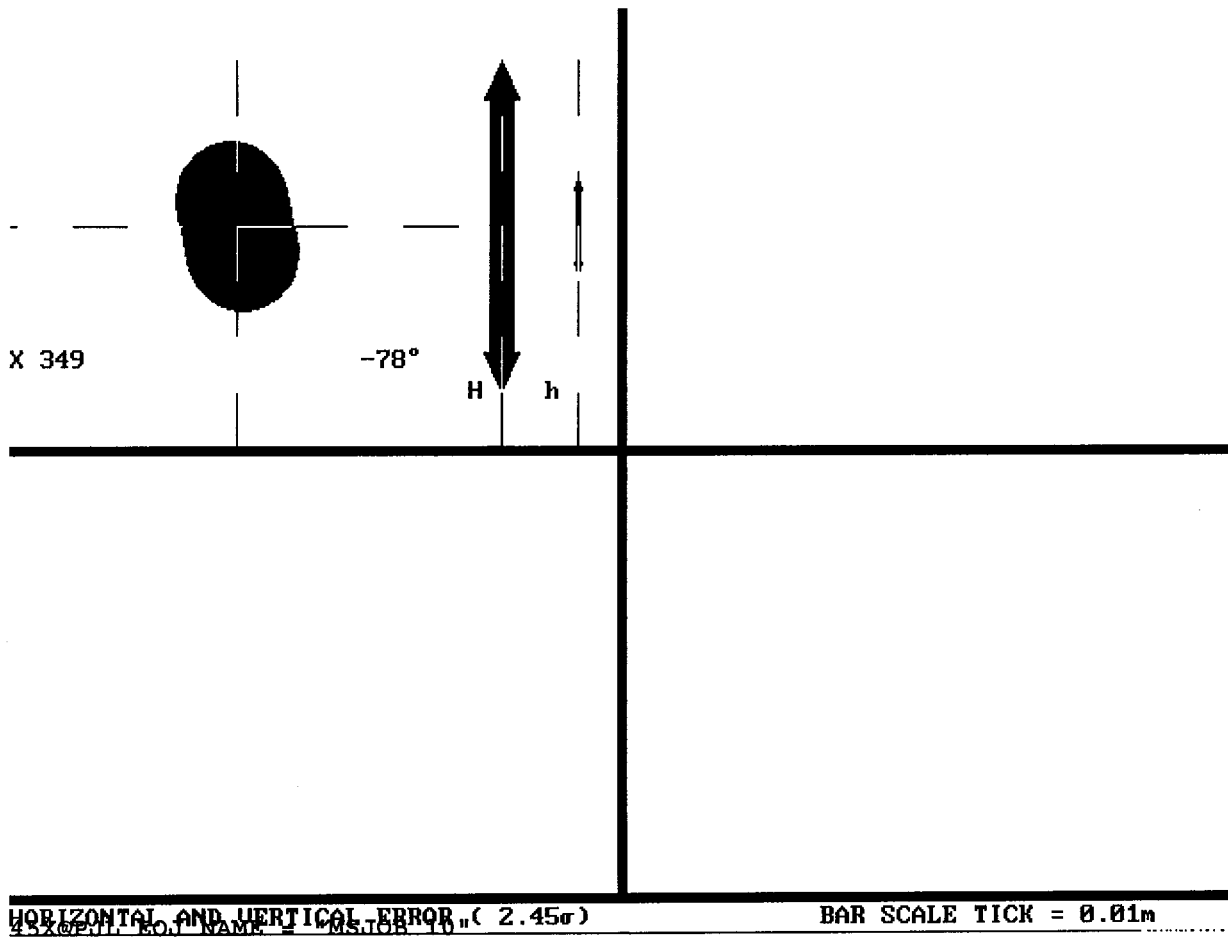




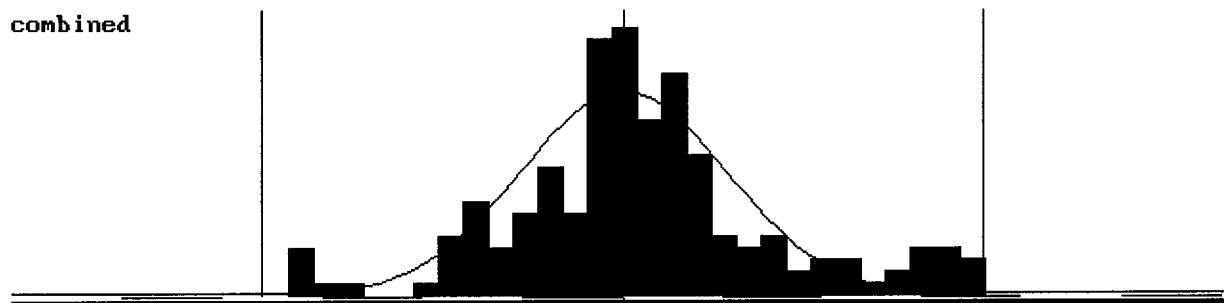




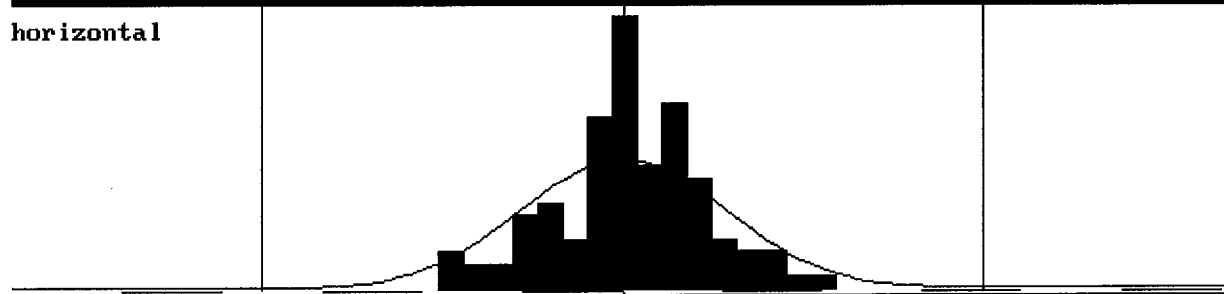
HORIZONTAL AND VERTICAL ERROR (2.45σ) BAR SCALE TICK = 0.01m



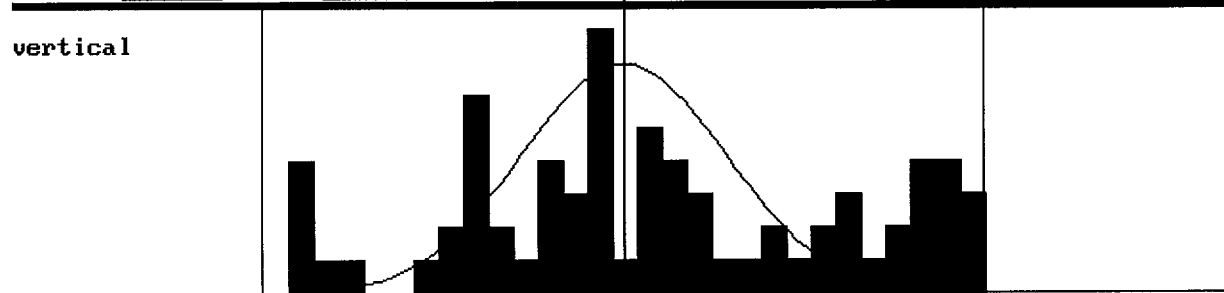
combined



horizontal



vertical



STANDARDIZED RESIDUALS

45X@P11: ECRP Name = MSJOB 12"

Tau

BAR SCALE TICK = 1σ