

## No. 78 SELENODETTIC MEASURES ON YERKES LUNAR PHOTOGRAPH NO. 482

by D. W. G. ARTHUR

July 14, 1966

### ABSTRACT

Details are given of the measures and reductions for 1438 points on Yerkes lunar photograph No. 482. The catalog lists the uncorrected photographic coordinates, the refraction-free coordinates, and the standard direction-cosines of 990 points on the disk. Also given are the uncorrected coordinates and the refraction-free photographic rectangular and polar coordinates of 448 points on the bright limb. The disk and limb surveys are incomplete because of plate damage.

### 1. *The Photograph*

Yerkes 482 is a photograph with fairly high resolution obtained by E. Moore using the 40-in. refractor of the Yerkes observatory at 8<sup>h</sup>12<sup>m</sup>17<sup>s</sup> on 18 September 1959. The phase is near full with the evening terminator through the crater La Pérouse.

Despite extensive plate damage, which made it impossible to measure in a lune-shaped area in the second lunar quadrant against the northwest limb, I decided to measure this plate since no better one at this phase was obtained in the Yerkes photographic program.

Despite the commonly held idea that measures can be made over the entire disk for a plate near full, I found that noticeable phase effects made measurement either risky or impossible over wide areas of the plate. Craters near the terminator are easily seen as such and cause no difficulties. Craters near the bright limb are seen as spots and are also easy to bisect. Between these is a relatively wide zone in which the bright spots are not fully developed, sometimes appearing as crescents. I preferred to omit such points from the measures since it is quite difficult to estimate the positions of the centers of the rims.

Measures of these points may introduce appreciable phase effects, and indeed, there are reasons to believe that such effects are present in the selenodetic triangulations of Franz and others.

The measures on 482 relate to 990 points on the disk and 448 points on the bright limb. These were made by Mr. H. Connors. The survey of the disk is incomplete because of the plate damage, which also restricts the limb survey to an arc of 119°. The incompleteness of the limb survey implies that the limb radius  $r$  is not entirely reliable, and indeed for this photograph, the discrepancy between  $r$  and the theoretical radius  $1/\mu$  derived from the selenodetic points is abnormally large.

### 2. *The Measures and Reductions*

The measures were made in the same way and with the same equipment as for previously measured photographs. The details are given in *Comm. LPL* Nos. 60 and 61 and need not be repeated here. However, two innovations were introduced in the measures of 482 which should be noted.

As noted in *Comm.* No. 61, the eyepiece grati- cules supplied with the comparator were found to

be quite unsuitable for measures on lunar photographs. The comparator is now fitted with a graticule that is essentially a centered grid square to the coordinate axes. There is a small gap in the arms of the central cross where they meet, so that very small craters are not visually obliterated during bisection. The other grid lines permit direct bisections of craters of all sizes, ranging up to 20 km, and obviate the boxing and tangenting that was previously necessary. Measures with the new graticule appear to be more rapid and accurate.

The other innovation is the use of two fiducial marks on opposite edges of the photograph. Previously it was the practice to observe the photograph in two reverse orientations. During the measures in one orientation, the plate could not be disturbed in any way. This was found to be inconvenient. Also, the forward and reverse orientations were united by using the measures on the selenodetic points themselves. This too was inconvenient, since it meant that observations in the first orientation could not be repeated for dubious readings without a considerable amount of reobservation.

The present procedure utilizes the two fiducial marks. These are naturally occurring pinholes or defects which can be bisected within one or two microns. These marks are bisected repeatedly in the initial measuring sessions in both orientations, and standard readings are established for both marks in both orientations. In subsequent measuring sessions, the readings are converted to standard readings by the transformation

$$\left. \begin{aligned} X &= x \cos \theta - y \sin \theta + h \\ Y &= y \cos \theta + x \sin \theta + k \end{aligned} \right\} \quad (1)$$

The coefficients  $\theta$ ,  $h$ ,  $k$  are determined from the standard and current readings on the marks. After both direct and reverse readings are standardized in this way they are united using (1), but with coefficients found from the two sets of standard values of the marks.

This procedure is valid only when temperatures are closely controlled, as is the case in the LPL measures, since (1) makes no allowance for change of scale. We are therefore considering the use of the transformation

$$\left. \begin{aligned} X &= px - qy + h \\ Y &= py + qx + k \end{aligned} \right\}, \quad (2)$$

which would allow for a change of scale. The use of (2) would make the temperature of the initial direct session the effective temperature of *all* the measures.

However if (2) is used, the scale factor  $\sqrt{(p^2 + q^2)}$  must be carefully tabulated for each session and monitored for errors in the measures of the marks.

### 3. The Internal and External Precision of the Measures

The internal precision was estimated from the semidifferences  $\delta x$  and  $\delta y$  of the direct and reverse readings, using every tenth point of the final listing to obtain a representative sample. The standard errors of the mean  $x$  and  $y$  are estimated as 8 and 6 microns respectively.

The positions in the plane of the refracted photograph were adjusted to the theoretical positions of 57 points taken from the Breslau triangulation (Schrutka-Rechtenstamm 1958). The residuals are given in Table 1 in terms of the horizontal and vertical plate coordinates  $u'$  and  $v'$ . The standard values, corrected for four degrees of freedom, are 0.00018 and 0.00022 in units of the moon's radius. Almost all this dispersion must come from errors in the measures on 482. This was confirmed by repeating the adjustment using points from the ACIC triangulation (Meyer and Ruffin 1965). The residuals in the two adjustments were found to be strongly correlated, and hence it must be inferred that these residuals are, for the most part, due to something common to both adjustments, namely the errors of the LPL positions. Since the internal errors are quite small, the relatively large dispersion encountered in the adjustments must be attributed to seeing errors. These are now known to be of such a magnitude as to limit the usefulness of the short-exposure lunar photographs that have hitherto been used for selenodetic work.

### 4. Data for the Reduction of Yerkes 482

|               |   |
|---------------|---|
| LIBRATIONS:   | $l' = +3^{\circ}90,$<br>$b' = +1^{\circ}18,$<br>$C' = 335^{\circ}34.$   |
| GEODETIC:     | $\rho = 0.99852,$<br>$\phi = +42^{\circ}57,$<br>$\phi' = +42^{\circ}38,$<br>$L = 5^{\text{h}}54^{\text{m}}13^{\text{s}}64 \text{ W.}$ |
| SEMIDIAMETER: | $\pi = 55'63,$<br>$s = 909''5,$<br>$\sin s' = 0.004461.$  |
| ATMOSPHERIC:  | $b = 28.63 \text{ in.},$<br>$F = 52^{\circ}\text{F.}$   |

TABLE 1  
LEAST SQUARES FIT TO SELENODETIC CONTROLS

| POINT            |                 | RESIDUALS* |      | POINT            |                 | RESIDUALS* |      |
|------------------|-----------------|------------|------|------------------|-----------------|------------|------|
| Blagg and Müller | Consol. Catalog | $u'$       | $v'$ | Blagg and Müller | Consol. Catalog | $u'$       | $v'$ |
| 895              | 10470           | +10        | + 5  | 3736             | 41278           | - 4        | -36  |
| 622              | 13421           | + 2        | - 6  | 3780             | 41365           | -22        | - 3  |
| 965              | 11718           | -15        | -29  | 2396             | 36258           | -28        | -17  |
| 391              | 15645A          | - 4        | - 6  | 2419             | 35356           | - 5        | -28  |
| 834              | 10093           | -22        | +17  | 2491             | 34339           | -13        | + 6  |
| 1214             | 20115           | - 7        | +10  | 1390             | 23535           | +23        | +22  |
| 1215             | 20155           | +10        | 0    | 1589             | 24496           | +13        | +12  |
| 865              | 10016           | - 7        | +16  | 1529             | 24197           | +10        | - 4  |
| 857              | 10002           | - 6        | +27  | 1212             | 20141           | +34        | -21  |
| 482              | 14512           | +11        | + 7  | 3570             | 40370           | - 8        | -10  |
| 12               | 19233           | -27        | +27  | 4143             | 45340           | - 8        | -42  |
| 183              | 16315           | + 8        | +22  | 4108             | 44339           | -15        | + 7  |
| 216              | 17152           | + 2        | + 5  | 4083B            | 44494           | +17        | -48  |
| 224              | 17053           | + 2        | -11  | 4488             | 44761           | -12        | -16  |
| 2963             | 30114           | + 8        | +15  | 4338             | 47221           | -32        | - 5  |
| 2947             | 30058           | +31        | +13  | 4258A            | 47099           | -13        | +20  |
| 2933             | 30095           | +12        | -23  | 4690             | 49106           | -32        | +17  |
| 2920             | 31019           | + 1        | +22  | 819              | 12122           | + 6        | -19  |
| 2918             | 31161           | +16        | + 3  | 629              | 11486           | + 5        | + 8  |
| 2856             | 31290           | +18        | - 2  | 987              | 10950           | +29        | -18  |
| 1498             | 23021           | -12        | - 4  | 3667             | 44001           | +18        | +12  |
| 2922             | 32022           | -10        | +13  | 177              | 16446           | +10        | +38  |
| 3055             | 32307           | + 6        | +24  | 2935             | 31043           | + 3        | + 5  |
| 2485             | 35003           | -36        | - 7  | 2088             | 38243           | +21        | +16  |
| 3680             | 43029           | - 1        | +32  | 2831             | 33285           | - 2        | -17  |
| 3607             | 41025           | -19        | +18  | 2417             | 36278           | +28        | -39  |
| 3606             | 41142           | +18        | +27  | 1814             | 27201           | -24        | 0    |
| 3683             | 43100           | - 5        | +12  | 1145             | 20497           | + 7        | -32  |
|                  |                 |            |      | 4004             | 42697           | + 9        | -36  |

\*Residuals are stated in units of  $10^{-5}r$ .

REFRACTION:  $\sin ZD' = +0.697\ 773,$   
 $\cos ZD' = +0.716\ 319,$   
 $\sin Q' = +0.392\ 579,$   
 $\cos Q' = +0.919\ 718,$   
 $1/\kappa = 0.99948,$   
 $1/\kappa' = 0.99973.$

LEAST SQUARES FIT:  $p = +0.007\ 8220,$   
 $q = -0.008\ 5286,$   
 $\mu = +0.011\ 5725.$

PROFILE:  $h = +0.0994\ \text{mm},$   
 $k = +0.1074\ \text{mm},$   
 $r = 86.2619\ \text{mm}.$

Laboratories, U.S. Air Force, under Contract AF19 (628)-4332.

REFERENCES

Meyer, D. L., and Ruffin, B. W. 1965, *Coordinates of Lunar Features, Group I and II Solutions*, ACIC Tech. Paper No. 15, Aeronautical Chart and Information Center, U.S. Air Force, St. Louis, Mo.  
 Schrutka-Rechtenstamm, G. 1958, "Neureduktion der 150 Mondpunkte der Breslauer Messungen von J. Franz," *Sitz. Österr. Akad. Wiss. Math.-Naturw. Kl., Abt. II*, 167 Bd.

*Acknowledgments.* This selenodetic work was supported by the Air Force Cambridge Research

## POSITIONS ON THE DISK

| Ref     | x        | y        | $\delta x$ | $\delta y$ | weights | Ser  |
|---------|----------|----------|------------|------------|---------|------|
| 1000271 | 125.1587 | 148.2691 | -0.0025    | -0.0001    | 4.8 2.8 | 3408 |
| 1002262 | 126.8213 | 148.3192 | -0.0039    | -0.0024    | 5.6 1.3 | 3409 |
| 1002700 | 126.3256 | 152.5277 | -0.0085    | -0.0107    | 6.7 2.7 | 3410 |
| 1003056 | 127.5611 | 146.9282 | -0.0148    | 0.0028     | 4.4 6.2 | 3411 |
| 1004537 | 128.3193 | 151.4069 | -0.0133    | 0.0007     | 4.5 3.1 | 3412 |
| 1004947 | 128.3142 | 154.8297 | -0.0078    | -0.0098    | 2.9 8.1 | 3413 |
| 1006734 | 130.0553 | 152.8140 | 0.0068     | 0.0029     | 3.4 5.4 | 3414 |
| 1009311 | 132.4231 | 149.0719 | -0.0121    | 0.0032     | 6.1 4.3 | 3415 |
| 1010292 | 125.4524 | 157.0910 | -0.0084    | -0.0038    | 2.8 2.1 | 3416 |
| 1018383 | 132.3015 | 157.9649 | -0.0059    | 0.0013     | 4.2 7.7 | 3417 |
| 1027992 | 131.7667 | 171.8398 | -0.0008    | -0.0031    | 9.9 1.1 | 3418 |
| 1035222 | 129.5673 | 174.3942 | -0.0055    | 0.0036     | 3.5 9.9 | 3419 |
| 1039265 | 133.3316 | 174.7053 | 0.0004     | -0.0073    | 3.1 0.7 | 3420 |
| 1047031 | 131.5410 | 181.3186 | 0.0108     | -0.0004    | 3.8 3.8 | 3421 |
| 1048170 | 132.7834 | 182.1053 | -0.0031    | 0.0016     | 1.4 1.7 | 3422 |
| 1053144 | 128.4479 | 191.3955 | -0.0049    | -0.0064    | 9.9 3.4 | 3423 |
| 1064690 | 130.6822 | 204.0747 | -0.0020    | -0.0079    | 3.9 4.2 | 3424 |
| 1065583 | 131.3811 | 203.4571 | 0.0031     | 0.0009     | 0.8 1.7 | 3425 |
| 1065753 | 131.2546 | 205.1845 | 0.0039     | -0.0057    | 7.1 9.9 | 3426 |
| 1065830 | 131.0225 | 205.8445 | -0.0055    | -0.0055    | 3.3 3.3 | 3427 |
| 1065954 | 131.4184 | 207.0523 | -0.0004    | -0.0098    | 1.0 1.3 | 3428 |
| 1066449 | 131.8250 | 203.1052 | 0.0022     | -0.0071    | 1.5 2.5 | 3429 |
| 1066495 | 132.2812 | 202.7448 | -0.0106    | -0.0064    | 2.3 5.1 | 3430 |
| 1068052 | 133.4331 | 198.9168 | -0.0021    | -0.0092    | 1.1 5.7 | 3431 |
| 1069564 | 134.7048 | 203.5538 | -0.0130    | -0.0095    | 9.9 7.3 | 3432 |
| 1069841 | 134.6423 | 205.8848 | 0.0028     | -0.0031    | 4.4 3.3 | 3433 |
| 1070660 | 127.5417 | 212.8895 | -0.0103    | -0.0046    | 4.5 7.3 | 3434 |
| 1075008 | 131.0381 | 208.3598 | -0.0014    | -0.0067    | 3.0 3.1 | 3435 |
| 1077847 | 133.6398 | 215.2494 | -0.0109    | -0.0064    | 1.4 2.6 | 3436 |
| 1079791 | 135.6688 | 213.8650 | -0.0051    | -0.0037    | 4.7 3.8 | 3437 |
| 1085373 | 132.5468 | 219.3040 | 0.0002     | 0.0040     | 9.9 1.1 | 3438 |
| 1095066 | 133.2523 | 225.8477 | 0.0012     | -0.0089    | 4.6 5.1 | 3439 |
| 1095738 | 134.2807 | 232.3566 | -0.0127    | 0.0012     | 6.3 9.9 | 3440 |
| 1100641 | 133.6054 | 151.7127 | -0.0114    | -0.0037    | 2.6 3.6 | 3441 |
| 1101299 | 134.9012 | 148.8787 | -0.0124    | -0.0048    | 3.3 3.7 | 3442 |
| 1110395 | 134.1193 | 158.1583 | -0.0025    | 0.0011     | 2.7 1.7 | 3443 |
| 1130348 | 134.0750 | 175.9073 | -0.0027    | -0.0041    | 3.0 2.1 | 3444 |
| 1131067 | 135.0385 | 173.1473 | -0.0082    | 0.0093     | 5.1 3.4 | 3445 |
| 1132675 | 136.1518 | 178.1632 | -0.0074    | -0.0007    | 1.7 5.7 | 3446 |
| 1134036 | 137.4747 | 173.0200 | -0.0098    | -0.0070    | 2.9 6.5 | 3447 |
| 1134657 | 137.7227 | 178.3755 | -0.0074    | -0.0040    | 3.6 2.2 | 3448 |
| 1135013 | 138.0997 | 172.7581 | -0.0057    | 0.0090     | 4.7 2.3 | 3449 |
| 1139316 | 141.6231 | 175.5846 | -0.0044    | 0.0037     | 9.9 5.6 | 3450 |
| 1140243 | 134.3545 | 183.2563 | -0.0058    | -0.0055    | 1.6 3.9 | 3451 |
| 1140778 | 134.8288 | 188.1086 | -0.0141    | -0.0086    | 3.7 2.5 | 3452 |
| 1148615 | 141.2351 | 186.9186 | -0.0050    | -0.0021    | 3.9 2.0 | 3453 |
| 1160615 | 135.2388 | 204.5362 | -0.0072    | -0.0032    | 2.0 3.2 | 3454 |
| 1166219 | 140.1910 | 201.2952 | -0.0135    | -0.0096    | 4.5 1.5 | 3455 |
| 1166876 | 141.0519 | 206.3364 | -0.0039    | -0.0079    | 2.0 2.1 | 3456 |
| 1167467 | 141.5962 | 202.9185 | -0.0123    | -0.0003    | 2.4 1.3 | 3457 |
| 1171842 | 137.0534 | 214.8380 | -0.0050    | -0.0059    | 4.4 3.2 | 3458 |
| 1174647 | 139.6222 | 213.5115 | -0.0112    | -0.0026    | 5.4 3.9 | 3459 |
| 1177326 | 141.8318 | 210.7452 | -0.0059    | 0.0033     | 1.7 5.3 | 3460 |
| 1185873 | 141.9166 | 223.7528 | 0.0041     | -0.0041    | 1.3 3.4 | 3461 |
| 1186398 | 142.4575 | 219.7256 | 0.0000     | 0.0062     | 2.1 0.6 | 3462 |
| 1186625 | 142.1765 | 222.1803 | -0.0047    | 0.0007     | 1.9 1.9 | 3463 |
| 1189692 | 145.3912 | 221.9014 | -0.0025    | 0.0020     | 1.1 2.9 | 3464 |
| 1190407 | 137.7050 | 229.5101 | -0.0129    | -0.0059    | 2.6 2.9 | 3465 |
| 1193687 | 141.5649 | 231.3945 | -0.0068    | -0.0072    | 2.1 7.3 | 3466 |
| 1195692 | 143.3521 | 230.9489 | 0.0017     | -0.0021    | 3.9 1.3 | 3467 |
| 1199183 | 145.9235 | 226.4441 | 0.0024     | -0.0061    | 3.3 7.1 | 3468 |
| 1203773 | 145.2663 | 152.7062 | -0.0022    | 0.0059     | 1.8 1.7 | 3469 |
| 1204043 | 145.8709 | 146.6635 | -0.0120    | 0.0044     | 6.1 2.7 | 3470 |
| 1206609 | 147.2961 | 152.3846 | 0.0261     | 0.0023     | 0.4 1.0 | 3471 |
| 1209479 | 150.5846 | 150.6109 | -0.0099    | 0.0051     | 8.5 9.9 | 3472 |
| 1211068 | 143.5109 | 155.7915 | 0.0043     | 0.0006     | 7.5 2.7 | 3473 |
| 1212271 | 144.5006 | 156.8852 | -0.0054    | 0.0045     | 3.0 1.3 | 3474 |
| 1216237 | 147.6084 | 157.4272 | -0.0010    | -0.0032    | 4.8 6.8 | 3475 |
| 1231049 | 143.6336 | 173.2657 | -0.0100    | -0.0135    | 5.9 9.9 | 3476 |
| 1232632 | 144.5737 | 177.9272 | -0.0084    | 0.0083     | 3.2 4.5 | 3477 |
| 1233671 | 145.8001 | 177.7721 | 0.0145     | 0.0018     | 2.2 2.1 | 3478 |
| 1235315 | 146.9634 | 175.5995 | -0.0136    | -0.0109    | 9.9 0.6 | 3479 |
| 1238760 | 150.1930 | 178.6031 | -0.0085    | -0.0034    | 3.0 3.1 | 3480 |

## POSITIONS ON THE DISK

1b

| Ref     | x'      | y'      | $\xi$   | $\eta$  | $\zeta$ | Ser  |
|---------|---------|---------|---------|---------|---------|------|
| 1000271 | -5.3341 | 0.0282  | 0.00665 | 0.02085 | 0.99976 | 3408 |
| 1002262 | -3.6712 | 0.0869  | 0.02583 | 0.02155 | 0.99943 | 3409 |
| 1002700 | -4.1898 | 4.2944  | 0.01970 | 0.06998 | 0.99735 | 3410 |
| 1003056 | -2.9235 | -1.3008 | 0.03446 | 0.00557 | 0.99939 | 3411 |
| 1004537 | -2.1893 | 3.1834  | 0.04280 | 0.05722 | 0.99744 | 3412 |
| 1004947 | -2.2129 | 6.6075  | 0.04232 | 0.09661 | 0.99442 | 3413 |
| 1006734 | -0.4602 | 4.6000  | 0.06263 | 0.07352 | 0.99533 | 3414 |
| 1009311 | 1.9288  | 0.8688  | 0.09022 | 0.03057 | 0.99545 | 3415 |
| 1010292 | -5.0880 | 8.8549  | 0.00899 | 0.12242 | 0.99244 | 3416 |
| 1018383 | 1.7590  | 9.7644  | 0.08770 | 0.13291 | 0.98724 | 3417 |
| 1027992 | 1.1490  | 23.6416 | 0.07833 | 0.29215 | 0.95316 | 3418 |
| 1035222 | -1.0651 | 26.1856 | 0.05224 | 0.32129 | 0.94554 | 3419 |
| 1039265 | 2.6990  | 26.5163 | 0.09540 | 0.32506 | 0.94087 | 3420 |
| 1047031 | 0.8719  | 33.1228 | 0.07242 | 0.40066 | 0.91336 | 3421 |
| 1048170 | 2.1105  | 33.9162 | 0.08637 | 0.40972 | 0.90811 | 3422 |
| 1053144 | -2.2769 | 43.1874 | 0.03214 | 0.51558 | 0.85624 | 3423 |
| 1064690 | -0.1103 | 55.8828 | 0.04989 | 0.66009 | 0.74953 | 3424 |
| 1065583 | 0.5922  | 55.2686 | 0.05838 | 0.65311 | 0.75501 | 3425 |
| 1065753 | 0.4563  | 56.9960 | 0.05564 | 0.67273 | 0.73780 | 3426 |
| 1065830 | 0.2205  | 57.6550 | 0.05246 | 0.68021 | 0.73114 | 3427 |
| 1065954 | 0.6101  | 58.8653 | 0.05605 | 0.69394 | 0.71785 | 3428 |
| 1066449 | 1.0382  | 54.9188 | 0.06374 | 0.64913 | 0.75800 | 3429 |
| 1066495 | 1.4965  | 54.5607 | 0.06924 | 0.64506 | 0.76099 | 3430 |
| 1068052 | 2.6695  | 50.7372 | 0.08507 | 0.60158 | 0.79427 | 3431 |
| 1069564 | 3.9167  | 55.3825 | 0.09647 | 0.65438 | 0.74999 | 3432 |
| 1069841 | 3.8415  | 57.7140 | 0.09399 | 0.68085 | 0.72636 | 3433 |
| 1070660 | -3.2997 | 64.6846 | 0.00621 | 0.75985 | 0.65007 | 3434 |
| 1075008 | 0.2225  | 60.1713 | 0.05060 | 0.70875 | 0.70364 | 3435 |
| 1077847 | 2.7880  | 67.0769 | 0.07406 | 0.78690 | 0.61262 | 3436 |
| 1079791 | 4.8253  | 65.7024 | 0.09872 | 0.77134 | 0.62872 | 3437 |
| 1085373 | 1.6726  | 71.1273 | 0.05696 | 0.83258 | 0.55096 | 3438 |
| 1095066 | 2.3430  | 77.6771 | 0.05576 | 0.90603 | 0.41953 | 3439 |
| 1095738 | 3.3366  | 84.1937 | 0.05251 | 0.97779 | 0.20290 | 3440 |
| 1100641 | 3.0972  | 3.5166  | 0.10353 | 0.06104 | 0.99275 | 3441 |
| 1101299 | 4.4089  | 0.6883  | 0.11866 | 0.02847 | 0.99253 | 3442 |
| 1110395 | 3.5765  | 9.9672  | 0.10853 | 0.13522 | 0.98485 | 3443 |
| 1130348 | 3.4362  | 27.7225 | 0.10352 | 0.33887 | 0.93512 | 3444 |
| 1131067 | 4.4150  | 24.9665 | 0.11547 | 0.30730 | 0.94458 | 3445 |
| 1132675 | 5.5016  | 29.9900 | 0.12651 | 0.36479 | 0.92245 | 3446 |
| 1134036 | 6.8528  | 24.8517 | 0.14339 | 0.30595 | 0.94119 | 3447 |
| 1134657 | 7.0719  | 30.2105 | 0.14441 | 0.36729 | 0.91883 | 3448 |
| 1135013 | 7.4795  | 24.5929 | 0.15062 | 0.30297 | 0.94102 | 3449 |
| 1139316 | 10.9890 | 27.4386 | 0.18991 | 0.33547 | 0.92271 | 3450 |
| 1140243 | 3.6760  | 35.0757 | 0.10391 | 0.42296 | 0.90017 | 3451 |
| 1140778 | 4.1242  | 39.9322 | 0.10714 | 0.47842 | 0.87157 | 3452 |
| 1148615 | 10.5395 | 38.7748 | 0.18092 | 0.46508 | 0.86658 | 3453 |
| 1160615 | 4.4456  | 56.3680 | 0.10186 | 0.66557 | 0.73936 | 3454 |
| 1166219 | 9.4172  | 53.1513 | 0.16078 | 0.62891 | 0.76067 | 3455 |
| 1166876 | 10.2512 | 58.1988 | 0.16685 | 0.68621 | 0.70801 | 3456 |
| 1167467 | 10.8142 | 54.7825 | 0.17563 | 0.64741 | 0.74163 | 3457 |
| 1171842 | 6.2051  | 66.6829 | 0.11357 | 0.78239 | 0.61235 | 3458 |
| 1174647 | 8.7821  | 65.3692 | 0.14421 | 0.76748 | 0.62465 | 3459 |
| 1177326 | 11.0075 | 62.6132 | 0.17197 | 0.73622 | 0.65453 | 3460 |
| 1185873 | 11.0220 | 75.6261 | 0.15778 | 0.88283 | 0.44240 | 3461 |
| 1186398 | 11.5849 | 71.6002 | 0.16949 | 0.83764 | 0.51926 | 3462 |
| 1186625 | 11.2905 | 74.0543 | 0.16304 | 0.86521 | 0.47416 | 3463 |
| 1189692 | 14.5080 | 73.7919 | 0.19970 | 0.86208 | 0.46576 | 3464 |
| 1190407 | 6.7776  | 81.3638 | 0.09939 | 0.94681 | 0.30607 | 3465 |
| 1193687 | 10.6289 | 83.2688 | 0.13768 | 0.96735 | 0.21278 | 3466 |
| 1195692 | 12.4192 | 82.8322 | 0.15892 | 0.96245 | 0.22010 | 3467 |
| 1199183 | 15.0159 | 78.3390 | 0.19825 | 0.91280 | 0.35706 | 3468 |
| 1203773 | 14.7573 | 4.5706  | 0.23656 | 0.07289 | 0.96888 | 3469 |
| 1204043 | 15.3948 | -1.4712 | 0.24398 | 0.00329 | 0.96977 | 3470 |
| 1206609 | 16.7897 | 4.2594  | 0.25965 | 0.06922 | 0.96322 | 3471 |
| 1209479 | 20.0890 | 2.5020  | 0.29710 | 0.04882 | 0.95360 | 3472 |
| 1211068 | 12.9845 | 7.6480  | 0.21618 | 0.10835 | 0.97032 | 3473 |
| 1212271 | 13.9687 | 8.7472  | 0.22728 | 0.12096 | 0.96629 | 3474 |
| 1216237 | 17.0748 | 9.3054  | 0.26249 | 0.12724 | 0.95651 | 3475 |
| 1231049 | 13.0128 | 25.1293 | 0.21357 | 0.30896 | 0.92679 | 3476 |
| 1232632 | 13.9280 | 29.7973 | 0.22267 | 0.36236 | 0.90505 | 3477 |
| 1233671 | 15.1558 | 29.6485 | 0.23666 | 0.36061 | 0.90219 | 3478 |
| 1235315 | 16.3313 | 27.4811 | 0.25063 | 0.33576 | 0.90799 | 3479 |
| 1238760 | 19.5459 | 30.5024 | 0.28613 | 0.37017 | 0.88380 | 3480 |

## POSITIONS ON THE DISK

| Ref     | x        | y        | $\delta x$ | $\delta y$ | weights | Ser  |
|---------|----------|----------|------------|------------|---------|------|
| 1245437 | 147.5125 | 185.3279 | -0.0144    | -0.0011    | 4.8 2.4 | 3481 |
| 1245880 | 148.0227 | 188.2486 | 0.0126     | 0.0136     | 2.5 2.3 | 3482 |
| 1250344 | 143.5257 | 192.9856 | -0.0079    | -0.0107    | 2.5 3.3 | 3483 |
| 1251018 | 143.9917 | 190.6344 | 0.0012     | 0.0035     | 2.4 1.7 | 3484 |
| 1260222 | 143.7174 | 200.6678 | -0.0111    | -0.0011    | 3.9 3.3 | 3485 |
| 1260406 | 143.7259 | 202.7859 | -0.0067    | -0.0035    | 5.5 3.6 | 3486 |
| 1266533 | 149.3138 | 203.4174 | -0.0061    | 0.0027     | 3.7 3.1 | 3487 |
| 1269738 | 152.1926 | 205.6004 | -0.0147    | -0.0055    | 3.3 2.1 | 3488 |
| 1270195 | 144.9833 | 208.8475 | -0.0138    | -0.0080    | 6.1 3.6 | 3489 |
| 1272162 | 146.4520 | 208.5591 | -0.0143    | -0.0086    | 2.6 3.0 | 3490 |
| 1272255 | 146.4833 | 209.7098 | -0.0148    | -0.0081    | 4.0 3.3 | 3491 |
| 1274107 | 147.6857 | 209.0528 | -0.0061    | 0.0050     | 3.4 2.3 | 3492 |
| 1274399 | 148.6768 | 210.9875 | -0.0015    | 0.0035     | 3.3 2.1 | 3493 |
| 1281599 | 147.1040 | 221.5471 | -0.0009    | 0.0072     | 8.1 2.4 | 3494 |
| 1283696 | 148.9860 | 222.2321 | 0.0020     | -0.0054    | 9.9 6.2 | 3495 |
| 1285759 | 150.6223 | 223.4140 | 0.0076     | -0.0056    | 5.6 3.7 | 3496 |
| 1286885 | 151.7688 | 223.9330 | 0.0023     | -0.0091    | 9.9 2.7 | 3497 |
| 1287413 | 151.5097 | 220.1562 | -0.0024    | 0.0001     | 3.2 2.5 | 3498 |
| 1289512 | 153.5736 | 221.0042 | -0.0099    | -0.0032    | 5.3 4.2 | 3499 |
| 1290212 | 146.3662 | 227.3319 | 0.0010     | -0.0009    | 1.5 4.7 | 3500 |
| 1291024 | 146.9830 | 225.6886 | -0.0065    | -0.0101    | 4.4 2.8 | 3501 |
| 1291524 | 147.9890 | 230.1913 | 0.0045     | -0.0028    | 4.2 1.7 | 3502 |
| 1292172 | 148.5827 | 226.3582 | -0.0054    | 0.0012     | 9.9 8.7 | 3503 |
| 1292203 | 148.1281 | 227.3925 | 0.0042     | 0.0057     | 2.8 7.1 | 3504 |
| 1297180 | 153.0701 | 226.1398 | 0.0004     | -0.0045    | 3.7 5.5 | 3505 |
| 1304810 | 154.5261 | 153.3377 | 0.0037     | 0.0002     | 1.9 1.1 | 3506 |
| 1305650 | 155.6558 | 151.6116 | -0.0032    | 0.0006     | 4.1 2.6 | 3507 |
| 1311345 | 152.1581 | 158.1441 | -0.0094    | 0.0020     | 8.9 9.9 | 3508 |
| 1316038 | 156.5020 | 155.7198 | 0.0003     | 0.0001     | 5.5 4.8 | 3509 |
| 1320358 | 151.5457 | 167.0954 | -0.0012    | 0.0006     | 5.5 4.8 | 3510 |
| 1323594 | 154.5809 | 168.4646 | -0.0069    | 0.0037     | 1.7 6.9 | 3511 |
| 1328665 | 158.7818 | 169.3895 | -0.0059    | 0.0098     | 5.2 5.0 | 3512 |
| 1332680 | 153.8407 | 177.7309 | -0.0119    | -0.0120    | 3.5 2.8 | 3513 |
| 1340529 | 151.8379 | 186.3372 | 0.0015     | 0.0040     | 5.6 5.1 | 3514 |
| 1342158 | 153.8346 | 182.8194 | -0.0077    | -0.0071    | 5.1 1.9 | 3515 |
| 1351838 | 153.4755 | 197.7122 | -0.0125    | -0.0042    | 4.0 3.6 | 3516 |
| 1352553 | 154.3535 | 194.6545 | -0.0076    | -0.0150    | 4.3 9.9 | 3517 |
| 1354427 | 155.8606 | 194.0941 | -0.0147    | -0.0085    | 5.3 3.5 | 3518 |
| 1358431 | 159.4496 | 193.6009 | 0.0142     | 0.0052     | 4.6 3.0 | 3519 |
| 1358553 | 159.7217 | 194.6172 | -0.0003    | 0.0085     | 2.4 3.3 | 3520 |
| 1360540 | 152.9898 | 203.1150 | -0.0148    | -0.0050    | 5.5 9.9 | 3521 |
| 1361420 | 153.6553 | 202.2785 | -0.0139    | -0.0068    | 5.4 1.5 | 3522 |
| 1362696 | 155.3179 | 204.5232 | -0.0138    | -0.0057    | 3.8 9.9 | 3523 |
| 1363759 | 155.8881 | 205.7189 | -0.0130    | 0.0070     | 2.4 3.0 | 3524 |
| 1364082 | 156.6340 | 198.9246 | 0.0020     | 0.0102     | 3.1 1.9 | 3525 |
| 1366697 | 158.8622 | 204.6153 | -0.0121    | 0.0039     | 4.7 6.9 | 3526 |
| 1371862 | 154.9838 | 214.7398 | -0.0111    | 0.0027     | 5.3 3.5 | 3527 |
| 1374540 | 157.2088 | 212.0105 | 0.0043     | 0.0056     | 2.7 1.3 | 3528 |
| 1376726 | 159.1385 | 214.3039 | -0.0067    | 0.0008     | 6.4 4.5 | 3529 |
| 1377239 | 159.6852 | 210.1227 | 0.0072     | 0.0050     | 2.4 9.9 | 3530 |
| 1383543 | 157.4373 | 221.0922 | 0.0116     | 0.0005     | 6.8 5.5 | 3531 |
| 1384512 | 158.0295 | 221.0913 | -0.0055    | -0.0003    | 4.8 2.2 | 3532 |
| 1386689 | 160.7304 | 222.5837 | 0.0035     | -0.0049    | 0.9 6.1 | 3533 |
| 1386841 | 160.5662 | 223.6357 | -0.0049    | 0.0023     | 1.9 3.2 | 3534 |
| 1389824 | 163.2664 | 223.9984 | -0.0028    | 0.0009     | 4.1 2.1 | 3535 |
| 1390177 | 155.8796 | 226.8218 | -0.0029    | -0.0052    | 3.9 9.9 | 3536 |
| 1395011 | 159.6018 | 225.3721 | 0.0031     | -0.0051    | 9.9 2.9 | 3537 |
| 1408335 | 167.1231 | 149.4447 | 0.0012     | 0.0010     | 3.1 4.3 | 3538 |
| 1413632 | 162.7350 | 160.4522 | -0.0130    | 0.0048     | 3.7 2.6 | 3539 |
| 1414815 | 163.5359 | 162.4954 | -0.0127    | -0.0044    | 7.5 4.4 | 3540 |
| 1422946 | 162.1932 | 172.1313 | -0.0017    | -0.0036    | 4.3 1.5 | 3541 |
| 1426789 | 166.1101 | 170.7253 | -0.0084    | -0.0051    | 9.9 3.3 | 3542 |
| 1428554 | 167.5696 | 168.4676 | -0.0033    | -0.0103    | 4.2 3.4 | 3543 |
| 1429974 | 168.8160 | 172.0214 | 0.0045     | -0.0075    | 3.1 2.4 | 3544 |
| 1431810 | 161.3303 | 179.4948 | -0.0089    | -0.0075    | 5.3 1.0 | 3545 |
| 1436230 | 165.7658 | 174.2293 | 0.0031     | 0.0051     | 4.4 2.3 | 3546 |
| 1436629 | 165.8440 | 178.5591 | -0.0023    | -0.0013    | 3.5 1.5 | 3547 |
| 1449062 | 169.0369 | 181.3875 | -0.0040    | -0.0009    | 4.3 3.9 | 3548 |
| 1451295 | 162.5845 | 192.1657 | -0.0086    | -0.0053    | 3.3 2.7 | 3549 |
| 1451624 | 162.2257 | 195.5977 | -0.0080    | 0.0020     | 3.1 4.0 | 3550 |
| 1453417 | 163.8154 | 194.0979 | -0.0062    | 0.0134     | 6.6 2.4 | 3551 |
| 1458890 | 169.1151 | 197.0194 | -0.0030    | -0.0028    | 9.9 9.9 | 3552 |
| 1460880 | 162.5111 | 205.8194 | 0.0041     | -0.0084    | 4.4 3.8 | 3553 |

## POSITIONS ON THE DISK

2b

| Ref     | x'      | y'      | $\xi$   | $\eta$  | $\zeta$ | Ser  |
|---------|---------|---------|---------|---------|---------|------|
| 1245437 | 16.8280 | 37.2159 | 0.25299 | 0.44704 | 0.85799 | 3481 |
| 1245880 | 17.3225 | 40.1403 | 0.25739 | 0.48040 | 0.83843 | 3482 |
| 1250344 | 12.7982 | 44.8559 | 0.20389 | 0.53437 | 0.82029 | 3483 |
| 1251018 | 13.2771 | 42.5062 | 0.21045 | 0.50757 | 0.83552 | 3484 |
| 1260222 | 12.9484 | 52.5419 | 0.20133 | 0.62186 | 0.75680 | 3485 |
| 1260406 | 12.9454 | 54.6608 | 0.19994 | 0.64594 | 0.73674 | 3486 |
| 1266533 | 18.5321 | 55.3213 | 0.26273 | 0.65317 | 0.71017 | 3487 |
| 1269738 | 21.4002 | 57.5200 | 0.29345 | 0.67794 | 0.67401 | 3488 |
| 1270195 | 14.1705 | 60.7311 | 0.20941 | 0.71477 | 0.66727 | 3489 |
| 1272162 | 15.6414 | 60.4502 | 0.22628 | 0.71151 | 0.66524 | 3490 |
| 1272255 | 15.6665 | 61.6015 | 0.22562 | 0.72455 | 0.65124 | 3491 |
| 1274107 | 16.8729 | 60.9504 | 0.23979 | 0.71711 | 0.65441 | 3492 |
| 1274399 | 17.8539 | 62.8909 | 0.24921 | 0.73902 | 0.62589 | 3493 |
| 1281599 | 16.2234 | 73.4463 | 0.21945 | 0.85809 | 0.46424 | 3494 |
| 1283696 | 18.1024 | 74.1413 | 0.23953 | 0.86573 | 0.43948 | 3495 |
| 1285759 | 19.7330 | 75.3320 | 0.25592 | 0.87888 | 0.40258 | 3496 |
| 1286885 | 20.8771 | 75.8571 | 0.26777 | 0.88462 | 0.38178 | 3497 |
| 1287413 | 20.6383 | 72.0776 | 0.27067 | 0.84237 | 0.46599 | 3498 |
| 1289512 | 22.6984 | 72.9366 | 0.29241 | 0.85179 | 0.43468 | 3499 |
| 1290212 | 15.4540 | 79.2294 | 0.20142 | 0.92263 | 0.32891 | 3500 |
| 1291024 | 16.0799 | 77.5887 | 0.21148 | 0.90437 | 0.37065 | 3501 |
| 1291524 | 17.0620 | 82.0983 | 0.21218 | 0.95389 | 0.21229 | 3502 |
| 1292172 | 17.6766 | 78.2668 | 0.22802 | 0.91175 | 0.34165 | 3503 |
| 1292203 | 17.2163 | 79.2991 | 0.22085 | 0.92322 | 0.31446 | 3504 |
| 1297180 | 22.1670 | 78.0715 | 0.27792 | 0.90903 | 0.31052 | 3505 |
| 1304810 | 24.0173 | 5.2501  | 0.34132 | 0.08021 | 0.93652 | 3506 |
| 1305650 | 25.1568 | 3.5292  | 0.35426 | 0.06033 | 0.93320 | 3507 |
| 1311345 | 21.6224 | 10.0461 | 0.31388 | 0.13551 | 0.93974 | 3508 |
| 1316038 | 25.9811 | 7.6433  | 0.36326 | 0.10760 | 0.92545 | 3509 |
| 1320358 | 20.9613 | 18.9975 | 0.30505 | 0.23832 | 0.92203 | 3510 |
| 1323594 | 23.4903 | 20.3829 | 0.33895 | 0.25402 | 0.90586 | 3511 |
| 1328665 | 28.1879 | 21.3298 | 0.38596 | 0.26456 | 0.88377 | 3512 |
| 1332680 | 23.1997 | 29.6487 | 0.32764 | 0.36019 | 0.87345 | 3513 |
| 1340529 | 21.1496 | 38.2479 | 0.30144 | 0.45859 | 0.83596 | 3514 |
| 1342158 | 23.1661 | 34.7391 | 0.32554 | 0.41839 | 0.84792 | 3515 |
| 1351838 | 22.7263 | 49.6355 | 0.31358 | 0.58827 | 0.74539 | 3516 |
| 1352553 | 23.6212 | 46.5812 | 0.32535 | 0.55345 | 0.76671 | 3517 |
| 1354427 | 25.1319 | 46.0284 | 0.34261 | 0.54704 | 0.76378 | 3518 |
| 1358431 | 28.7250 | 45.5535 | 0.38312 | 0.54133 | 0.74845 | 3519 |
| 1358553 | 28.9917 | 46.5716 | 0.38555 | 0.55290 | 0.73868 | 3520 |
| 1360540 | 22.2112 | 55.0378 | 0.30435 | 0.64971 | 0.69660 | 3521 |
| 1361420 | 22.8815 | 54.2044 | 0.31245 | 0.64020 | 0.70180 | 3522 |
| 1362696 | 24.5326 | 56.4585 | 0.32938 | 0.66566 | 0.66964 | 3523 |
| 1363759 | 25.0965 | 57.6576 | 0.33479 | 0.67921 | 0.65314 | 3524 |
| 1364082 | 25.8795 | 50.8646 | 0.34823 | 0.60201 | 0.71855 | 3525 |
| 1366697 | 28.0778 | 56.5689 | 0.36890 | 0.66659 | 0.64774 | 3526 |
| 1371862 | 24.1431 | 66.6771 | 0.31607 | 0.78129 | 0.53822 | 3527 |
| 1374540 | 26.3837 | 63.9583 | 0.34375 | 0.75039 | 0.56458 | 3528 |
| 1376726 | 28.3018 | 66.2625 | 0.36268 | 0.77618 | 0.51577 | 3529 |
| 1377239 | 28.8713 | 62.0826 | 0.37315 | 0.72894 | 0.57394 | 3530 |
| 1383543 | 26.5632 | 73.0445 | 0.33490 | 0.85253 | 0.40129 | 3531 |
| 1384512 | 27.1556 | 73.0467 | 0.34140 | 0.85247 | 0.39591 | 3532 |
| 1386689 | 29.8495 | 74.5536 | 0.36825 | 0.86882 | 0.33096 | 3533 |
| 1386841 | 29.6795 | 75.6051 | 0.36443 | 0.88051 | 0.30315 | 3534 |
| 1389824 | 32.3788 | 75.9819 | 0.39240 | 0.88407 | 0.25384 | 3535 |
| 1390177 | 24.9739 | 78.7682 | 0.30688 | 0.91624 | 0.25753 | 3536 |
| 1395011 | 28.7054 | 77.3372 | 0.35027 | 0.89980 | 0.26015 | 3537 |
| 1408335 | 36.6403 | 1.4206  | 0.48301 | 0.03501 | 0.87492 | 3538 |
| 1413632 | 32.1910 | 12.4096 | 0.43241 | 0.16186 | 0.88703 | 3539 |
| 1414815 | 32.9811 | 14.4576 | 0.44095 | 0.18531 | 0.87819 | 3540 |
| 1422946 | 31.5858 | 24.0902 | 0.42337 | 0.29590 | 0.85627 | 3541 |
| 1426789 | 35.5118 | 22.7038 | 0.46755 | 0.27964 | 0.83857 | 3542 |
| 1428554 | 36.9841 | 20.4528 | 0.48447 | 0.25368 | 0.83722 | 3543 |
| 1429974 | 38.2118 | 24.0144 | 0.49725 | 0.29435 | 0.81615 | 3544 |
| 1431810 | 30.6827 | 31.4519 | 0.41109 | 0.38023 | 0.82851 | 3545 |
| 1436230 | 35.1484 | 26.2074 | 0.46257 | 0.31980 | 0.82689 | 3546 |
| 1436629 | 35.2032 | 30.5392 | 0.46184 | 0.36936 | 0.80640 | 3547 |
| 1449062 | 38.3821 | 33.3850 | 0.49615 | 0.40153 | 0.76981 | 3548 |
| 1451295 | 31.8689 | 44.1339 | 0.41895 | 0.52487 | 0.74094 | 3549 |
| 1451624 | 31.4913 | 47.5654 | 0.41287 | 0.56397 | 0.71517 | 3550 |
| 1453417 | 33.0898 | 46.0732 | 0.43150 | 0.54682 | 0.71749 | 3551 |
| 1458890 | 38.3757 | 49.0231 | 0.48828 | 0.57975 | 0.65229 | 3552 |
| 1460880 | 31.7216 | 57.7923 | 0.40844 | 0.68007 | 0.60883 | 3553 |

## POSITIONS ON THE DISK

| Ref     | x        | y        | $\delta x$ | $\delta y$ | weights | Ser  |
|---------|----------|----------|------------|------------|---------|------|
| 1461456 | 162.8661 | 202.8603 | 0.0018     | 0.0102     | 2.8 3.1 | 3554 |
| 1462758 | 164.0249 | 205.6712 | -0.0110    | 0.0045     | 2.8 2.7 | 3555 |
| 1462965 | 164.2156 | 207.1999 | -0.0074    | 0.0113     | 6.3 3.3 | 3556 |
| 1470411 | 162.3320 | 211.1792 | -0.0081    | 0.0067     | 2.2 3.0 | 3557 |
| 1472658 | 164.7261 | 213.6968 | -0.0027    | 0.0096     | 4.8 9.9 | 3558 |
| 1473167 | 165.2729 | 209.0365 | -0.0031    | 0.0101     | 3.4 9.9 | 3559 |
| 1473253 | 165.3040 | 209.6727 | 0.0043     | 0.0037     | 8.0 3.7 | 3560 |
| 1473729 | 165.5136 | 214.5990 | 0.0024     | 0.0119     | 3.1 5.4 | 3561 |
| 1475034 | 166.7737 | 207.4587 | 0.0045     | 0.0025     | 4.0 9.9 | 3562 |
| 1481507 | 164.5209 | 221.5300 | 0.0144     | -0.0090    | 5.6 4.7 | 3563 |
| 1484219 | 166.9293 | 219.0608 | 0.0047     | 0.0059     | 2.7 1.9 | 3564 |
| 1485373 | 168.4051 | 219.4569 | 0.0002     | -0.0014    | 2.8 8.1 | 3565 |
| 1500308 | 168.6392 | 149.7167 | 0.0048     | -0.0021    | 2.9 2.2 | 3566 |
| 1503826 | 171.5356 | 153.8709 | -0.0094    | 0.0018     | 0.7 2.3 | 3567 |
| 1510688 | 169.4967 | 161.0121 | -0.0060    | 0.0033     | 2.0 2.5 | 3568 |
| 1511584 | 170.3546 | 159.8231 | -0.0028    | 0.0005     | 1.3 0.9 | 3569 |
| 1514744 | 172.8051 | 161.5706 | -0.0064    | 0.0085     | 3.2 2.2 | 3570 |
| 1514769 | 172.9419 | 162.0319 | -0.0068    | 0.0019     | 2.3 0.8 | 3571 |
| 1532935 | 171.3942 | 180.8678 | 0.0019     | 0.0001     | 3.7 2.6 | 3572 |
| 1533005 | 171.8019 | 172.9779 | -0.0018    | -0.0012    | 3.1 4.3 | 3573 |
| 1533874 | 172.6571 | 179.8720 | -0.0015    | -0.0073    | 2.5 1.9 | 3574 |
| 1533970 | 172.7308 | 180.3425 | -0.0132    | 0.0042     | 4.3 4.8 | 3575 |
| 1536881 | 175.5009 | 179.6207 | -0.0032    | 0.0006     | 3.6 1.3 | 3576 |
| 1543000 | 172.0808 | 181.2735 | -0.0138    | 0.0063     | 2.8 2.2 | 3577 |
| 1550305 | 170.0173 | 193.1678 | 0.0004     | 0.0052     | 2.9 3.8 | 3578 |
| 1551224 | 170.9084 | 192.1458 | -0.0134    | -0.0037    | 3.6 2.5 | 3579 |
| 1554785 | 174.5361 | 196.6251 | -0.0033    | 0.0038     | 3.7 5.7 | 3580 |
| 1554808 | 173.9101 | 197.7154 | -0.0051    | 0.0118     | 3.6 0.7 | 3581 |
| 1555836 | 175.0135 | 197.6087 | -0.0020    | 0.0126     | 4.3 5.8 | 3582 |
| 1559992 | 179.3433 | 198.1932 | -0.0005    | 0.0038     | 6.7 9.9 | 3583 |
| 1563836 | 173.9281 | 206.4076 | -0.0022    | 0.0050     | 5.5 9.9 | 3584 |
| 1564576 | 175.0047 | 203.8027 | -0.0012    | 0.0049     | 3.7 3.1 | 3585 |
| 1565013 | 174.9950 | 199.1115 | -0.0021    | 0.0046     | 4.3 3.3 | 3586 |
| 1567403 | 176.9778 | 202.7045 | -0.0018    | -0.0031    | 4.3 1.0 | 3587 |
| 1567869 | 178.0375 | 206.6932 | -0.0005    | 0.0044     | 3.9 3.9 | 3588 |
| 1572153 | 173.4725 | 208.7666 | -0.0062    | 0.0028     | 9.9 8.2 | 3589 |
| 1573150 | 174.3347 | 208.6511 | -0.0032    | 0.0033     | 5.1 3.4 | 3590 |
| 1575059 | 176.1938 | 208.4634 | 0.0009     | 0.0097     | 3.1 2.4 | 3591 |
| 1577271 | 178.4591 | 209.6127 | 0.0006     | 0.0060     | 4.5 3.6 | 3592 |
| 1578546 | 179.5901 | 212.8046 | 0.0008     | 0.0050     | 9.9 3.1 | 3593 |
| 1581156 | 173.6640 | 217.9339 | -0.0037    | 0.0072     | 3.8 6.8 | 3594 |
| 1584044 | 176.3929 | 217.0402 | -0.0065    | 0.0035     | 6.1 2.1 | 3595 |
| 1604688 | 182.0536 | 152.4746 | -0.0058    | -0.0015    | 2.5 1.8 | 3596 |
| 1604927 | 181.5897 | 154.8936 | -0.0124    | 0.0066     | 1.9 1.0 | 3597 |
| 1606614 | 183.2825 | 152.1181 | -0.0052    | 0.0063     | 2.1 2.2 | 3598 |
| 1611666 | 179.2620 | 160.9501 | -0.0119    | -0.0029    | 3.8 2.3 | 3599 |
| 1613774 | 181.1840 | 161.6683 | -0.0142    | 0.0007     | 1.4 2.9 | 3600 |
| 1625341 | 182.8970 | 166.5989 | -0.0010    | 0.0004     | 4.3 5.4 | 3601 |
| 1627224 | 184.5304 | 166.0424 | 0.0076     | 0.0125     | 1.9 2.2 | 3602 |
| 1629476 | 186.8973 | 167.9310 | 0.0076     | -0.0050    | 4.0 2.2 | 3603 |
| 1630010 | 178.2009 | 172.6097 | 0.0099     | 0.0017     | 1.7 3.6 | 3604 |
| 1631305 | 179.1874 | 175.6409 | 0.0069     | 0.0065     | 6.4 6.4 | 3605 |
| 1631517 | 179.2724 | 177.6011 | 0.0103     | 0.0001     | 6.8 4.7 | 3606 |
| 1632060 | 180.5019 | 172.5655 | -0.0034    | -0.0090    | 4.1 1.0 | 3607 |
| 1636098 | 184.5126 | 173.3525 | 0.0062     | -0.0019    | 4.3 2.5 | 3608 |
| 1636516 | 183.9294 | 177.5043 | 0.0074     | -0.0090    | 4.2 3.5 | 3609 |
| 1637054 | 185.0121 | 173.0093 | 0.0039     | 0.0045     | 3.2 2.0 | 3610 |
| 1638080 | 186.2484 | 172.6913 | 0.0064     | -0.0046    | 6.9 3.0 | 3611 |
| 1638195 | 186.3506 | 174.0345 | 0.0074     | 0.0064     | 3.3 2.8 | 3612 |
| 1639822 | 186.8388 | 179.8496 | 0.0021     | -0.0041    | 4.4 2.1 | 3613 |
| 1644691 | 183.2497 | 186.7235 | 0.0080     | 0.0005     | 3.5 4.0 | 3614 |
| 1647616 | 185.3299 | 187.2062 | 0.0102     | 0.0019     | 4.7 4.0 | 3615 |
| 1648588 | 186.7737 | 186.5031 | -0.0024    | 0.0071     | 2.2 2.8 | 3616 |
| 1650452 | 179.5600 | 193.7831 | 0.0100     | -0.0129    | 3.0 4.4 | 3617 |
| 1650947 | 179.8192 | 198.6751 | 0.0008     | -0.0046    | 9.6 5.7 | 3618 |
| 1652448 | 181.4229 | 194.2816 | 0.0101     | 0.0012     | 2.0 2.5 | 3619 |
| 1653039 | 181.9468 | 190.9349 | -0.0033    | -0.0058    | 2.5 1.8 | 3620 |
| 1653269 | 182.3770 | 192.6499 | -0.0120    | 0.0094     | 2.5 2.5 | 3621 |
| 1654142 | 182.9916 | 191.1859 | -0.0032    | 0.0108     | 4.6 1.0 | 3622 |
| 1654985 | 183.9761 | 198.5715 | -0.0116    | 0.0106     | 2.5 1.4 | 3623 |
| 1660925 | 180.5537 | 207.3099 | 0.0000     | 0.0042     | 9.9 3.8 | 3624 |
| 1662571 | 182.4391 | 203.5233 | -0.0079    | 0.0052     | 5.2 9.9 | 3625 |
| 1666846 | 186.3962 | 206.7394 | -0.0001    | 0.0055     | 3.0 6.3 | 3626 |

| Ref     | x'      | y'      | $\xi$   | $\eta$  | $\zeta$ | Ser  |
|---------|---------|---------|---------|---------|---------|------|
| 1461456 | 32.0927 | 54.8339 | 0.41483 | 0.64649 | 0.64028 | 3554 |
| 1462758 | 33.2368 | 57.6518 | 0.42532 | 0.67830 | 0.59917 | 3555 |
| 1462965 | 33.4193 | 59.1821 | 0.42606 | 0.69560 | 0.57846 | 3556 |
| 1470411 | 31.5134 | 63.1531 | 0.40136 | 0.74072 | 0.53874 | 3557 |
| 1472658 | 33.8948 | 65.6840 | 0.42486 | 0.76892 | 0.47777 | 3558 |
| 1473167 | 34.4670 | 61.0248 | 0.43594 | 0.71630 | 0.54486 | 3559 |
| 1473253 | 34.4947 | 61.6614 | 0.43564 | 0.72348 | 0.53553 | 3560 |
| 1473729 | 34.6778 | 66.5906 | 0.43235 | 0.77899 | 0.45414 | 3561 |
| 1475034 | 35.9743 | 59.9543 | 0.45349 | 0.70399 | 0.54657 | 3562 |
| 1481507 | 33.6472 | 73.5190 | 0.41096 | 0.85660 | 0.31200 | 3563 |
| 1484219 | 36.0699 | 71.0613 | 0.44116 | 0.82878 | 0.34424 | 3564 |
| 1485373 | 37.5441 | 71.4652 | 0.45617 | 0.83294 | 0.31324 | 3565 |
| 1500308 | 38.1555 | 1.7006  | 0.49987 | 0.03806 | 0.86526 | 3566 |
| 1503826 | 41.0306 | 5.8712  | 0.53158 | 0.08573 | 0.84266 | 3567 |
| 1510688 | 38.9523 | 13.0045 | 0.50772 | 0.16799 | 0.84498 | 3568 |
| 1511584 | 39.8169 | 11.8195 | 0.51749 | 0.15427 | 0.84166 | 3569 |
| 1514744 | 42.2589 | 13.5803 | 0.54431 | 0.17419 | 0.82060 | 3570 |
| 1514769 | 42.3933 | 14.0425 | 0.54573 | 0.17948 | 0.81852 | 3571 |
| 1532935 | 40.7431 | 32.8773 | 0.52248 | 0.39543 | 0.75541 | 3572 |
| 1533005 | 41.1936 | 24.9866 | 0.53005 | 0.30513 | 0.79117 | 3573 |
| 1533874 | 42.0119 | 31.8877 | 0.53687 | 0.38396 | 0.75123 | 3574 |
| 1533970 | 42.0831 | 32.3587 | 0.53748 | 0.38933 | 0.74802 | 3575 |
| 1536881 | 44.8582 | 31.6509 | 0.56832 | 0.38086 | 0.72936 | 3576 |
| 1543000 | 41.4278 | 33.2867 | 0.52989 | 0.40002 | 0.74780 | 3577 |
| 1550305 | 39.2991 | 45.1747 | 0.50078 | 0.53586 | 0.67976 | 3578 |
| 1551224 | 40.1961 | 44.1570 | 0.51123 | 0.52416 | 0.68110 | 3579 |
| 1554785 | 43.8010 | 48.6566 | 0.54806 | 0.57479 | 0.60766 | 3580 |
| 1554808 | 43.1689 | 49.7441 | 0.54041 | 0.58724 | 0.60258 | 3581 |
| 1555836 | 44.2733 | 49.6430 | 0.55254 | 0.58591 | 0.59280 | 3582 |
| 1559992 | 48.6016 | 50.2501 | 0.59906 | 0.59201 | 0.53912 | 3583 |
| 1563836 | 43.1399 | 58.4396 | 0.53301 | 0.68571 | 0.49568 | 3584 |
| 1564576 | 44.2310 | 55.8393 | 0.54722 | 0.65613 | 0.51966 | 3585 |
| 1565013 | 44.2466 | 51.1463 | 0.55117 | 0.60297 | 0.57675 | 3586 |
| 1567403 | 46.2108 | 54.7508 | 0.56958 | 0.64344 | 0.51143 | 3587 |
| 1567869 | 47.2493 | 58.7465 | 0.57688 | 0.68833 | 0.43979 | 3588 |
| 1572153 | 42.6713 | 60.7971 | 0.52557 | 0.71239 | 0.46506 | 3589 |
| 1573150 | 43.5345 | 60.6860 | 0.53499 | 0.71097 | 0.45642 | 3590 |
| 1575059 | 45.3953 | 60.5078 | 0.55515 | 0.70857 | 0.43559 | 3591 |
| 1577271 | 47.6553 | 61.6692 | 0.57780 | 0.72109 | 0.38234 | 3592 |
| 1578546 | 48.7695 | 64.8681 | 0.58480 | 0.75651 | 0.29275 | 3593 |
| 1581156 | 42.8133 | 69.9687 | 0.51416 | 0.81494 | 0.26742 | 3594 |
| 1584044 | 45.5481 | 69.0888 | 0.54396 | 0.80432 | 0.23910 | 3595 |
| 1604688 | 51.5603 | 4.5286  | 0.64772 | 0.06871 | 0.75877 | 3596 |
| 1604927 | 51.0831 | 6.9461  | 0.64231 | 0.09662 | 0.76033 | 3597 |
| 1606614 | 52.7916 | 4.1784  | 0.66121 | 0.06446 | 0.74743 | 3598 |
| 1611666 | 48.7217 | 12.9929 | 0.61567 | 0.16652 | 0.77021 | 3599 |
| 1613774 | 50.6406 | 13.7212 | 0.63659 | 0.17457 | 0.75119 | 3600 |
| 1625341 | 52.3276 | 18.6625 | 0.65406 | 0.23098 | 0.72032 | 3601 |
| 1627224 | 53.9646 | 18.1142 | 0.67202 | 0.22439 | 0.70572 | 3602 |
| 1629476 | 56.3222 | 20.0157 | 0.69716 | 0.24573 | 0.67348 | 3603 |
| 1630010 | 47.5971 | 24.6513 | 0.60073 | 0.30038 | 0.74087 | 3604 |
| 1631305 | 48.5676 | 27.6887 | 0.61043 | 0.33499 | 0.71775 | 3605 |
| 1631517 | 48.6421 | 29.6500 | 0.61056 | 0.35740 | 0.70674 | 3606 |
| 1632060 | 49.8993 | 24.6189 | 0.62597 | 0.29964 | 0.71999 | 3607 |
| 1636098 | 53.9073 | 25.4269 | 0.66941 | 0.30817 | 0.67596 | 3608 |
| 1636516 | 53.3014 | 29.5772 | 0.66138 | 0.35575 | 0.66032 | 3609 |
| 1637054 | 54.4088 | 25.0862 | 0.67496 | 0.30418 | 0.67224 | 3610 |
| 1638080 | 55.6473 | 24.7744 | 0.68849 | 0.30036 | 0.66013 | 3611 |
| 1638195 | 55.7423 | 26.1186 | 0.68907 | 0.31572 | 0.65230 | 3612 |
| 1639822 | 56.1993 | 31.9384 | 0.69176 | 0.38213 | 0.61273 | 3613 |
| 1644691 | 52.5716 | 38.7963 | 0.64930 | 0.46107 | 0.60484 | 3614 |
| 1647616 | 54.6500 | 39.2899 | 0.67144 | 0.46626 | 0.57599 | 3615 |
| 1648588 | 56.0981 | 38.5940 | 0.68738 | 0.45802 | 0.56367 | 3616 |
| 1650452 | 48.8422 | 45.8395 | 0.60477 | 0.54191 | 0.58359 | 3617 |
| 1650947 | 49.0751 | 50.7346 | 0.60379 | 0.59741 | 0.52777 | 3618 |
| 1652448 | 50.7032 | 46.3478 | 0.62455 | 0.54732 | 0.55711 | 3619 |
| 1653039 | 51.2454 | 43.0025 | 0.63256 | 0.50920 | 0.58359 | 3620 |
| 1653269 | 51.6665 | 44.7204 | 0.63603 | 0.52864 | 0.56214 | 3621 |
| 1654142 | 52.2892 | 43.2590 | 0.64367 | 0.51191 | 0.56889 | 3622 |
| 1654985 | 53.2342 | 50.6524 | 0.64840 | 0.59555 | 0.47423 | 3623 |
| 1660925 | 49.7632 | 59.3764 | 0.60284 | 0.69480 | 0.39221 | 3624 |
| 1662571 | 51.6698 | 55.5981 | 0.62716 | 0.65179 | 0.42643 | 3625 |
| 1666846 | 55.6110 | 58.8358 | 0.66417 | 0.68693 | 0.29497 | 3626 |

## POSITIONS ON THE DISK

| Ref     | x        | y        | $\delta x$ | $\delta y$ | weights | Ser  |
|---------|----------|----------|------------|------------|---------|------|
| 1668077 | 187.7284 | 199.6345 | 0.0019     | -0.0031    | 9.9 1.6 | 3627 |
| 1668586 | 188.4220 | 203.9992 | 0.0000     | -0.0077    | 6.1 3.8 | 3628 |
| 1668994 | 188.9963 | 207.4244 | -0.0053    | 0.0072     | 1.5 2.4 | 3629 |
| 1672178 | 183.1557 | 209.4090 | -0.0002    | 0.0111     | 3.1 2.3 | 3630 |
| 1673068 | 183.8822 | 208.5886 | 0.0012     | 0.0050     | 3.9 4.2 | 3631 |
| 1702558 | 189.1745 | 151.6216 | -0.0027    | -0.0056    | 2.6 4.7 | 3632 |
| 1705392 | 192.3053 | 149.4732 | 0.0043     | 0.0137     | 2.9 3.7 | 3633 |
| 1706046 | 192.7200 | 147.1889 | -0.0085    | 0.0053     | 2.4 3.3 | 3634 |
| 1708031 | 194.4625 | 146.8102 | 0.0037     | 0.0024     | 4.4 9.9 | 3635 |
| 1708122 | 194.4573 | 147.6839 | 0.0041     | 0.0043     | 7.8 2.0 | 3636 |
| 1711048 | 188.1604 | 155.9701 | 0.0095     | 0.0036     | 3.2 2.2 | 3637 |
| 1714562 | 191.2283 | 159.8484 | -0.0149    | 0.0064     | 6.8 2.4 | 3638 |
| 1715286 | 192.3168 | 157.6298 | 0.0041     | -0.0060    | 4.3 2.5 | 3639 |
| 1715894 | 192.5127 | 162.6683 | -0.0034    | 0.0102     | 4.2 2.3 | 3640 |
| 1718504 | 194.4092 | 160.0426 | 0.0016     | 0.0003     | 2.5 1.8 | 3641 |
| 1720728 | 187.4416 | 170.7123 | 0.0035     | -0.0063    | 1.7 2.4 | 3642 |
| 1724734 | 191.2139 | 170.4426 | -0.0051    | 0.0071     | 1.7 5.7 | 3643 |
| 1727238 | 194.0044 | 166.4932 | -0.0023    | 0.0053     | 2.5 3.3 | 3644 |
| 1728591 | 195.4739 | 168.5542 | 0.0149     | -0.0013    | 2.7 1.6 | 3645 |
| 1735371 | 192.7240 | 175.4538 | 0.0045     | 0.0050     | 2.5 1.8 | 3646 |
| 1736112 | 193.0007 | 173.8989 | -0.0068    | 0.0092     | 2.3 5.1 | 3647 |
| 1737833 | 194.4771 | 180.0831 | 0.0044     | 0.0012     | 8.1 3.9 | 3648 |
| 1737891 | 195.0726 | 179.8828 | 0.0001     | 0.0060     | 4.8 1.9 | 3649 |
| 1741872 | 189.6992 | 188.7079 | 0.0022     | 0.0020     | 6.5 3.4 | 3650 |
| 1742108 | 189.6235 | 183.0421 | -0.0008    | 0.0038     | 6.8 1.4 | 3651 |
| 1743566 | 191.3066 | 186.3877 | 0.0057     | -0.0003    | 4.1 2.2 | 3652 |
| 1744044 | 191.8247 | 181.8186 | 0.0006     | -0.0032    | 1.8 1.9 | 3653 |
| 1744572 | 192.3112 | 186.0462 | -0.0112    | -0.0085    | 2.0 3.0 | 3654 |
| 1744962 | 192.5079 | 189.6215 | 0.0103     | 0.0088     | 1.1 5.6 | 3655 |
| 1745169 | 192.9565 | 183.1225 | 0.0079     | -0.0027    | 3.6 1.5 | 3656 |
| 1745929 | 193.0923 | 190.2369 | 0.0000     | -0.0035    | 3.8 1.7 | 3657 |
| 1746077 | 194.0634 | 182.1645 | 0.0056     | -0.0029    | 5.0 4.3 | 3658 |
| 1746304 | 193.5144 | 184.5329 | -0.0119    | -0.0063    | 5.0 3.4 | 3659 |
| 1748927 | 195.9827 | 190.1483 | 0.0059     | 0.0035     | 3.1 1.2 | 3660 |
| 1750597 | 189.4658 | 195.3136 | 0.0087     | -0.0114    | 1.5 2.2 | 3661 |
| 1750934 | 189.1418 | 198.5156 | 0.0087     | 0.0064     | 2.6 3.3 | 3662 |
| 1751743 | 190.0076 | 196.6725 | 0.0082     | -0.0018    | 5.9 9.5 | 3663 |
| 1752294 | 191.1388 | 192.3560 | -0.0011    | -0.0001    | 3.1 2.3 | 3664 |
| 1754844 | 193.0538 | 197.8020 | 0.0043     | -0.0045    | 3.7 4.7 | 3665 |
| 1755718 | 193.7341 | 197.3181 | -0.0020    | -0.0061    | 2.3 2.8 | 3666 |
| 1756509 | 194.4255 | 195.5587 | 0.0046     | 0.0026     | 3.4 2.0 | 3667 |
| 1756576 | 195.0366 | 195.3523 | 0.0012     | -0.0020    | 3.9 2.9 | 3668 |
| 1757101 | 194.9545 | 191.3238 | 0.0145     | 0.0019     | 2.9 2.5 | 3669 |
| 1757477 | 195.9757 | 194.5239 | -0.0054    | 0.0065     | 6.6 1.8 | 3670 |
| 1759707 | 197.6539 | 197.2825 | 0.0024     | 0.0072     | 2.8 1.6 | 3671 |
| 1760449 | 189.8516 | 203.4627 | 0.0009     | 0.0001     | 1.3 0.7 | 3672 |
| 1762551 | 192.0075 | 203.6782 | -0.0075    | -0.0060    | 2.3 4.5 | 3673 |
| 1763329 | 192.5365 | 202.6280 | 0.0145     | 0.0103     | 1.6 1.5 | 3674 |
| 1764325 | 193.5643 | 202.2971 | 0.0100     | 0.0012     | 4.2 1.9 | 3675 |
| 1801927 | 197.3326 | 155.1589 | 0.0098     | 0.0018     | 3.8 5.5 | 3676 |
| 1802972 | 198.6823 | 154.7907 | 0.0018     | -0.0002    | 3.7 2.1 | 3677 |
| 1803578 | 199.6170 | 151.7780 | 0.0102     | -0.0049    | 4.3 4.0 | 3678 |
| 1807350 | 203.2820 | 149.4366 | 0.0133     | -0.0029    | 5.3 4.1 | 3679 |
| 1809610 | 204.7900 | 152.1343 | 0.0000     | -0.0020    | 2.4 1.6 | 3680 |
| 1809844 | 205.1413 | 154.1683 | -0.0020    | 0.0042     | 4.0 2.6 | 3681 |
| 1815060 | 201.5717 | 155.5043 | -0.0051    | 0.0004     | 2.9 8.2 | 3682 |
| 1816300 | 201.9436 | 158.1306 | -0.0026    | 0.0054     | 3.1 2.2 | 3683 |
| 1817154 | 203.3102 | 156.7629 | 0.0104     | 0.0054     | 2.5 5.5 | 3684 |
| 1818471 | 204.5270 | 159.1341 | -0.0016    | 0.0031     | 2.3 3.0 | 3685 |
| 1819063 | 205.4127 | 155.8727 | -0.0042    | 0.0022     | 3.5 2.6 | 3686 |
| 1819573 | 205.5972 | 160.2260 | -0.0103    | 0.0104     | 3.0 1.7 | 3687 |
| 1819694 | 205.7750 | 161.1881 | -0.0120    | 0.0093     | 1.5 1.8 | 3688 |
| 1831915 | 198.1577 | 181.1634 | 0.0079     | -0.0055    | 4.8 4.9 | 3689 |
| 1835654 | 202.3137 | 178.5988 | -0.0010    | 0.0036     | 2.4 2.9 | 3690 |
| 1836994 | 203.9154 | 181.2620 | 0.0084     | -0.0055    | 5.0 8.1 | 3691 |
| 1840427 | 197.6410 | 185.7821 | 0.0002     | -0.0041    | 1.5 2.6 | 3692 |
| 1841361 | 198.8793 | 184.3517 | -0.0012    | 0.0135     | 3.3 6.3 | 3693 |
| 1841955 | 199.2806 | 190.0455 | 0.0069     | 0.0066     | 3.1 1.1 | 3694 |
| 1842661 | 200.0793 | 187.0354 | 0.0019     | -0.0083    | 8.7 1.6 | 3695 |
| 1843625 | 200.7715 | 187.4287 | 0.0132     | -0.0011    | 2.8 4.1 | 3696 |
| 1845336 | 202.6699 | 184.9836 | 0.0098     | -0.0031    | 3.0 2.0 | 3697 |
| 1848000 | 205.0872 | 181.8349 | 0.0010     | -0.0034    | 1.6 1.4 | 3698 |
| 1848132 | 205.5380 | 182.9913 | 0.0002     | 0.0006     | 5.0 2.5 | 3699 |

## POSITIONS ON THE DISK

4b

| Ref     | x'      | y'      | $\xi$   | $\eta$  | $\zeta$ | Ser  |
|---------|---------|---------|---------|---------|---------|------|
| 1668077 | 56.9822 | 51.7352 | 0.68691 | 0.60678 | 0.39997 | 3627 |
| 1668586 | 57.6524 | 56.1050 | 0.68875 | 0.65566 | 0.30941 | 3628 |
| 1668994 | 58.2084 | 59.5344 | 0.68877 | 0.69357 | 0.21108 | 3629 |
| 1672178 | 52.3548 | 61.4897 | 0.62699 | 0.71769 | 0.30298 | 3630 |
| 1673068 | 53.0860 | 60.6727 | 0.63571 | 0.70833 | 0.30683 | 3631 |
| 1702558 | 58.6886 | 3.7121  | 0.72534 | 0.05792 | 0.68595 | 3632 |
| 1705392 | 61.8322 | 1.5790  | 0.75933 | 0.03262 | 0.64988 | 3633 |
| 1706046 | 62.2594 | -0.7040 | 0.76397 | 0.00619 | 0.64522 | 3634 |
| 1708031 | 64.0046 | -1.0738 | 0.78267 | 0.00148 | 0.62244 | 3635 |
| 1708122 | 63.9947 | -0.1998 | 0.78256 | 0.01157 | 0.62247 | 3636 |
| 1711048 | 57.6505 | 8.0569  | 0.71374 | 0.10815 | 0.69201 | 3637 |
| 1714562 | 60.6987 | 11.9525 | 0.74611 | 0.15227 | 0.64818 | 3638 |
| 1715286 | 61.7996 | 9.7387  | 0.75828 | 0.12656 | 0.63953 | 3639 |
| 1715894 | 61.9683 | 14.7800 | 0.75922 | 0.18443 | 0.62415 | 3640 |
| 1718504 | 63.8797 | 12.1631 | 0.78017 | 0.15391 | 0.60634 | 3641 |
| 1720728 | 56.8517 | 22.8008 | 0.70212 | 0.27753 | 0.65574 | 3642 |
| 1724734 | 60.6269 | 22.5505 | 0.74285 | 0.27382 | 0.61090 | 3643 |
| 1727238 | 63.4399 | 18.6140 | 0.77406 | 0.22804 | 0.59062 | 3644 |
| 1728591 | 64.8988 | 20.6834 | 0.78898 | 0.25136 | 0.56065 | 3645 |
| 1735371 | 62.1105 | 27.5713 | 0.75692 | 0.33088 | 0.56355 | 3646 |
| 1736112 | 62.3957 | 26.0173 | 0.76056 | 0.31305 | 0.56881 | 3647 |
| 1737833 | 63.8393 | 32.2114 | 0.77312 | 0.38336 | 0.50529 | 3648 |
| 1737891 | 64.4361 | 32.0141 | 0.77950 | 0.38094 | 0.49725 | 3649 |
| 1741872 | 59.0129 | 40.8147 | 0.71713 | 0.48257 | 0.50285 | 3650 |
| 1742108 | 58.9678 | 35.1464 | 0.71994 | 0.41809 | 0.55397 | 3651 |
| 1743566 | 60.6334 | 38.5019 | 0.73575 | 0.45586 | 0.50087 | 3652 |
| 1744044 | 61.1764 | 33.9338 | 0.74408 | 0.40372 | 0.53232 | 3653 |
| 1744572 | 61.6403 | 38.1655 | 0.74658 | 0.45175 | 0.48840 | 3654 |
| 1744962 | 61.8177 | 41.7431 | 0.74603 | 0.49233 | 0.44839 | 3655 |
| 1745169 | 62.3016 | 35.2440 | 0.75528 | 0.41833 | 0.50452 | 3656 |
| 1745929 | 62.3990 | 42.3618 | 0.75163 | 0.49916 | 0.43115 | 3657 |
| 1746077 | 63.4142 | 34.2914 | 0.76754 | 0.40717 | 0.49507 | 3658 |
| 1746304 | 62.8521 | 36.6578 | 0.76026 | 0.43427 | 0.48313 | 3659 |
| 1748927 | 65.2910 | 42.2880 | 0.78156 | 0.49735 | 0.37658 | 3660 |
| 1750597 | 58.7436 | 47.4216 | 0.70934 | 0.55755 | 0.43126 | 3661 |
| 1750934 | 58.4022 | 50.6231 | 0.70281 | 0.59380 | 0.39174 | 3662 |
| 1751743 | 59.2783 | 48.7838 | 0.71369 | 0.57278 | 0.40319 | 3663 |
| 1752294 | 60.4333 | 44.4716 | 0.72947 | 0.52366 | 0.44007 | 3664 |
| 1754844 | 62.3196 | 49.9294 | 0.74375 | 0.58463 | 0.32411 | 3665 |
| 1755718 | 63.0028 | 49.4489 | 0.75120 | 0.57896 | 0.31703 | 3666 |
| 1756509 | 63.7039 | 47.6924 | 0.76023 | 0.55893 | 0.33113 | 3667 |
| 1756576 | 64.3164 | 47.4891 | 0.76663 | 0.55639 | 0.32047 | 3668 |
| 1757101 | 64.2561 | 43.4587 | 0.76995 | 0.51096 | 0.38224 | 3669 |
| 1757477 | 65.2603 | 46.6652 | 0.77701 | 0.54673 | 0.31199 | 3670 |
| 1759707 | 66.9243 | 49.4335 | 0.78961 | 0.57689 | 0.20911 | 3671 |
| 1760449 | 59.0855 | 55.5757 | 0.70396 | 0.64918 | 0.28811 | 3672 |
| 1762551 | 61.2411 | 55.8024 | 0.72488 | 0.65073 | 0.22606 | 3673 |
| 1763329 | 61.7760 | 54.7545 | 0.73181 | 0.63883 | 0.23739 | 3674 |
| 1764325 | 62.8060 | 54.4288 | 0.74228 | 0.63468 | 0.21495 | 3675 |
| 1801927 | 66.8307 | 7.2927  | 0.81227 | 0.09712 | 0.57514 | 3676 |
| 1802972 | 68.1829 | 6.9313  | 0.82661 | 0.09256 | 0.55511 | 3677 |
| 1803578 | 69.1343 | 3.9224  | 0.83692 | 0.05762 | 0.54429 | 3678 |
| 1807350 | 72.8134 | 1.5990  | 0.87548 | 0.02959 | 0.48235 | 3679 |
| 1809610 | 74.3074 | 4.3055  | 0.89071 | 0.06022 | 0.45057 | 3680 |
| 1809844 | 74.6478 | 6.3420  | 0.89398 | 0.08353 | 0.44025 | 3681 |
| 1815060 | 71.0696 | 7.6601  | 0.85681 | 0.10002 | 0.50583 | 3682 |
| 1816300 | 71.4274 | 10.2893 | 0.86013 | 0.13013 | 0.49319 | 3683 |
| 1817154 | 72.8020 | 8.9281  | 0.87462 | 0.11399 | 0.47122 | 3684 |
| 1818471 | 74.0064 | 11.3065 | 0.88658 | 0.14086 | 0.44061 | 3685 |
| 1819063 | 74.9101 | 8.0485  | 0.89642 | 0.10306 | 0.43105 | 3686 |
| 1819573 | 75.0711 | 12.4043 | 0.89720 | 0.15303 | 0.41426 | 3687 |
| 1819694 | 75.2438 | 13.3677 | 0.89871 | 0.16401 | 0.40671 | 3688 |
| 1831915 | 67.5155 | 33.3110 | 0.81090 | 0.39473 | 0.43201 | 3689 |
| 1835654 | 71.6870 | 30.7669 | 0.85510 | 0.36421 | 0.36899 | 3690 |
| 1836994 | 73.2749 | 33.4394 | 0.86901 | 0.39379 | 0.29959 | 3691 |
| 1840427 | 66.9736 | 37.9288 | 0.80225 | 0.44736 | 0.39530 | 3692 |
| 1841361 | 68.2201 | 36.5042 | 0.81604 | 0.43074 | 0.38542 | 3693 |
| 1841955 | 68.5908 | 42.2022 | 0.81489 | 0.49502 | 0.30151 | 3694 |
| 1842661 | 69.4061 | 39.1951 | 0.82586 | 0.46072 | 0.32511 | 3695 |
| 1843625 | 70.0964 | 39.5921 | 0.83234 | 0.46488 | 0.30180 | 3696 |
| 1845336 | 72.0088 | 37.1559 | 0.85340 | 0.43645 | 0.28499 | 3697 |
| 1848000 | 74.4440 | 34.0185 | 0.87981 | 0.39970 | 0.25723 | 3698 |
| 1848132 | 74.8888 | 35.1777 | 0.88286 | 0.41249 | 0.22453 | 3699 |

## POSITIONS ON THE DISK

| Ref     | x        | y        | $\delta x$ | $\delta y$ | weights | Ser  |
|---------|----------|----------|------------|------------|---------|------|
| 1853210 | 201.2937 | 192.4218 | -0.0133    | 0.0086     | 4.1 1.1 | 3700 |
| 1901388 | 207.5772 | 150.2847 | 0.0084     | 0.0055     | 2.9 1.8 | 3701 |
| 1902205 | 207.5814 | 149.2302 | -0.0115    | 0.0001     | 3.6 1.7 | 3702 |
| 1904580 | 210.6094 | 151.5096 | -0.0074    | 0.0079     | 7.3 1.4 | 3703 |
| 1904895 | 210.6948 | 154.5306 | -0.0053    | 0.0097     | 2.5 1.2 | 3704 |
| 1904997 | 210.6548 | 155.5588 | -0.0039    | -0.0018    | 3.4 2.4 | 3705 |
| 1905488 | 211.5401 | 151.3465 | 0.0059     | 0.0122     | 3.7 2.1 | 3706 |
| 1910102 | 205.8112 | 156.7000 | -0.0076    | 0.0038     | 2.7 1.2 | 3707 |
| 1910384 | 206.6567 | 158.6059 | 0.0132     | 0.0018     | 2.6 1.2 | 3708 |
| 1910997 | 206.9486 | 164.0989 | 0.0073     | 0.0008     | 3.5 0.9 | 3709 |
| 1912746 | 208.3834 | 162.3392 | -0.0075    | 0.0033     | 4.9 3.3 | 3710 |
| 1913431 | 209.0948 | 159.3488 | 0.0051     | 0.0056     | 1.7 3.7 | 3711 |
| 1914558 | 210.4855 | 160.8419 | 0.0009     | -0.0113    | 5.5 1.3 | 3712 |
| 1914756 | 210.4758 | 162.4542 | -0.0011    | 0.0077     | 3.8 2.3 | 3713 |
| 1915577 | 211.7613 | 160.8667 | -0.0036    | -0.0048    | 3.2 2.2 | 3714 |
| 1916213 | 211.9690 | 157.8596 | -0.0027    | -0.0012    | 3.1 2.8 | 3715 |
| 1920030 | 206.3503 | 164.3553 | 0.0073     | 0.0098     | 1.5 2.0 | 3716 |
| 1923381 | 210.0268 | 167.2316 | 0.0022     | -0.0011    | 3.9 2.3 | 3717 |
| 2008909 | 117.7330 | 155.0459 | -0.0091    | 0.0041     | 3.2 1.9 | 3718 |
| 2012507 | 122.9925 | 160.0856 | -0.0130    | 0.0014     | 2.0 1.9 | 3719 |
| 2014004 | 121.1583 | 155.5046 | -0.0068    | 0.0063     | 4.0 4.4 | 3720 |
| 2014128 | 121.0625 | 156.6870 | -0.0015    | -0.0001    | 9.9 3.3 | 3721 |
| 2015532 | 120.1453 | 159.7365 | -0.0098    | -0.0003    | 3.1 2.6 | 3722 |
| 2016111 | 119.3893 | 156.1453 | -0.0032    | 0.0019     | 2.1 1.5 | 3723 |
| 2023537 | 122.0771 | 168.8756 | -0.0007    | -0.0098    | 1.6 2.5 | 3724 |
| 2023916 | 122.3039 | 172.2193 | -0.0030    | -0.0127    | 2.3 1.9 | 3725 |
| 2027762 | 118.4123 | 170.1765 | -0.0106    | 0.0038     | 5.0 2.0 | 3726 |
| 2028442 | 117.6215 | 167.6310 | -0.0013    | -0.0044    | 3.3 1.6 | 3727 |
| 2049780 | 117.0464 | 187.4784 | -0.0043    | -0.0034    | 2.7 1.6 | 3728 |
| 2052224 | 123.7606 | 192.1410 | -0.0122    | -0.0073    | 5.4 1.4 | 3729 |
| 2053392 | 122.3360 | 192.8939 | 0.0007     | -0.0087    | 2.7 2.4 | 3730 |
| 2059974 | 117.6939 | 198.3802 | -0.0100    | -0.0030    | 2.6 9.6 | 3731 |
| 2060324 | 126.1057 | 201.7625 | -0.0060    | -0.0023    | 3.7 1.7 | 3732 |
| 2064627 | 122.8177 | 204.7556 | -0.0031    | -0.0077    | 3.8 8.7 | 3733 |
| 2067352 | 119.7112 | 201.7091 | -0.0045    | 0.0045     | 4.8 8.0 | 3734 |
| 2070831 | 126.9540 | 214.7309 | -0.0085    | -0.0053    | 2.0 4.7 | 3735 |
| 2075524 | 122.5325 | 212.4667 | -0.0071    | -0.0095    | 5.9 5.6 | 3736 |
| 2078631 | 119.9059 | 213.0464 | -0.0082    | -0.0139    | 4.7 3.7 | 3737 |
| 2082200 | 125.8968 | 218.2210 | -0.0032    | -0.0016    | 3.6 2.1 | 3738 |
| 2090221 | 128.4282 | 227.1924 | -0.0100    | 0.0007     | 3.5 3.7 | 3739 |
| 2134231 | 112.7660 | 174.4734 | -0.0058    | 0.0004     | 8.7 7.6 | 3740 |
| 2144505 | 113.3757 | 186.1994 | -0.0040    | -0.0071    | 4.2 2.6 | 3741 |
| 2144559 | 112.9541 | 186.6013 | -0.0124    | -0.0090    | 5.0 4.1 | 3742 |
| 2152482 | 114.7647 | 193.8538 | -0.0100    | -0.0067    | 5.8 3.4 | 3743 |
| 2160845 | 117.5723 | 206.3359 | 0.0044     | -0.0029    | 2.9 1.4 | 3744 |
| 2163802 | 115.3094 | 206.0795 | -0.0020    | -0.0013    | 6.8 1.5 | 3745 |
| 2164817 | 114.3878 | 206.5624 | -0.0089    | -0.0082    | 3.2 1.8 | 3746 |
| 2166348 | 112.2088 | 202.3335 | 0.0051     | -0.0013    | 2.5 0.9 | 3747 |
| 2178224 | 111.1807 | 209.9373 | 0.0140     | -0.0068    | 2.9 2.0 | 3748 |
| 2181134 | 117.7695 | 217.7938 | -0.0034    | -0.0113    | 2.5 2.4 | 3749 |
| 2200308 | 107.4309 | 149.8802 | -0.0076    | 0.0030     | 5.4 3.8 | 3750 |
| 2200384 | 106.7419 | 149.6061 | -0.0022    | 0.0029     | 3.3 1.1 | 3751 |
| 2200549 | 107.1227 | 151.6478 | -0.0063    | -0.0078    | 7.1 3.0 | 3752 |
| 2206126 | 102.1257 | 148.0993 | -0.0124    | -0.0011    | 5.8 1.8 | 3753 |
| 2244200 | 104.7990 | 183.2304 | -0.0016    | -0.0030    | 2.1 2.2 | 3754 |
| 2248426 | 101.2450 | 185.5214 | -0.0148    | -0.0085    | 3.3 4.2 | 3755 |
| 2251179 | 107.0571 | 191.8722 | -0.0017    | -0.0026    | 4.4 2.8 | 3756 |
| 2253414 | 106.0128 | 194.0836 | -0.0058    | -0.0094    | 3.7 2.1 | 3757 |
| 2261754 | 108.0601 | 205.4625 | 0.0004     | -0.0068    | 3.3 2.7 | 3758 |
| 2286120 | 105.1683 | 217.5658 | -0.0096    | -0.0020    | 3.2 4.2 | 3759 |
| 2289585 | 102.6280 | 221.5998 | -0.0024    | 0.0096     | 2.6 3.1 | 3760 |
| 2302117 | 97.1271  | 148.2194 | -0.0056    | 0.0037     | 2.4 3.4 | 3761 |
| 2306549 | 93.5565  | 151.9437 | -0.0034    | 0.0001     | 3.9 2.4 | 3762 |
| 2322452 | 97.0682  | 167.8243 | -0.0135    | 0.0022     | 6.1 8.1 | 3763 |
| 2324993 | 95.1256  | 172.3303 | 0.0040     | -0.0028    | 1.9 2.6 | 3764 |
| 2332591 | 97.0256  | 177.3771 | -0.0084    | -0.0012    | 8.7 3.6 | 3765 |
| 2335022 | 94.9067  | 173.0603 | -0.0046    | -0.0072    | 3.8 3.1 | 3766 |
| 2344655 | 96.0487  | 187.2547 | 0.0081     | -0.0076    | 2.5 1.7 | 3767 |
| 2344797 | 95.8012  | 188.3790 | -0.0088    | -0.0050    | 3.1 2.1 | 3768 |
| 2353595 | 96.9828  | 195.1828 | -0.0123    | 0.0001     | 1.7 3.8 | 3769 |
| 2356748 | 94.9508  | 197.2361 | -0.0087    | -0.0076    | 3.6 5.3 | 3770 |
| 2414074 | 86.6623  | 155.8783 | -0.0140    | -0.0052    | 5.0 3.1 | 3771 |
| 2416163 | 85.0782  | 156.7320 | -0.0042    | -0.0073    | 2.5 1.0 | 3772 |

| Ref     | x'       | y'      | $\xi$    | $\eta$  | $\zeta$ | Ser  |
|---------|----------|---------|----------|---------|---------|------|
| 1853210 | 70.5918  | 44.5898 | 0.83118  | 0.52069 | 0.19501 | 3700 |
| 1901388 | 77.1057  | 2.4696  | 0.91931  | 0.03785 | 0.39172 | 3701 |
| 1902205 | 77.1156  | 1.4147  | 0.91946  | 0.02568 | 0.39234 | 3702 |
| 1904580 | 80.1324  | 3.7106  | 0.94914  | 0.05059 | 0.31076 | 3703 |
| 1904895 | 80.2015  | 6.7331  | 0.94939  | 0.08534 | 0.30227 | 3704 |
| 1904997 | 80.1559  | 7.7615  | 0.94876  | 0.09719 | 0.30067 | 3705 |
| 1905488 | 81.0644  | 3.5522  | 0.95811  | 0.04819 | 0.28232 | 3706 |
| 1910102 | 75.3043  | 8.8781  | 0.90030  | 0.11243 | 0.42049 | 3707 |
| 1910384 | 76.1398  | 10.7891 | 0.90840  | 0.13403 | 0.39604 | 3708 |
| 1910997 | 76.4021  | 16.2856 | 0.90950  | 0.19693 | 0.36609 | 3709 |
| 1912746 | 77.8470  | 14.5327 | 0.92444  | 0.17615 | 0.33821 | 3710 |
| 1913431 | 78.5748  | 11.5448 | 0.93249  | 0.14152 | 0.33233 | 3711 |
| 1914558 | 79.9580  | 13.0456 | 0.94546  | 0.15794 | 0.28490 | 3712 |
| 1914756 | 79.9396  | 14.6585 | 0.94470  | 0.17641 | 0.27645 | 3713 |
| 1915577 | 81.2342  | 13.0770 | 0.95747  | 0.15746 | 0.24178 | 3714 |
| 1916213 | 81.4582  | 10.0699 | 0.96056  | 0.12286 | 0.24946 | 3715 |
| 1920030 | 75.8022  | 16.5390 | 0.90340  | 0.20011 | 0.37923 | 3716 |
| 1923381 | 79.4646  | 19.4353 | 0.93802  | 0.23125 | 0.25815 | 3717 |
| 2008909 | 12.7994  | 6.7692  | -0.08010 | 0.09825 | 0.99193 | 3718 |
| 2012507 | -7.5651  | 11.8379 | -0.01996 | 0.15666 | 0.98745 | 3719 |
| 2014004 | -9.3752  | 7.2457  | -0.04043 | 0.10384 | 0.99377 | 3720 |
| 2014128 | -9.4775  | 8.4281  | -0.04172 | 0.11743 | 0.99220 | 3721 |
| 2015532 | -10.4115 | 11.4740 | -0.05287 | 0.15241 | 0.98690 | 3722 |
| 2016111 | -11.1484 | 7.8775  | -0.06104 | 0.11105 | 0.99194 | 3723 |
| 2023537 | -8.5284  | 20.6264 | -0.03258 | 0.25749 | 0.96573 | 3724 |
| 2023916 | -8.3196  | 23.9725 | -0.03092 | 0.29585 | 0.95473 | 3725 |
| 2027762 | 12.2017  | 21.9089 | -0.07545 | 0.27209 | 0.95931 | 3726 |
| 2028442 | 12.9790  | 19.3583 | -0.08393 | 0.24283 | 0.96643 | 3727 |
| 2049780 | -13.6617 | 39.2101 | -0.09797 | 0.46994 | 0.87724 | 3728 |
| 2052224 | -6.9701  | 43.9090 | -0.02241 | 0.52374 | 0.85158 | 3729 |
| 2053392 | -8.3993  | 44.6549 | -0.03933 | 0.53221 | 0.84570 | 3730 |
| 2059974 | -13.0729 | 50.1192 | -0.09660 | 0.59430 | 0.79842 | 3731 |
| 2060324 | -4.6761  | 53.5461 | -0.00124 | 0.63350 | 0.77374 | 3732 |
| 2064627 | -7.9816  | 56.5234 | -0.04151 | 0.66726 | 0.74367 | 3733 |
| 2067352 | -11.0728 | 53.4598 | -0.07537 | 0.63237 | 0.77100 | 3734 |
| 2070831 | -3.8976  | 66.5237 | -0.00242 | 0.78063 | 0.62498 | 3735 |
| 2075524 | -8.3086  | 64.2359 | -0.05144 | 0.75467 | 0.65408 | 3736 |
| 2078631 | -10.9394 | 64.8022 | -0.08260 | 0.76099 | 0.64348 | 3737 |
| 2082200 | -4.9741  | 70.0096 | -0.01849 | 0.81995 | 0.57213 | 3738 |
| 2090221 | -2.4903  | 78.9974 | -0.00220 | 0.92073 | 0.39020 | 3739 |
| 2134231 | -17.8734 | 26.1782 | -0.14254 | 0.32077 | 0.93637 | 3740 |
| 2144505 | -17.3269 | 37.9117 | -0.14017 | 0.45496 | 0.87941 | 3741 |
| 2144559 | 17.7508  | 38.3116 | -0.14529 | 0.45950 | 0.87621 | 3742 |
| 2152482 | -15.9788 | 45.5761 | -0.12798 | 0.54245 | 0.83028 | 3743 |
| 2160845 | -13.2376 | 58.0772 | -0.10381 | 0.68472 | 0.72137 | 3744 |
| 2163802 | -15.5000 | 57.8091 | -0.13006 | 0.68157 | 0.72010 | 3745 |
| 2164817 | -16.4246 | 58.2874 | -0.14125 | 0.68695 | 0.71284 | 3746 |
| 2166348 | 18.5815  | 54.0457 | -0.16349 | 0.63868 | 0.75191 | 3747 |
| 2178224 | 19.6512  | 61.6470 | -0.18191 | 0.72482 | 0.66448 | 3748 |
| 2181134 | -13.1023 | 69.5404 | -0.11273 | 0.81438 | 0.56928 | 3749 |
| 2200308 | -23.0776 | 1.5485  | -0.19970 | 0.03766 | 0.97913 | 3750 |
| 2200384 | -23.7654 | 1.2707  | -0.20775 | 0.03442 | 0.97758 | 3751 |
| 2200549 | 23.3955  | 3.3151  | -0.20349 | 0.05798 | 0.97736 | 3752 |
| 2206126 | -28.3752 | -0.2604 | -0.26188 | 0.01644 | 0.96496 | 3753 |
| 2244200 | 25.8909  | 34.8974 | -0.23941 | 0.42001 | 0.87537 | 3754 |
| 2248426 | -29.4587 | 37.1709 | -0.28244 | 0.44568 | 0.84947 | 3755 |
| 2251179 | -23.6787 | 43.5540 | -0.21722 | 0.51895 | 0.82674 | 3756 |
| 2253414 | -24.7353 | 45.7608 | -0.23083 | 0.54402 | 0.80670 | 3757 |
| 2261754 | -22.7488 | 57.1545 | -0.21478 | 0.67369 | 0.70712 | 3758 |
| 2286120 | -25.7072 | 69.2473 | -0.26168 | 0.81007 | 0.52471 | 3759 |
| 2289585 | -28.2703 | 73.2697 | -0.29832 | 0.85480 | 0.42466 | 3760 |
| 2302117 | -33.3764 | -0.1661 | -0.32091 | 0.01707 | 0.94695 | 3761 |
| 2306549 | -36.9686 | 3.5412  | -0.36363 | 0.05939 | 0.92965 | 3762 |
| 2322452 | -33.5414 | 19.4457 | -0.32511 | 0.24249 | 0.91406 | 3763 |
| 2324993 | 35.5091  | 23.9434 | -0.34956 | 0.29384 | 0.88964 | 3764 |
| 2332591 | 33.6357  | 29.0018 | -0.32884 | 0.35193 | 0.87636 | 3765 |
| 2335022 | -35.7321 | 24.6725 | -0.35241 | 0.30216 | 0.88572 | 3766 |
| 2344655 | -34.6664 | 38.8780 | -0.34501 | 0.46466 | 0.81551 | 3767 |
| 2344797 | -34.9201 | 40.0015 | -0.34857 | 0.47745 | 0.80656 | 3768 |
| 2353595 | -33.7748 | 46.8138 | -0.33861 | 0.55518 | 0.75968 | 3769 |
| 2356748 | -35.8187 | 48.8574 | -0.36432 | 0.57819 | 0.73005 | 3770 |
| 2414074 | 43.8867  | 7.4417  | -0.44644 | 0.10342 | 0.88882 | 3771 |
| 2416163 | -45.4761 | 8.2875  | -0.46559 | 0.11293 | 0.87777 | 3772 |

## POSITIONS ON THE DISK

| Ref     | x       | y        | $\delta x$ | $\delta y$ | weights | Ser  |
|---------|---------|----------|------------|------------|---------|------|
| 2419754 | 82.7398 | 162.0946 | -0.0031    | 0.0024     | 5.8 1.4 | 3773 |
| 2422182 | 88.3851 | 165.2835 | -0.0014    | -0.0062    | 2.3 2.6 | 3774 |
| 2425674 | 86.0611 | 169.8429 | 0.0126     | -0.0054    | 7.1 3.7 | 3775 |
| 2427213 | 84.8235 | 166.3442 | -0.0134    | -0.0058    | 9.3 3.1 | 3776 |
| 2429655 | 82.9438 | 170.0147 | 0.0089     | -0.0055    | 3.5 1.2 | 3777 |
| 2434975 | 87.3036 | 181.2869 | -0.0060    | 0.0008     | 3.8 3.2 | 3778 |
| 2435605 | 86.9361 | 178.6629 | -0.0085    | 0.0008     | 1.6 2.1 | 3779 |
| 2439534 | 83.3514 | 177.7470 | -0.0115    | -0.0039    | 2.7 3.5 | 3780 |
| 2446896 | 85.8539 | 189.2927 | -0.0137    | 0.0029     | 5.6 3.4 | 3781 |
| 2449684 | 83.3162 | 187.3723 | 0.0068     | -0.0014    | 3.2 2.5 | 3782 |
| 2452666 | 89.7416 | 196.2359 | -0.0047    | -0.0076    | 2.4 2.3 | 3783 |
| 2453284 | 88.5794 | 192.6165 | 0.0014     | -0.0039    | 2.1 1.5 | 3784 |
| 2462074 | 89.8608 | 199.6229 | -0.0038    | -0.0032    | 5.3 4.5 | 3785 |
| 2500797 | 81.4327 | 153.6250 | -0.0047    | -0.0007    | 5.5 2.3 | 3786 |
| 2501063 | 80.7807 | 147.2811 | -0.0114    | -0.0064    | 6.1 1.9 | 3787 |
| 2509132 | 74.4789 | 148.1726 | -0.0135    | 0.0035     | 2.2 1.8 | 3788 |
| 2509471 | 74.1367 | 150.7337 | -0.0090    | -0.0008    | 8.7 3.4 | 3789 |
| 2512631 | 80.3930 | 161.0080 | -0.0084    | -0.0049    | 4.4 4.3 | 3790 |
| 2518244 | 75.3353 | 157.9278 | -0.0046    | -0.0080    | 3.4 1.0 | 3791 |
| 2528557 | 75.5203 | 169.4240 | -0.0079    | -0.0062    | 6.3 2.9 | 3792 |
| 2530492 | 81.9813 | 176.7967 | -0.0088    | -0.0080    | 0.7 4.5 | 3793 |
| 2532564 | 80.5696 | 177.8135 | 0.0014     | -0.0098    | 3.8 9.9 | 3794 |
| 2532610 | 81.0033 | 178.3680 | 0.0012     | -0.0044    | 4.0 1.1 | 3795 |
| 2536507 | 77.8027 | 178.1473 | 0.0005     | -0.0119    | 3.8 4.3 | 3796 |
| 2539615 | 75.3492 | 178.8779 | -0.0115    | 0.0008     | 3.8 2.5 | 3797 |
| 2539663 | 74.9413 | 178.7211 | -0.0103    | 0.0025     | 1.3 3.2 | 3798 |
| 2547958 | 77.2150 | 190.5116 | -0.0145    | -0.0134    | 2.4 3.4 | 3799 |
| 2550872 | 83.1942 | 197.7947 | -0.0061    | -0.0100    | 3.3 2.6 | 3800 |
| 2553453 | 80.6585 | 194.3662 | 0.0022     | 0.0002     | 2.3 3.2 | 3801 |
| 2604046 | 70.2861 | 147.7829 | -0.0130    | -0.0053    | 4.1 1.4 | 3802 |
| 2604896 | 69.9713 | 154.6796 | -0.0102    | -0.0009    | 2.7 2.8 | 3803 |
| 2608851 | 67.0504 | 154.3492 | 0.0026     | -0.0042    | 2.5 2.7 | 3804 |
| 2610492 | 73.3144 | 159.4551 | -0.0006    | -0.0054    | 2.5 1.1 | 3805 |
| 2615764 | 69.5523 | 162.3941 | -0.0036    | -0.0141    | 7.1 4.5 | 3806 |
| 2619928 | 66.6520 | 164.5416 | -0.0103    | -0.0122    | 4.1 6.9 | 3807 |
| 2621913 | 73.4642 | 172.7129 | 0.0017     | -0.0084    | 3.0 4.3 | 3808 |
| 2623991 | 71.1825 | 172.5378 | 0.0013     | -0.0020    | 2.4 4.0 | 3809 |
| 2625706 | 70.3446 | 171.2772 | -0.0054    | -0.0081    | 2.9 3.4 | 3810 |
| 2629130 | 66.6179 | 165.6169 | -0.0139    | -0.0042    | 4.0 2.9 | 3811 |
| 2632358 | 72.4835 | 176.6538 | -0.0096    | -0.0080    | 2.6 1.9 | 3812 |
| 2645619 | 70.9492 | 188.1055 | -0.0132    | -0.0135    | 3.6 1.6 | 3813 |
| 2700221 | 65.6462 | 149.1477 | -0.0057    | -0.0003    | 2.1 1.3 | 3814 |
| 2702821 | 64.0560 | 154.4710 | -0.0057    | 0.0036     | 3.0 2.3 | 3815 |
| 2703766 | 62.9711 | 154.0625 | 0.0121     | 0.0013     | 6.3 1.6 | 3816 |
| 2703919 | 63.4171 | 155.9992 | -0.0015    | 0.0029     | 3.5 1.3 | 3817 |
| 2707691 | 59.5230 | 152.8802 | 0.0093     | -0.0095    | 1.2 4.3 | 3818 |
| 2707980 | 59.6660 | 155.3567 | -0.0034    | -0.0017    | 5.7 2.0 | 3819 |
| 2713742 | 63.2789 | 162.3415 | -0.0147    | 0.0015     | 9.9 7.1 | 3820 |
| 2720118 | 65.9860 | 166.3121 | -0.0027    | -0.0005    | 2.3 2.4 | 3821 |
| 2720841 | 65.9256 | 171.8369 | 0.0016     | -0.0075    | 4.3 9.9 | 3822 |
| 2721309 | 65.3443 | 168.1347 | 0.0040     | -0.0063    | 8.6 0.6 | 3823 |
| 2721452 | 64.9060 | 168.4151 | 0.0017     | 0.0018     | 1.3 1.4 | 3824 |
| 2725077 | 61.5182 | 165.4502 | -0.0115    | 0.0007     | 2.1 1.8 | 3825 |
| 2727160 | 60.0197 | 165.8085 | -0.0110    | -0.0093    | 4.0 1.7 | 3826 |
| 2728909 | 60.0385 | 173.5315 | -0.0124    | -0.0067    | 3.5 3.2 | 3827 |
| 2733637 | 64.0399 | 179.3861 | -0.0017    | 0.0000     | 3.3 1.7 | 3828 |
| 2735884 | 62.0669 | 180.9258 | -0.0016    | -0.0010    | 3.7 4.5 | 3829 |
| 2802233 | 56.0923 | 149.6968 | 0.0068     | -0.0020    | 3.6 3.4 | 3830 |
| 2804088 | 54.1295 | 148.4273 | -0.0076    | 0.0013     | 3.5 2.0 | 3831 |
| 2810369 | 57.5486 | 159.7040 | -0.0037    | -0.0098    | 4.2 4.3 | 3832 |
| 2810548 | 57.6997 | 161.3734 | 0.0133     | -0.0097    | 3.0 3.0 | 3833 |
| 2811221 | 57.0974 | 158.1290 | -0.0098    | 0.0038     | 3.9 3.3 | 3834 |
| 2817842 | 52.5672 | 163.6135 | 0.0100     | 0.0019     | 2.9 2.3 | 3835 |
| 2819480 | 50.6028 | 160.1328 | -0.0148    | -0.0022    | 6.2 4.4 | 3836 |
| 2827023 | 52.7559 | 165.4722 | -0.0010    | -0.0043    | 2.8 2.4 | 3837 |
| 2830755 | 58.4834 | 180.2886 | -0.0025    | -0.0059    | 3.2 1.6 | 3838 |
| 2831910 | 58.0677 | 181.6284 | -0.0085    | -0.0104    | 4.5 1.6 | 3839 |
| 2835640 | 54.7364 | 179.2078 | -0.0016    | -0.0098    | 3.3 1.0 | 3840 |
| 2902560 | 48.4206 | 152.3646 | -0.0003    | 0.0003     | 3.0 2.8 | 3841 |
| 2905152 | 46.3364 | 149.2398 | 0.0052     | -0.0042    | 3.8 3.9 | 3842 |
| 2905657 | 46.4129 | 154.0794 | -0.0016    | -0.0036    | 2.7 2.3 | 3843 |
| 2906250 | 45.7048 | 150.0288 | 0.0056     | -0.0058    | 3.4 2.4 | 3844 |
| 2910948 | 50.3278 | 165.2143 | 0.0051     | -0.0060    | 4.2 1.0 | 3845 |

| Ref     | x'       | y'      | $\xi$    | $\eta$  | $\zeta$ | Ser  |
|---------|----------|---------|----------|---------|---------|------|
| 2419754 | -47.8444 | 13.6400 | -0.49482 | 0.17409 | 0.85138 | 3773 |
| 2422182 | -42.2141 | 16.8592 | -0.42782 | 0.21184 | 0.87869 | 3774 |
| 2425674 | -44.5637 | 21.4083 | -0.45703 | 0.26369 | 0.84946 | 3775 |
| 2427213 | -45.7829 | 17.9019 | -0.47084 | 0.22331 | 0.85349 | 3776 |
| 2429655 | -47.6831 | 21.5641 | -0.49463 | 0.26501 | 0.82771 | 3777 |
| 2434975 | -43.3826 | 32.8629 | -0.44666 | 0.39492 | 0.80283 | 3778 |
| 2435605 | -43.7361 | 30.2361 | -0.44988 | 0.36485 | 0.81516 | 3779 |
| 2439534 | -47.3172 | 29.3013 | -0.49270 | 0.35363 | 0.79511 | 3780 |
| 2446896 | -44.8762 | 40.8642 | -0.46852 | 0.48598 | 0.73778 | 3781 |
| 2449684 | -47.4045 | 38.9300 | -0.49811 | 0.46353 | 0.73282 | 3782 |
| 2452666 | -41.0245 | 47.8300 | -0.42622 | 0.56582 | 0.70582 | 3783 |
| 2453284 | -42.1676 | 44.2033 | -0.43772 | 0.52441 | 0.73034 | 3784 |
| 2462074 | -40.9236 | 51.2189 | -0.42741 | 0.60433 | 0.67239 | 3785 |
| 2500797 | 49.1062  | 5.1606  | -0.50899 | 0.07640 | 0.85738 | 3786 |
| 2501063 | -49.7241 | -1.1890 | -0.51620 | 0.00314 | 0.85646 | 3787 |
| 2509132 | -56.0332 | -0.3297 | -0.59277 | 0.01189 | 0.80528 | 3788 |
| 2509471 | -56.3894 | 2.2306  | -0.59719 | 0.04134 | 0.80103 | 3789 |
| 2512631 | -50.1862 | 12.5409 | -0.52291 | 0.16109 | 0.83703 | 3790 |
| 2518244 | -55.2292 | 9.4335  | -0.58367 | 0.12447 | 0.80239 | 3791 |
| 2528557 | -55.1064 | 20.9349 | -0.58457 | 0.25651 | 0.76973 | 3792 |
| 2530492 | -48.6827 | 28.3436 | -0.50886 | 0.34246 | 0.78980 | 3793 |
| 2532564 | -50.1005 | 29.3535 | -0.52644 | 0.35377 | 0.77312 | 3794 |
| 2532610 | -49.6696 | 29.9105 | -0.52142 | 0.36021 | 0.77354 | 3795 |
| 2536507 | -52.8702 | 29.6732 | -0.56029 | 0.35693 | 0.74745 | 3796 |
| 2539615 | -55.3287 | 30.3914 | -0.59068 | 0.36465 | 0.71981 | 3797 |
| 2539663 | -55.7359 | 30.2324 | -0.59561 | 0.36275 | 0.71670 | 3798 |
| 2547958 | -53.5251 | 42.0390 | -0.57481 | 0.49778 | 0.64947 | 3799 |
| 2550872 | -47.5829 | 49.3556 | -0.50703 | 0.58207 | 0.63570 | 3800 |
| 2553453 | -50.1011 | 45.9128 | -0.53534 | 0.54250 | 0.64738 | 3801 |
| 2604046 | -60.2255 | -0.7412 | -0.64413 | 0.00625 | 0.76489 | 3802 |
| 2604896 | -60.5778 | 6.1565  | -0.64882 | 0.08564 | 0.75610 | 3803 |
| 2608851 | -63.4980 | 5.8109  | -0.68488 | 0.08096 | 0.72414 | 3804 |
| 2610492 | -57.2592 | 10.9510 | -0.60869 | 0.14151 | 0.78069 | 3805 |
| 2615764 | -61.0387 | 13.8716 | -0.65568 | 0.17423 | 0.73466 | 3806 |
| 2619928 | -63.9517 | 16.0050 | -0.69229 | 0.19799 | 0.69393 | 3807 |
| 2621913 | 57.1810  | 24.2144 | -0.61102 | 0.29364 | 0.73514 | 3808 |
| 2623991 | -59.4627 | 24.0275 | -0.63906 | 0.29100 | 0.71198 | 3809 |
| 2625706 | 60.2941  | 22.7621 | -0.64890 | 0.27632 | 0.70893 | 3810 |
| 2629130 | -63.9916 | 17.0805 | -0.69306 | 0.21032 | 0.68951 | 3811 |
| 2632358 | -58.1834 | 28.1517 | -0.62486 | 0.33845 | 0.70356 | 3812 |
| 2645619 | -59.7803 | 39.5997 | -0.65091 | 0.46856 | 0.59730 | 3813 |
| 2700221 | -64.8746 | 0.6002  | -0.70167 | 0.02056 | 0.71221 | 3814 |
| 2702821 | -66.4943 | 5.9173  | -0.72221 | 0.08138 | 0.68687 | 3815 |
| 2703766 | -67.5774 | 5.5030  | -0.73574 | 0.07630 | 0.67295 | 3816 |
| 2703919 | -67.1417 | 7.4427  | -0.73050 | 0.09875 | 0.67573 | 3817 |
| 2707691 | -71.0204 | 4.3025  | -0.77911 | 0.06139 | 0.62387 | 3818 |
| 2707980 | -70.8908 | 6.7807  | -0.77774 | 0.08997 | 0.62212 | 3819 |
| 2713742 | -67.3142 | 13.7867 | -0.73381 | 0.17161 | 0.65732 | 3820 |
| 2720118 | -64.6275 | 17.7727 | -0.70119 | 0.21809 | 0.67881 | 3821 |
| 2720841 | -64.7179 | 23.2992 | -0.70415 | 0.28135 | 0.65193 | 3822 |
| 2721309 | -65.2794 | 19.5926 | -0.70989 | 0.23876 | 0.66261 | 3823 |
| 2721452 | -65.7193 | 19.8709 | -0.71549 | 0.24183 | 0.65543 | 3824 |
| 2725077 | -69.0924 | 16.8874 | -0.75708 | 0.20663 | 0.61978 | 3825 |
| 2727160 | -70.5935 | 17.2381 | -0.77629 | 0.21016 | 0.59432 | 3826 |
| 2728909 | -70.6164 | 24.9641 | -0.77970 | 0.29851 | 0.55041 | 3827 |
| 2733637 | 66.6451  | 30.8414 | -0.73203 | 0.36690 | 0.57403 | 3828 |
| 2735884 | -68.6272 | 32.3715 | -0.75835 | 0.38365 | 0.52699 | 3829 |
| 2802233 | -74.4352 | 1.1002  | -0.82266 | 0.02321 | 0.56806 | 3830 |
| 2804088 | -76.3919 | -0.1798 | -0.84807 | 0.00761 | 0.52982 | 3831 |
| 2810369 | -73.0325 | 11.1186 | -0.80588 | 0.13908 | 0.57552 | 3832 |
| 2810548 | -72.8904 | 12.7894 | -0.80444 | 0.15832 | 0.57254 | 3833 |
| 2811221 | 73.4754  | 9.5407  | -0.81125 | 0.12078 | 0.57209 | 3834 |
| 2817842 | 78.0370  | 15.0039 | -0.87263 | 0.18145 | 0.45343 | 3835 |
| 2819480 | -79.9833 | 11.5118 | -0.89778 | 0.14035 | 0.41749 | 3836 |
| 2827023 | 77.8583  | 16.8642 | -0.87099 | 0.20283 | 0.44748 | 3837 |
| 2830755 | -72.2087 | 31.7156 | -0.80459 | 0.37476 | 0.46064 | 3838 |
| 2831910 | -72.6318 | 33.0538 | -0.81128 | 0.38974 | 0.43580 | 3839 |
| 2835640 | -75.9513 | 30.6151 | -0.85412 | 0.36036 | 0.37499 | 3840 |
| 2902560 | -82.1244 | 3.7295  | -0.92566 | 0.04951 | 0.37510 | 3841 |
| 2905152 | -84.1925 | 0.5928  | -0.95545 | 0.01157 | 0.29492 | 3842 |
| 2905657 | -84.1421 | 5.4345  | -0.95540 | 0.06740 | 0.28752 | 3843 |
| 2906250 | -84.8286 | 1.3788  | -0.96535 | 0.01993 | 0.26021 | 3844 |
| 2910948 | -80.2859 | 16.5937 | -0.90410 | 0.19830 | 0.37852 | 3845 |

## POSITIONS ON THE DISK

| Ref     | x        | y        | $\delta x$ | $\delta y$ | weights | Ser  |
|---------|----------|----------|------------|------------|---------|------|
| 2912092 | 48.3037  | 156.9410 | 0.0075     | -0.0066    | 3.7 3.8 | 3846 |
| 2915159 | 46.6070  | 158.5623 | 0.0006     | -0.0063    | 1.5 0.9 | 3847 |
| 2916472 | 45.9873  | 160.7999 | 0.0050     | 0.0021     | 2.4 9.9 | 3848 |
| 2921812 | 50.2363  | 172.5415 | -0.0024    | -0.0061    | 3.2 1.3 | 3849 |
| 2925199 | 46.8368  | 167.3714 | -0.0065    | -0.0011    | 4.2 4.4 | 3850 |
| 3003559 | 121.4606 | 141.3402 | -0.0094    | 0.0115     | 4.7 1.8 | 3851 |
| 3004334 | 120.8424 | 143.5469 | -0.0053    | -0.0017    | 6.0 1.5 | 3852 |
| 3005847 | 119.8042 | 138.9928 | -0.0077    | -0.0004    | 6.2 3.5 | 3853 |
| 3009506 | 116.8136 | 141.7019 | -0.0139    | -0.0076    | 3.6 2.8 | 3854 |
| 3011448 | 123.3720 | 133.7027 | -0.0003    | -0.0022    | 2.9 1.7 | 3855 |
| 3032858 | 122.7148 | 112.9476 | -0.0104    | 0.0063     | 2.3 3.3 | 3856 |
| 3037697 | 117.9941 | 114.8072 | -0.0014    | 0.0003     | 2.6 1.9 | 3857 |
| 3046553 | 119.3494 | 107.4313 | -0.0105    | -0.0026    | 3.3 1.4 | 3858 |
| 3065165 | 120.7859 | 93.6052  | -0.0047    | -0.0009    | 2.2 1.8 | 3859 |
| 3068334 | 118.5701 | 91.9711  | -0.0007    | -0.0014    | 4.0 5.6 | 3860 |
| 3074539 | 122.6802 | 81.4206  | 0.0021     | -0.0058    | 2.0 0.8 | 3861 |
| 3082332 | 124.8837 | 75.1779  | -0.0122    | 0.0048     | 1.9 2.1 | 3862 |
| 3090060 | 127.0709 | 69.5243  | 0.0088     | -0.0032    | 4.3 1.7 | 3863 |
| 3100122 | 115.8096 | 145.5164 | 0.0043     | 0.0049     | 3.1 2.8 | 3864 |
| 3101997 | 114.2696 | 138.1429 | -0.0131    | 0.0007     | 2.2 2.8 | 3865 |
| 3102487 | 113.5287 | 142.4780 | -0.0119    | 0.0044     | 5.3 4.2 | 3866 |
| 3104301 | 112.4877 | 143.8689 | -0.0051    | -0.0001    | 3.7 1.3 | 3867 |
| 3104797 | 111.7478 | 139.8928 | -0.0070    | 0.0051     | 3.7 3.1 | 3868 |
| 3105564 | 111.1194 | 141.8810 | -0.0043    | 0.0004     | 4.0 1.4 | 3869 |
| 3111581 | 114.3788 | 133.5221 | -0.0038    | 0.0043     | 7.5 3.0 | 3870 |
| 3112667 | 113.7434 | 132.0615 | -0.0063    | 0.0069     | 2.8 2.5 | 3871 |
| 3115828 | 111.5085 | 130.2948 | -0.0144    | 0.0036     | 4.2 3.7 | 3872 |
| 3116195 | 110.0543 | 136.6249 | -0.0115    | 0.0010     | 2.0 2.5 | 3873 |
| 3121650 | 114.7489 | 124.0137 | -0.0013    | -0.0015    | 3.5 3.2 | 3874 |
| 3122788 | 113.6693 | 122.4742 | -0.0096    | 0.0037     | 2.6 7.1 | 3875 |
| 3123626 | 113.3088 | 123.5599 | 0.0070     | 0.0008     | 3.0 1.4 | 3876 |
| 3125563 | 111.1592 | 124.7469 | -0.0091    | 0.0045     | 3.0 2.1 | 3877 |
| 3129060 | 107.7810 | 129.3251 | 0.0001     | 0.0031     | 1.6 3.8 | 3878 |
| 3130018 | 116.0698 | 119.8890 | -0.0019    | -0.0012    | 4.0 1.1 | 3879 |
| 3133789 | 113.0243 | 113.7995 | -0.0039    | -0.0041    | 1.2 9.6 | 3880 |
| 3156725 | 111.4904 | 97.0618  | -0.0021    | -0.0071    | 1.7 0.8 | 3881 |
| 3164834 | 113.5850 | 87.8084  | -0.0077    | -0.0036    | 2.1 2.5 | 3882 |
| 3170963 | 117.4206 | 78.5768  | -0.0012    | 0.0082     | 2.3 1.7 | 3883 |
| 3180138 | 117.8802 | 76.5111  | 0.0045     | -0.0032    | 1.6 1.5 | 3884 |
| 3181514 | 117.6339 | 73.4839  | 0.0059     | 0.0004     | 2.1 3.0 | 3885 |
| 3185090 | 113.0468 | 77.9771  | 0.0080     | -0.0014    | 2.6 4.7 | 3886 |
| 3185412 | 114.0366 | 74.5197  | 0.0025     | 0.0074     | 3.2 1.7 | 3887 |
| 3186437 | 113.0508 | 74.0755  | -0.0147    | 0.0002     | 5.2 3.0 | 3888 |
| 3195531 | 115.3159 | 65.6817  | -0.0052    | -0.0069    | 1.2 3.6 | 3889 |
| 3202284 | 104.9582 | 144.5698 | -0.0069    | -0.0061    | 4.0 1.2 | 3890 |
| 3204238 | 103.6669 | 144.2524 | -0.0113    | 0.0040     | 2.9 3.0 | 3891 |
| 3208293 | 99.8423  | 144.7292 | -0.0037    | 0.0088     | 3.4 1.7 | 3892 |
| 3208308 | 100.5292 | 143.3852 | -0.0136    | 0.0048     | 3.3 4.2 | 3893 |
| 3210753 | 106.9490 | 131.6314 | -0.0085    | -0.0013    | 2.2 1.2 | 3894 |
| 3217615 | 101.3891 | 132.4060 | 0.0006     | 0.0117     | 2.5 6.3 | 3895 |
| 3219757 | 99.3189  | 131.3962 | -0.0118    | 0.0040     | 3.2 4.6 | 3896 |
| 3219913 | 99.6912  | 130.0309 | -0.0106    | -0.0052    | 3.4 3.8 | 3897 |
| 3224067 | 103.4855 | 128.7461 | -0.0059    | 0.0018     | 5.8 2.7 | 3898 |
| 3224105 | 104.0006 | 128.0728 | -0.0099    | 0.0001     | 3.0 1.9 | 3899 |
| 3225551 | 102.8038 | 124.9571 | 0.0010     | 0.0054     | 2.1 1.3 | 3900 |
| 3228355 | 100.2397 | 126.4103 | -0.0106    | -0.0018    | 2.3 4.2 | 3901 |
| 3229932 | 99.6184  | 121.4484 | -0.0116    | 0.0053     | 1.5 2.4 | 3902 |
| 3230703 | 107.6707 | 114.4460 | -0.0008    | 0.0068     | 4.0 3.2 | 3903 |
| 3231493 | 105.9595 | 116.9752 | 0.0017     | 0.0043     | 4.8 1.8 | 3904 |
| 3246575 | 102.1482 | 107.4224 | -0.0090    | 0.0049     | 2.1 2.0 | 3905 |
| 3248280 | 100.3177 | 110.4372 | -0.0126    | 0.0014     | 3.3 2.8 | 3906 |
| 3255031 | 103.5192 | 103.5023 | 0.0110     | -0.0015    | 2.9 2.2 | 3907 |
| 3257058 | 101.6667 | 102.8506 | -0.0096    | -0.0003    | 3.0 1.4 | 3908 |
| 3257945 | 102.0582 | 95.4466  | -0.0110    | 0.0048     | 2.4 1.8 | 3909 |
| 3262916 | 106.9926 | 86.8060  | -0.0055    | 0.0012     | 2.7 1.0 | 3910 |
| 3263318 | 105.8782 | 91.7849  | -0.0040    | 0.0040     | 1.7 1.2 | 3911 |
| 3268818 | 101.9621 | 87.6342  | -0.0047    | 0.0128     | 2.2 1.1 | 3912 |
| 3274968 | 105.6481 | 78.3335  | -0.0071    | 0.0089     | 3.7 1.9 | 3913 |
| 3275498 | 104.1461 | 82.5191  | -0.0118    | 0.0057     | 2.5 2.8 | 3914 |
| 3276073 | 103.2300 | 86.3349  | 0.0010     | 0.0029     | 1.7 4.0 | 3915 |
| 3277902 | 103.6016 | 78.8727  | -0.0100    | 0.0057     | 2.1 1.2 | 3916 |
| 3279009 | 101.2693 | 85.8762  | -0.0115    | 0.0063     | 2.0 1.5 | 3917 |
| 3292151 | 108.5980 | 68.9738  | 0.0014     | -0.0010    | 4.0 1.5 | 3918 |

| Ref     | x'       | y'       | $\xi$    | $\eta$   | $\zeta$ | Ser  |
|---------|----------|----------|----------|----------|---------|------|
| 2912092 | -82.2661 | 8.3070   | -0.92864 | 0.10205  | 0.35668 | 3846 |
| 2915159 | 83.9722  | 9.9201   | -0.95443 | 0.11900  | 0.27368 | 3847 |
| 2916472 | 84.6042  | 12.1553  | -0.96603 | 0.14366  | 0.21481 | 3848 |
| 2921812 | -80.4171 | 23.9232  | -0.91126 | 0.28150  | 0.30062 | 3849 |
| 2925199 | -83.7900 | 18.7336  | -0.95920 | 0.21905  | 0.17873 | 3850 |
| 3003559 | -8.9962  | -6.9223  | -0.03579 | -0.05935 | 0.99760 | 3851 |
| 3004334 | -9.6266  | -4.7180  | -0.04301 | -0.03394 | 0.99850 | 3852 |
| 3005847 | 10.6406  | -9.2791  | -0.05498 | -0.08659 | 0.99473 | 3853 |
| 3009506 | -13.6470 | -6.5844  | -0.08972 | -0.05560 | 0.99441 | 3854 |
| 3011448 | -7.0427  | -14.5528 | -0.01383 | -0.14743 | 0.98898 | 3855 |
| 3032858 | -7.5879  | -35.3189 | -0.02478 | -0.38828 | 0.92121 | 3856 |
| 3037697 | -12.3205 | -33.4830 | -0.07907 | -0.36707 | 0.92683 | 3857 |
| 3046553 | 10.9248  | -40.8546 | -0.06553 | -0.45289 | 0.88916 | 3858 |
| 3065165 | -9.4130  | -54.6784 | -0.05510 | -0.61465 | 0.78687 | 3859 |
| 3068334 | 11.6208  | -56.3245 | -0.08186 | -0.63411 | 0.76890 | 3860 |
| 3074539 | -7.4520  | -66.8577 | -0.04180 | -0.75840 | 0.65044 | 3861 |
| 3082332 | -5.2139  | -73.0913 | -0.02257 | -0.83269 | 0.55328 | 3862 |
| 3090060 | -2.9953  | -78.7357 | -0.00504 | -0.90077 | 0.43427 | 3863 |
| 3100122 | -14.6720 | -2.7737  | -0.10154 | -0.01169 | 0.99476 | 3864 |
| 3101997 | -16.1727 | -10.1579 | -0.11933 | -0.09695 | 0.98811 | 3865 |
| 3102487 | -16.9374 | -5.8250  | -0.12798 | -0.04698 | 0.99066 | 3866 |
| 3104301 | -17.9863 | -4.4390  | -0.14017 | -0.03104 | 0.98964 | 3867 |
| 3104797 | -18.7050 | -8.4203  | -0.14873 | -0.07702 | 0.98587 | 3868 |
| 3105564 | -19.3444 | -6.4346  | -0.15609 | -0.05413 | 0.98626 | 3869 |
| 3111581 | 16.0385  | -14.7798 | -0.11823 | -0.15036 | 0.98154 | 3870 |
| 3112667 | -16.6662 | -16.2442 | -0.12574 | -0.16732 | 0.97785 | 3871 |
| 3115828 | -18.8924 | -18.0231 | -0.15197 | -0.18803 | 0.97034 | 3872 |
| 3116195 | -20.3814 | -11.6982 | -0.16857 | -0.11497 | 0.97896 | 3873 |
| 3121650 | -15.6168 | -24.2898 | -0.11495 | -0.26046 | 0.95862 | 3874 |
| 3122788 | -16.6885 | -25.8354 | -0.12779 | -0.27844 | 0.95191 | 3875 |
| 3123626 | -17.0550 | -24.7512 | -0.13182 | -0.26588 | 0.95495 | 3876 |
| 3125563 | 19.2119  | -23.5748 | -0.15674 | -0.25236 | 0.95486 | 3877 |
| 3129060 | -22.6162 | -19.0124 | -0.19570 | -0.19971 | 0.96011 | 3878 |
| 3130018 | 14.2731  | -28.4092 | -0.10030 | -0.30819 | 0.94602 | 3879 |
| 3133789 | 17.2868  | -34.5166 | -0.13726 | -0.37934 | 0.91502 | 3880 |
| 3156725 | -18.7308 | -51.2684 | -0.16178 | -0.57514 | 0.80190 | 3881 |
| 3164834 | -16.5853 | -60.5144 | -0.14295 | -0.68381 | 0.71552 | 3882 |
| 3170963 | -12.6983 | -69.7296 | -0.10595 | -0.79288 | 0.60010 | 3883 |
| 3180138 | -12.2273 | -71.7937 | -0.10281 | -0.81751 | 0.56666 | 3884 |
| 3181514 | 12.4574  | -74.8233 | -0.10946 | -0.85392 | 0.50876 | 3885 |
| 3185090 | 17.0706  | -70.3521 | -0.15808 | -0.80069 | 0.57785 | 3886 |
| 3185412 | -16.0617 | -73.8057 | -0.15054 | -0.84201 | 0.51803 | 3887 |
| 3186437 | 17.0455  | -74.2551 | -0.16282 | -0.84753 | 0.50515 | 3888 |
| 3195531 | 14.7341  | -82.6403 | -0.15215 | -0.95015 | 0.27215 | 3889 |
| 3202284 | -25.5225 | -3.7766  | -0.22835 | -0.02387 | 0.97329 | 3890 |
| 3204238 | 26.8126  | -4.1008  | -0.24351 | -0.02771 | 0.96950 | 3891 |
| 3208293 | -30.6413 | -3.6436  | -0.28860 | -0.02276 | 0.95718 | 3892 |
| 3208308 | -29.9468 | -4.9845  | -0.28045 | -0.03816 | 0.95911 | 3893 |
| 3210753 | -23.4610 | -16.7095 | -0.20523 | -0.17311 | 0.96328 | 3894 |
| 3217615 | -29.0272 | -15.9633 | -0.27057 | -0.16492 | 0.94847 | 3895 |
| 3219757 | -31.0928 | -16.9842 | -0.29510 | -0.17693 | 0.93894 | 3896 |
| 3219913 | -30.7129 | -18.3480 | -0.29083 | -0.19269 | 0.93717 | 3897 |
| 3224067 | -26.9102 | -19.6137 | -0.24623 | -0.20700 | 0.94685 | 3898 |
| 3224105 | -26.3913 | -20.2846 | -0.24024 | -0.21473 | 0.94666 | 3899 |
| 3225551 | -27.5717 | -23.4077 | -0.25477 | -0.25103 | 0.93385 | 3900 |
| 3228355 | -30.1446 | -21.9671 | -0.28481 | -0.23457 | 0.92944 | 3901 |
| 3229932 | -30.7393 | -26.9341 | -0.29302 | -0.29226 | 0.91034 | 3902 |
| 3230703 | 22.6460  | -33.8975 | -0.19978 | -0.37250 | 0.90627 | 3903 |
| 3231493 | -24.3716 | -31.3762 | -0.21923 | -0.34330 | 0.91328 | 3904 |
| 3246575 | -28.1327 | -40.9522 | -0.26715 | -0.45523 | 0.84935 | 3905 |
| 3248280 | -29.9802 | -37.9457 | -0.28772 | -0.42033 | 0.86054 | 3906 |
| 3255031 | -26.7399 | -44.8667 | -0.25255 | -0.50084 | 0.82787 | 3907 |
| 3257058 | 28.5896  | -45.5281 | -0.27477 | -0.50878 | 0.81587 | 3908 |
| 3257945 | 28.1579  | -52.9329 | -0.27402 | -0.59561 | 0.75509 | 3909 |
| 3262916 | 23.1749  | -61.5512 | -0.22146 | -0.69669 | 0.68234 | 3910 |
| 3263318 | -24.3166 | -56.5762 | -0.23104 | -0.63806 | 0.73451 | 3911 |
| 3268818 | -28.2118 | -60.7486 | -0.28062 | -0.68782 | 0.66944 | 3912 |
| 3274968 | -24.4741 | -70.0337 | -0.24565 | -0.79781 | 0.55059 | 3913 |
| 3275498 | -25.9993 | -65.8543 | -0.25910 | -0.74812 | 0.61088 | 3914 |
| 3276073 | -26.9364 | -62.0419 | -0.26657 | -0.70297 | 0.65938 | 3915 |
| 3277902 | -26.5243 | -69.5049 | -0.26955 | -0.79180 | 0.54808 | 3916 |
| 3279009 | -28.8954 | -62.5108 | -0.29038 | -0.70881 | 0.64286 | 3917 |
| 3292151 | -21.4724 | -79.3817 | -0.22509 | -0.91077 | 0.34617 | 3918 |

## POSITIONS ON THE DISK

| Ref     | x        | y        | $\delta x$ | $\delta y$ | weights | Ser  |
|---------|----------|----------|------------|------------|---------|------|
| 3293140 | 107.8610 | 69.0254  | -0.0066    | 0.0001     | 4.3 1.3 | 3919 |
| 3298490 | 104.1600 | 66.8526  | -0.0107    | -0.0009    | 2.0 1.3 | 3920 |
| 3305955 | 94.2025  | 138.5631 | -0.0109    | 0.0060     | 3.0 1.4 | 3921 |
| 3306780 | 93.1554  | 140.7622 | -0.0067    | 0.0041     | 2.9 1.8 | 3922 |
| 3306973 | 93.1946  | 138.6991 | -0.0087    | 0.0080     | 2.8 1.7 | 3923 |
| 3310786 | 98.2578  | 131.4977 | -0.0082    | 0.0045     | 2.0 2.7 | 3924 |
| 3317699 | 92.2761  | 132.1720 | 0.0046     | -0.0018    | 2.1 1.2 | 3925 |
| 3325437 | 94.4752  | 125.3985 | -0.0054    | 0.0005     | 3.9 2.8 | 3926 |
| 3328562 | 91.7592  | 125.0797 | 0.0021     | 0.0034     | 1.8 0.7 | 3927 |
| 3331107 | 98.1889  | 119.3063 | -0.0076    | 0.0027     | 5.5 5.1 | 3928 |
| 3335124 | 94.6720  | 119.6678 | -0.0112    | 0.0061     | 2.3 5.7 | 3929 |
| 3343890 | 96.1388  | 105.3728 | -0.0108    | -0.0041    | 2.6 2.2 | 3930 |
| 3351502 | 98.8394  | 99.1407  | -0.0068    | -0.0029    | 3.2 1.2 | 3931 |
| 3352411 | 97.9172  | 100.1720 | -0.0056    | 0.0001     | 2.1 2.2 | 3932 |
| 3362154 | 97.8358  | 93.9083  | -0.0057    | 0.0007     | 3.4 2.3 | 3933 |
| 3362254 | 97.9228  | 93.1030  | -0.0055    | -0.0008    | 2.5 1.8 | 3934 |
| 3362302 | 98.3737  | 92.4083  | 0.0016     | 0.0058     | 7.3 2.1 | 3935 |
| 3364189 | 95.9354  | 93.5291  | -0.0094    | 0.0076     | 2.6 5.0 | 3936 |
| 3364305 | 96.7236  | 92.1854  | -0.0124    | 0.0044     | 2.3 2.2 | 3937 |
| 3365080 | 95.0468  | 95.1684  | -0.0104    | 0.0033     | 4.8 1.8 | 3938 |
| 3366854 | 94.8974  | 88.0855  | 0.0022     | 0.0057     | 1.9 1.6 | 3939 |
| 3370325 | 100.4394 | 83.6681  | -0.0001    | -0.0022    | 2.2 1.8 | 3940 |
| 3371016 | 99.5658  | 86.1386  | 0.0035     | 0.0068     | 2.0 2.1 | 3941 |
| 3371850 | 99.7164  | 79.9355  | -0.0084    | 0.0125     | 1.7 2.2 | 3942 |
| 3373170 | 97.3955  | 85.8500  | -0.0026    | -0.0029    | 1.8 2.3 | 3943 |
| 3375679 | 96.1345  | 80.9619  | -0.0131    | 0.0070     | 2.2 2.6 | 3944 |
| 3383681 | 98.7425  | 73.2912  | 0.0066     | 0.0005     | 3.4 1.8 | 3945 |
| 3401763 | 89.1066  | 140.5210 | -0.0035    | -0.0018    | 2.8 1.6 | 3946 |
| 3407403 | 84.5821  | 143.2121 | -0.0059    | -0.0036    | 2.2 1.0 | 3947 |
| 3412682 | 88.0966  | 132.8199 | -0.0083    | 0.0064     | 4.7 1.6 | 3948 |
| 3418288 | 83.1025  | 135.8606 | -0.0085    | -0.0061    | 3.9 1.9 | 3949 |
| 3421184 | 88.9871  | 128.3202 | -0.0014    | -0.0043    | 3.0 1.0 | 3950 |
| 3422444 | 88.5166  | 125.8016 | -0.0119    | 0.0038     | 5.3 2.6 | 3951 |
| 3423590 | 87.2791  | 125.2788 | 0.0055     | 0.0010     | 3.1 1.3 | 3952 |
| 3428279 | 83.3186  | 127.1356 | -0.0095    | -0.0078    | 2.7 1.7 | 3953 |
| 3429034 | 82.7426  | 129.3740 | -0.0089    | 0.0053     | 6.9 2.4 | 3954 |
| 3433974 | 87.7650  | 112.8825 | -0.0031    | -0.0043    | 2.6 1.8 | 3955 |
| 3439445 | 82.9225  | 117.1893 | 0.0050     | 0.0044     | 1.9 1.6 | 3956 |
| 3441618 | 90.0892  | 106.5042 | -0.0052    | 0.0069     | 3.3 0.7 | 3957 |
| 3442858 | 89.0374  | 104.8031 | -0.0132    | 0.0012     | 3.0 1.7 | 3958 |
| 3443307 | 88.4537  | 109.2031 | 0.0012     | 0.0042     | 2.0 3.4 | 3959 |
| 3445265 | 86.2164  | 110.2729 | -0.0117    | 0.0001     | 6.8 2.5 | 3960 |
| 3449043 | 83.0051  | 112.2539 | -0.0045    | 0.0051     | 4.0 1.2 | 3961 |
| 3450019 | 91.1190  | 103.0259 | -0.0131    | 0.0019     | 2.9 1.2 | 3962 |
| 3451196 | 89.6730  | 102.4101 | 0.0044     | 0.0003     | 2.8 1.3 | 3963 |
| 3452778 | 89.1841  | 97.2203  | -0.0147    | -0.0027    | 1.9 0.6 | 3964 |
| 3453541 | 88.5310  | 99.5185  | 0.0096     | -0.0016    | 2.7 1.0 | 3965 |
| 3455041 | 86.6671  | 103.7611 | -0.0098    | -0.0058    | 1.6 2.1 | 3966 |
| 3459157 | 83.3243  | 102.4558 | -0.0042    | 0.0079     | 2.1 1.9 | 3967 |
| 3459224 | 83.6265  | 101.9093 | 0.0043     | 0.0008     | 3.0 1.2 | 3968 |
| 3462979 | 89.8695  | 86.9501  | -0.0021    | 0.0016     | 3.0 2.0 | 3969 |
| 3463693 | 88.6998  | 89.9915  | -0.0024    | -0.0005    | 2.7 1.6 | 3970 |
| 3463855 | 89.1506  | 88.1487  | -0.0122    | 0.0012     | 5.0 2.6 | 3971 |
| 3469579 | 83.8836  | 90.4329  | -0.0070    | -0.0021    | 4.3 1.9 | 3972 |
| 3471353 | 91.1946  | 84.1115  | 0.0128     | -0.0046    | 3.3 1.8 | 3973 |
| 3478483 | 85.3422  | 83.3894  | 0.0028     | 0.0046     | 3.1 1.9 | 3974 |
| 3479428 | 85.0516  | 82.9884  | 0.0007     | 0.0063     | 2.3 2.1 | 3975 |
| 3486036 | 87.9972  | 78.1662  | -0.0054    | 0.0067     | 5.6 2.1 | 3976 |
| 3500342 | 81.7741  | 144.2535 | -0.0147    | -0.0038    | 3.9 2.6 | 3977 |
| 3500582 | 81.4372  | 142.4929 | -0.0060    | 0.0040     | 9.2 2.1 | 3978 |
| 3521662 | 80.8937  | 124.3355 | -0.0049    | -0.0004    | 2.8 2.4 | 3979 |
| 3524320 | 78.6998  | 127.1460 | -0.0015    | 0.0030     | 1.9 2.9 | 3980 |
| 3526348 | 76.8835  | 126.5275 | -0.0149    | 0.0008     | 2.3 1.3 | 3981 |
| 3533723 | 79.8366  | 114.8744 | -0.0114    | 0.0036     | 4.0 5.2 | 3982 |
| 3535698 | 77.5997  | 115.3870 | -0.0115    | 0.0062     | 2.4 4.0 | 3983 |
| 3538506 | 75.8876  | 116.4231 | -0.0033    | 0.0023     | 2.2 2.1 | 3984 |
| 3541807 | 82.0547  | 105.1232 | -0.0006    | 0.0002     | 2.6 2.9 | 3985 |
| 3543313 | 80.1076  | 109.7049 | -0.0128    | -0.0001    | 2.5 1.6 | 3986 |
| 3549040 | 74.8265  | 112.6812 | 0.0040     | -0.0069    | 4.0 3.7 | 3987 |
| 3549056 | 74.7965  | 112.1495 | -0.0039    | -0.0009    | 2.1 1.2 | 3988 |
| 3549174 | 74.6145  | 111.5028 | -0.0053    | -0.0007    | 2.6 2.2 | 3989 |
| 3553126 | 80.2965  | 102.6862 | -0.0026    | -0.0046    | 2.7 3.1 | 3990 |
| 3559563 | 75.3180  | 99.6975  | -0.0146    | -0.0016    | 4.3 1.5 | 3991 |

## POSITIONS ON THE DISK

8b

| Ref     | x'       | y'       | $\xi$    | $\eta$   | $\zeta$ | Ser  |
|---------|----------|----------|----------|----------|---------|------|
| 3293140 | -22.2100 | -79.3338 | -0.23397 | -0.91035 | 0.34135 | 3919 |
| 3298490 | 25.9007  | -81.5265 | -0.28758 | -0.93965 | 0.18537 | 3920 |
| 3305955 | -36.2499 | -9.8410  | -0.35531 | -0.09486 | 0.92992 | 3921 |
| 3306780 | -37.3093 | -7.6465  | -0.36773 | -0.06964 | 0.92732 | 3922 |
| 3306973 | -37.2590 | -9.7102  | -0.36729 | -0.09347 | 0.92540 | 3923 |
| 3310786 | -32.1548 | -16.8881 | -0.30764 | -0.17592 | 0.93510 | 3924 |
| 3317699 | -38.1425 | -16.2444 | -0.37858 | -0.16914 | 0.90998 | 3925 |
| 3325437 | -35.9059 | -23.0090 | -0.35328 | -0.24727 | 0.90225 | 3926 |
| 3328562 | 38.6213  | -23.3420 | -0.38568 | -0.25147 | 0.88770 | 3927 |
| 3331107 | -32.1578 | -29.0843 | -0.31041 | -0.31739 | 0.89605 | 3928 |
| 3335124 | -35.6780 | -28.7408 | -0.35209 | -0.31381 | 0.88179 | 3929 |
| 3343890 | -34.1334 | -43.0335 | -0.33935 | -0.48026 | 0.80882 | 3930 |
| 3351502 | 31.3980  | -49.2540 | -0.31020 | -0.55279 | 0.77343 | 3931 |
| 3352411 | -32.3261 | -48.2271 | -0.32064 | -0.54086 | 0.77759 | 3932 |
| 3362154 | 32.3737  | -54.4935 | -0.32532 | -0.61454 | 0.71868 | 3933 |
| 3362254 | -32.2823 | -55.2986 | -0.32482 | -0.62402 | 0.71070 | 3934 |
| 3362302 | -31.8274 | -55.9913 | -0.31990 | -0.63212 | 0.70575 | 3935 |
| 3364189 | -34.2728 | -54.8826 | -0.34834 | -0.61942 | 0.70354 | 3936 |
| 3364305 | -33.4770 | -56.2228 | -0.33983 | -0.63511 | 0.69365 | 3937 |
| 3365080 | -35.1706 | -53.2473 | -0.35790 | -0.60029 | 0.71523 | 3938 |
| 3366854 | -35.2817 | -60.3336 | -0.36506 | -0.68407 | 0.63149 | 3939 |
| 3370325 | -29.7137 | -64.7240 | -0.30238 | -0.73525 | 0.60662 | 3940 |
| 3371016 | -30.6010 | -62.2571 | -0.31056 | -0.70607 | 0.63641 | 3941 |
| 3371850 | -30.4168 | -68.4617 | -0.31512 | -0.78001 | 0.54063 | 3942 |
| 3373170 | -32.7706 | -62.5570 | -0.33693 | -0.71000 | 0.61837 | 3943 |
| 3375679 | -34.0056 | -67.4534 | -0.35737 | -0.76868 | 0.53049 | 3944 |
| 3383681 | 31.3551  | -75.1135 | -0.33712 | -0.86076 | 0.38137 | 3945 |
| 3401763 | -41.3584 | -7.9087  | -0.41599 | -0.07316 | 0.90642 | 3946 |
| 3407403 | -45.8992 | -5.2399  | -0.47022 | -0.04299 | 0.88150 | 3947 |
| 3412682 | -42.3272 | -15.6178 | -0.42843 | -0.16244 | 0.88886 | 3948 |
| 3418288 | -47.3396 | -12.6017 | -0.48816 | -0.12829 | 0.86327 | 3949 |
| 3421184 | -41.4120 | -20.1146 | -0.41829 | -0.21441 | 0.88264 | 3950 |
| 3422444 | -41.8690 | -22.6365 | -0.42432 | -0.24373 | 0.87210 | 3951 |
| 3423590 | -43.1042 | -23.1659 | -0.43924 | -0.25006 | 0.86286 | 3952 |
| 3428279 | -47.0763 | -21.3288 | -0.48656 | -0.22937 | 0.84300 | 3953 |
| 3429034 | -47.6646 | -19.0926 | -0.49316 | -0.20353 | 0.84579 | 3954 |
| 3433974 | -42.5510 | -35.5643 | -0.43668 | -0.39426 | 0.80863 | 3955 |
| 3439445 | -47.4187 | -31.2808 | -0.49369 | -0.34516 | 0.79821 | 3956 |
| 3441618 | -40.1914 | -41.9329 | -0.41127 | -0.46829 | 0.78202 | 3957 |
| 3442858 | -41.2344 | -43.6401 | -0.42472 | -0.48845 | 0.76225 | 3958 |
| 3443307 | -41.8422 | -39.2414 | -0.42979 | -0.43708 | 0.79009 | 3959 |
| 3445265 | -44.0861 | -38.1828 | -0.45633 | -0.42510 | 0.78170 | 3960 |
| 3449043 | -47.3094 | -36.2176 | -0.49440 | -0.40274 | 0.77030 | 3961 |
| 3450019 | -39.1424 | -45.4072 | -0.40055 | -0.50881 | 0.76202 | 3962 |
| 3451196 | 40.5856  | -46.0307 | -0.41828 | -0.51637 | 0.74726 | 3963 |
| 3452778 | -41.0467 | -51.2249 | -0.42724 | -0.57752 | 0.69565 | 3964 |
| 3453541 | -41.7125 | -48.9292 | -0.43371 | -0.55063 | 0.71324 | 3965 |
| 3455041 | -43.6000 | -44.6947 | -0.45388 | -0.50125 | 0.73671 | 3966 |
| 3459157 | -46.9371 | -46.0177 | -0.49522 | -0.51747 | 0.69783 | 3967 |
| 3459224 | -46.6318 | -46.5628 | -0.49186 | -0.52381 | 0.69548 | 3968 |
| 3462979 | -40.3054 | -61.4953 | -0.42727 | -0.69895 | 0.57350 | 3969 |
| 3463693 | -41.4921 | -58.4589 | -0.43868 | -0.66313 | 0.60648 | 3970 |
| 3463855 | -41.0311 | -60.3000 | -0.43488 | -0.68490 | 0.58463 | 3971 |
| 3469579 | -46.3125 | -58.0421 | -0.49749 | -0.65942 | 0.56362 | 3972 |
| 3471353 | 38.9645  | -64.3281 | -0.41407 | -0.73243 | 0.54045 | 3973 |
| 3478483 | -44.8153 | -65.0807 | -0.48761 | -0.74321 | 0.45812 | 3974 |
| 3479428 | -45.1038 | -65.4833 | -0.49186 | -0.74818 | 0.44532 | 3975 |
| 3486036 | -42.1310 | -70.2921 | -0.46272 | -0.80551 | 0.37019 | 3976 |
| 3500342 | -48.7140 | -4.2126  | -0.50406 | -0.03157 | 0.86309 | 3977 |
| 3500582 | -49.0415 | -5.9756  | -0.50808 | -0.05198 | 0.85974 | 3978 |
| 3521662 | -49.4870 | -24.1425 | -0.51640 | -0.26248 | 0.81513 | 3979 |
| 3524320 | -51.6969 | -21.3423 | -0.54246 | -0.23037 | 0.80787 | 3980 |
| 3526348 | 53.5106  | -21.9703 | -0.56469 | -0.23803 | 0.79023 | 3981 |
| 3533723 | -50.4933 | -33.6125 | -0.53193 | -0.37296 | 0.76023 | 3982 |
| 3535698 | -52.7339 | -33.1113 | -0.55905 | -0.36760 | 0.74319 | 3983 |
| 3538506 | -54.4522 | -32.0836 | -0.57965 | -0.35600 | 0.73299 | 3984 |
| 3541807 | 48.2216  | -43.3559 | -0.50923 | -0.48650 | 0.70994 | 3985 |
| 3543313 | -50.1942 | -38.7825 | -0.53073 | -0.43333 | 0.72838 | 3986 |
| 3549040 | -55.4935 | -35.8323 | -0.59420 | -0.40007 | 0.69776 | 3987 |
| 3549056 | -55.5206 | -36.3644 | -0.59481 | -0.40630 | 0.69362 | 3988 |
| 3549174 | -55.6992 | -37.0123 | -0.59736 | -0.41394 | 0.68689 | 3989 |
| 3553126 | -49.9673 | -45.8028 | -0.53214 | -0.51565 | 0.67151 | 3990 |
| 3559563 | -54.9316 | -48.8183 | -0.59589 | -0.55261 | 0.58270 | 3991 |

## POSITIONS ON THE DISK

| Ref     | x       | y        | $\delta x$ | $\delta y$ | weights | Ser  |
|---------|---------|----------|------------|------------|---------|------|
| 3563580 | 80.5830 | 91.3350  | -0.0080    | 0.0068     | 4.4 2.0 | 3992 |
| 3566593 | 78.0960 | 91.1231  | -0.0145    | 0.0035     | 2.3 3.6 | 3993 |
| 3569174 | 75.5787 | 94.4818  | 0.0044     | 0.0019     | 1.4 0.9 | 3994 |
| 3569416 | 76.3087 | 91.8197  | 0.0118     | -0.0005    | 3.6 1.6 | 3995 |
| 3569650 | 76.1341 | 90.6650  | 0.0002     | 0.0117     | 2.1 2.9 | 3996 |
| 3573587 | 81.5734 | 82.4331  | 0.0069     | 0.0069     | 4.9 1.0 | 3997 |
| 3576484 | 79.0810 | 83.5860  | -0.0053    | -0.0028    | 1.7 2.6 | 3998 |
| 3578342 | 77.6972 | 84.6224  | 0.0070     | 0.0074     | 2.9 2.0 | 3999 |
| 3579336 | 77.0849 | 84.3615  | 0.0042     | 0.0052     | 3.4 1.8 | 4000 |
| 3582039 | 83.5187 | 78.1022  | 0.0047     | 0.0000     | 2.2 1.3 | 4001 |
| 3605400 | 69.8189 | 143.7718 | -0.0053    | 0.0044     | 2.9 2.1 | 4002 |
| 3605620 | 69.6528 | 142.0904 | -0.0105    | 0.0083     | 4.7 7.5 | 4003 |
| 3605852 | 69.4071 | 140.1573 | -0.0107    | 0.0022     | 3.3 2.0 | 4004 |
| 3608594 | 66.7387 | 142.6724 | -0.0073    | -0.0009    | 2.3 2.8 | 4005 |
| 3609758 | 66.1415 | 140.6104 | -0.0070    | -0.0003    | 3.8 5.1 | 4006 |
| 3611311 | 73.0176 | 135.8815 | -0.0046    | -0.0017    | 5.1 2.8 | 4007 |
| 3614955 | 70.2441 | 130.3802 | -0.0070    | 0.0023     | 2.6 1.2 | 4008 |
| 3617346 | 67.8989 | 135.4792 | -0.0041    | -0.0019    | 3.4 3.0 | 4009 |
| 3618073 | 66.8297 | 138.4294 | 0.0089     | 0.0006     | 2.0 1.3 | 4010 |
| 3621150 | 72.7019 | 129.0508 | -0.0062    | -0.0055    | 1.5 3.9 | 4011 |
| 3621657 | 72.8139 | 124.1356 | -0.0002    | -0.0038    | 2.8 1.4 | 4012 |
| 3625822 | 69.8608 | 122.8704 | -0.0089    | 0.0019     | 2.5 1.8 | 4013 |
| 3627817 | 68.2998 | 122.5144 | 0.0047     | -0.0004    | 2.3 1.2 | 4014 |
| 3628529 | 67.4104 | 125.0043 | -0.0005    | -0.0009    | 2.3 3.0 | 4015 |
| 3629497 | 66.0021 | 126.0722 | -0.0031    | 0.0037     | 4.0 2.0 | 4016 |
| 3630019 | 74.0692 | 120.4761 | -0.0127    | 0.0033     | 4.7 3.7 | 4017 |
| 3632427 | 72.3992 | 117.2530 | -0.0026    | 0.0009     | 2.5 1.6 | 4018 |
| 3635136 | 69.8263 | 120.0199 | -0.0048    | 0.0001     | 2.6 1.1 | 4019 |
| 3636842 | 69.1103 | 114.3772 | -0.0110    | -0.0087    | 5.9 4.5 | 4020 |
| 3637368 | 68.0845 | 118.1915 | -0.0051    | -0.0038    | 2.0 1.1 | 4021 |
| 3639208 | 66.9212 | 119.0472 | -0.0118    | 0.0111     | 2.9 0.5 | 4022 |
| 3645848 | 70.3719 | 105.3362 | 0.0074     | -0.0007    | 3.1 2.2 | 4023 |
| 3646511 | 69.6604 | 108.4945 | -0.0057    | 0.0008     | 0.7 4.1 | 4024 |
| 3647141 | 68.4880 | 111.9749 | 0.0123     | 0.0054     | 7.1 1.3 | 4025 |
| 3647491 | 68.1394 | 109.3626 | -0.0090    | -0.0030    | 3.1 4.5 | 4026 |
| 3648922 | 68.1376 | 105.0744 | 0.0108     | 0.0052     | 3.3 1.9 | 4027 |
| 3649728 | 67.3256 | 106.3187 | -0.0053    | -0.0091    | 2.6 2.1 | 4028 |
| 3652841 | 73.2700 | 97.3598  | -0.0135    | -0.0019    | 4.5 3.6 | 4029 |
| 3653333 | 72.3313 | 101.4410 | 0.0114     | -0.0040    | 2.7 1.5 | 4030 |
| 3653514 | 72.5525 | 99.6941  | -0.0043    | 0.0016     | 3.3 2.7 | 4031 |
| 3654652 | 71.4506 | 99.0692  | -0.0150    | 0.0007     | 5.8 2.0 | 4032 |
| 3657724 | 69.4571 | 98.1536  | 0.0091     | 0.0113     | 2.4 2.2 | 4033 |
| 3660248 | 75.1753 | 93.3323  | -0.0052    | 0.0024     | 4.0 3.4 | 4034 |
| 3660510 | 75.6412 | 91.4603  | -0.0026    | -0.0018    | 4.1 2.2 | 4035 |
| 3664386 | 71.7631 | 92.8512  | -0.0033    | -0.0037    | 2.6 1.8 | 4036 |
| 3664472 | 71.9015 | 92.3731  | -0.0042    | 0.0052     | 2.1 1.4 | 4037 |
| 3664555 | 72.2981 | 91.2081  | 0.0062     | 0.0112     | 6.0 1.7 | 4038 |
| 3664828 | 72.8767 | 88.5013  | -0.0086    | 0.0018     | 1.5 1.3 | 4039 |
| 3665989 | 71.7284 | 87.6917  | -0.0097    | 0.0086     | 2.4 5.0 | 4040 |
| 3666204 | 70.7945 | 93.9008  | 0.0025     | -0.0046    | 4.8 1.6 | 4041 |
| 3667453 | 69.9072 | 92.3098  | -0.0061    | 0.0023     | 6.8 1.9 | 4042 |
| 3667481 | 69.5355 | 92.5470  | -0.0014    | 0.0031     | 2.0 1.8 | 4043 |
| 3669405 | 68.7867 | 92.2841  | -0.0136    | 0.0028     | 3.7 5.2 | 4044 |
| 3669464 | 68.3589 | 92.3055  | 0.0102     | 0.0054     | 2.7 2.9 | 4045 |
| 3669925 | 69.4051 | 88.1346  | 0.0075     | -0.0028    | 2.8 1.3 | 4046 |
| 3670577 | 76.3782 | 82.7100  | 0.0016     | 0.0067     | 2.2 9.4 | 4047 |
| 3671624 | 76.2014 | 82.1730  | 0.0118     | 0.0036     | 1.7 2.5 | 4048 |
| 3672641 | 75.3548 | 82.4872  | 0.0072     | 0.0072     | 2.0 1.2 | 4049 |
| 3672674 | 75.2255 | 82.2574  | 0.0047     | 0.0101     | 4.2 1.5 | 4050 |
| 3674016 | 73.0467 | 87.0550  | -0.0110    | 0.0034     | 2.2 2.2 | 4051 |
| 3700535 | 65.5494 | 142.6071 | 0.0012     | -0.0042    | 3.7 8.0 | 4052 |
| 3701986 | 64.3251 | 139.1412 | 0.0048     | -0.0042    | 2.4 2.4 | 4053 |
| 3711600 | 64.9976 | 133.5860 | -0.0093    | -0.0051    | 2.6 6.3 | 4054 |
| 3715115 | 61.6864 | 137.5133 | -0.0012    | 0.0019     | 2.3 3.2 | 4055 |
| 3722516 | 64.2928 | 125.3730 | 0.0034     | 0.0021     | 3.7 1.4 | 4056 |
| 3722757 | 64.0480 | 123.6174 | -0.0024    | 0.0032     | 2.0 4.9 | 4057 |
| 3724358 | 62.3744 | 126.9082 | 0.0023     | 0.0007     | 2.2 2.2 | 4058 |
| 3726290 | 60.3992 | 128.5661 | -0.0024    | 0.0034     | 4.5 2.9 | 4059 |
| 3726975 | 60.7648 | 122.0816 | -0.0026    | -0.0022    | 3.0 1.7 | 4060 |
| 3733276 | 63.1741 | 119.3645 | -0.0131    | 0.0031     | 1.3 3.8 | 4061 |
| 3733519 | 63.7844 | 116.5369 | -0.0007    | 0.0023     | 1.7 1.9 | 4062 |
| 3734537 | 62.8128 | 116.7304 | -0.0106    | 0.0011     | 4.6 2.2 | 4063 |
| 3735356 | 61.8105 | 118.5686 | -0.0105    | 0.0065     | 2.7 2.0 | 4064 |

## POSITIONS ON THE DISK

9b

| Ref     | x'       | y'       | $\xi$    | $\eta$   | $\zeta$ | Ser  |
|---------|----------|----------|----------|----------|---------|------|
| 3563580 | -49.6193 | -57.1567 | -0.53764 | -0.64988 | 0.53722 | 3992 |
| 3566593 | -52.1061 | -57.3815 | -0.56913 | -0.65342 | 0.49914 | 3993 |
| 3569174 | -54.6426 | -54.0346 | -0.59733 | -0.61442 | 0.51545 | 3994 |
| 3569416 | -53.8979 | -56.6939 | -0.59100 | -0.64588 | 0.48328 | 3995 |
| 3569650 | -54.0663 | -57.8499 | -0.59465 | -0.65980 | 0.45941 | 3996 |
| 3573587 | 48.5804  | -66.0568 | -0.53726 | -0.75662 | 0.37267 | 3997 |
| 3576484 | -51.0800 | -64.9163 | -0.56764 | -0.74396 | 0.35256 | 3998 |
| 3578342 | -52.4699 | -63.8867 | -0.58387 | -0.73213 | 0.35084 | 3999 |
| 3579336 | -53.0810 | -64.1508 | -0.59258 | -0.73574 | 0.32793 | 4000 |
| 3582039 | 46.6109  | -70.3792 | -0.52164 | -0.80901 | 0.27091 | 4001 |
| 3605400 | -60.6712 | -4.7561  | -0.64970 | -0.04021 | 0.75913 | 4002 |
| 3605620 | -60.8283 | -6.4390  | -0.65173 | -0.05969 | 0.75610 | 4003 |
| 3605852 | -61.0636 | -8.3741  | -0.65479 | -0.08212 | 0.75133 | 4004 |
| 3608594 | 63.7467  | -5.8718  | -0.68779 | -0.05387 | 0.72391 | 4005 |
| 3609758 | -64.3330 | -7.9377  | -0.69524 | -0.07791 | 0.71454 | 4006 |
| 3611311 | -57.4286 | -12.6328 | -0.61064 | -0.13057 | 0.78107 | 4007 |
| 3614955 | -60.1734 | -18.1505 | -0.64542 | -0.19519 | 0.73846 | 4008 |
| 3617346 | 62.5471  | -13.0617 | -0.67375 | -0.13677 | 0.72619 | 4009 |
| 3618073 | -63.6327 | -10.1159 | -0.68678 | -0.10294 | 0.71954 | 4010 |
| 3621150 | -57.7075 | -19.4677 | -0.61539 | -0.20989 | 0.75977 | 4011 |
| 3621657 | -57.5688 | -24.3841 | -0.61506 | -0.26701 | 0.74190 | 4012 |
| 3625822 | 60.5163  | -25.6650 | -0.65188 | -0.28268 | 0.70367 | 4013 |
| 3627817 | -62.0759 | -26.0292 | -0.67139 | -0.28736 | 0.68312 | 4014 |
| 3628529 | -62.9792 | -23.5430 | -0.68175 | -0.25865 | 0.68433 | 4015 |
| 3629497 | -64.3938 | -22.4819 | -0.69906 | -0.24671 | 0.67115 | 4016 |
| 3630019 | -56.2933 | -28.0385 | -0.60064 | -0.30926 | 0.73729 | 4017 |
| 3632427 | -57.9465 | -31.2714 | -0.62231 | -0.34739 | 0.70146 | 4018 |
| 3635136 | -60.5354 | -28.5167 | -0.65321 | -0.31594 | 0.68811 | 4019 |
| 3636842 | -61.2211 | -34.1652 | -0.66443 | -0.38217 | 0.64225 | 4020 |
| 3637368 | -62.2679 | -30.3548 | -0.67561 | -0.33791 | 0.65526 | 4021 |
| 3639208 | -63.4363 | -29.5048 | -0.68984 | -0.32834 | 0.64522 | 4022 |
| 3645848 | -59.9101 | -43.2030 | -0.65383 | -0.48795 | 0.57828 | 4023 |
| 3646511 | -60.6390 | -40.0472 | -0.66071 | -0.45103 | 0.60003 | 4024 |
| 3647141 | 61.8307  | -36.5716 | -0.67345 | -0.41058 | 0.61472 | 4025 |
| 3647491 | -62.1653 | -39.1867 | -0.67936 | -0.44143 | 0.58618 | 4026 |
| 3648922 | -62.1439 | -43.4764 | -0.68238 | -0.49201 | 0.54064 | 4027 |
| 3649728 | -62.9629 | -42.2359 | -0.69179 | -0.47768 | 0.54152 | 4028 |
| 3652841 | -56.9677 | -51.1674 | -0.62374 | -0.58117 | 0.52268 | 4029 |
| 3653333 | 57.9289  | -47.0895 | -0.63203 | -0.53317 | 0.56238 | 4030 |
| 3653514 | -57.6981 | -48.8359 | -0.63070 | -0.55377 | 0.54366 | 4031 |
| 3654652 | -58.7971 | -49.4668 | -0.64526 | -0.56167 | 0.51785 | 4032 |
| 3657724 | -60.7864 | -50.3930 | -0.67180 | -0.57355 | 0.46875 | 4033 |
| 3660248 | -55.0399 | -55.1866 | -0.60370 | -0.62831 | 0.49069 | 4034 |
| 3660510 | 54.5637  | -57.0569 | -0.59996 | -0.65050 | 0.46572 | 4035 |
| 3664386 | -58.4508 | -55.6854 | -0.64832 | -0.63583 | 0.41882 | 4036 |
| 3664472 | -58.3098 | -56.1630 | -0.64718 | -0.64151 | 0.41186 | 4037 |
| 3664555 | 57.9067  | -57.3264 | -0.64370 | -0.65534 | 0.39520 | 4038 |
| 3664828 | 57.3133  | -60.0312 | -0.64068 | -0.68788 | 0.34111 | 4039 |
| 3665989 | -58.4576 | -60.8470 | -0.65830 | -0.69879 | 0.27989 | 4040 |
| 3666204 | -59.4255 | -54.6404 | -0.65956 | -0.62376 | 0.41941 | 4041 |
| 3667453 | 60.3045  | -56.2366 | -0.67376 | -0.64354 | 0.36318 | 4042 |
| 3667481 | -60.6777 | -56.0012 | -0.67837 | -0.64092 | 0.35922 | 4043 |
| 3669405 | 61.4253  | -56.2681 | -0.68904 | -0.64468 | 0.33107 | 4044 |
| 3669464 | 61.8534  | -56.2489 | -0.69491 | -0.64477 | 0.31840 | 4045 |
| 3669925 | 60.7842  | -60.4159 | -0.69138 | -0.69588 | 0.19428 | 4046 |
| 3670577 | -53.7791 | -65.8066 | -0.60672 | -0.75694 | 0.24275 | 4047 |
| 3671624 | 53.9530  | -66.3447 | -0.61134 | -0.76405 | 0.20613 | 4048 |
| 3672641 | 54.8017  | -66.0347 | -0.62299 | -0.76110 | 0.18059 | 4049 |
| 3672674 | -54.9298 | -66.2653 | -0.62652 | -0.76446 | 0.15194 | 4050 |
| 3674016 | -57.1354 | -61.4771 | -0.64146 | -0.70554 | 0.30124 | 4051 |
| 3700535 | -64.9361 | -5.9433  | -0.70258 | -0.05501 | 0.70948 | 4052 |
| 3701986 | -66.1421 | -9.4168  | -0.71796 | -0.09554 | 0.68949 | 4053 |
| 3711600 | -65.4393 | -14.9705 | -0.71011 | -0.15971 | 0.68574 | 4054 |
| 3715115 | -68.7731 | -11.0589 | -0.75125 | -0.11538 | 0.64985 | 4055 |
| 3722516 | -66.1000 | -23.1902 | -0.72072 | -0.25550 | 0.64442 | 4056 |
| 3722757 | 66.3354  | -24.9477 | -0.72435 | -0.27608 | 0.63174 | 4057 |
| 3724358 | -68.0274 | -21.6643 | -0.74452 | -0.23837 | 0.62360 | 4058 |
| 3726290 | -70.0124 | -20.0160 | -0.76918 | -0.21989 | 0.60001 | 4059 |
| 3726975 | -69.6115 | -26.5010 | -0.76671 | -0.29542 | 0.56999 | 4060 |
| 3733276 | -67.1866 | -29.2067 | -0.73707 | -0.32614 | 0.59192 | 4061 |
| 3733519 | -66.5608 | -32.0322 | -0.73062 | -0.35901 | 0.58078 | 4062 |
| 3734537 | -67.5338 | -31.8436 | -0.74294 | -0.35718 | 0.56610 | 4063 |
| 3735356 | -68.5464 | -30.0099 | -0.75487 | -0.33608 | 0.56323 | 4064 |

## POSITIONS ON THE DISK

| Ref     | x        | y        | $\delta x$ | $\delta y$ | weights | Ser  |
|---------|----------|----------|------------|------------|---------|------|
| 3738946 | 59.7634  | 113.5554 | -0.0046    | -0.0021    | 3.0 2.0 | 4065 |
| 3739493 | 58.4783  | 118.1622 | 0.0075     | 0.0128     | 6.2 3.2 | 4066 |
| 3740574 | 66.0426  | 108.3614 | -0.0082    | -0.0040    | 3.4 1.0 | 4067 |
| 3742471 | 64.4093  | 109.5645 | 0.0001     | 0.0072     | 2.9 0.7 | 4068 |
| 3748968 | 60.2943  | 104.9504 | 0.0042     | -0.0050    | 2.4 1.7 | 4069 |
| 3751813 | 66.5672  | 97.5559  | 0.0111     | -0.0026    | 2.9 1.7 | 4070 |
| 3752417 | 65.4679  | 100.6007 | -0.0011    | 0.0103     | 2.8 2.9 | 4071 |
| 3754443 | 63.7594  | 100.9940 | 0.0004     | -0.0023    | 2.9 1.8 | 4072 |
| 3755201 | 63.1404  | 102.8890 | 0.0138     | -0.0056    | 2.2 1.7 | 4073 |
| 3758377 | 60.5634  | 101.7223 | -0.0049    | -0.0071    | 1.8 2.8 | 4074 |
| 3758712 | 61.4305  | 98.7339  | 0.0032     | -0.0055    | 3.0 1.7 | 4075 |
| 3760074 | 67.0061  | 95.7803  | 0.0118     | 0.0000     | 3.2 3.4 | 4076 |
| 3761679 | 67.2596  | 90.4241  | 0.0117     | 0.0064     | 3.7 2.0 | 4077 |
| 3761764 | 67.3719  | 90.0444  | -0.0034    | 0.0090     | 2.8 0.7 | 4078 |
| 3762058 | 65.7583  | 95.5166  | -0.0041    | -0.0017    | 2.6 1.2 | 4079 |
| 3763046 | 65.0473  | 95.7372  | 0.0001     | 0.0013     | 3.1 1.2 | 4080 |
| 3763226 | 65.4800  | 94.0637  | 0.0122     | 0.0069     | 2.8 2.7 | 4081 |
| 3767082 | 62.1665  | 96.3293  | 0.0136     | 0.0100     | 5.5 1.6 | 4082 |
| 3805769 | 53.5463  | 140.9863 | -0.0112    | -0.0069    | 2.2 3.4 | 4083 |
| 3807476 | 51.9495  | 143.9145 | 0.0078     | 0.0035     | 3.7 7.6 | 4084 |
| 3808183 | 51.1505  | 146.8066 | 0.0085     | 0.0001     | 2.5 3.4 | 4085 |
| 3817568 | 52.1021  | 134.2700 | -0.0017    | -0.0095    | 1.8 1.6 | 4086 |
| 3818172 | 51.2779  | 138.2622 | 0.0073     | 0.0075     | 2.8 1.4 | 4087 |
| 3818748 | 51.5800  | 132.5587 | 0.0056     | 0.0041     | 2.5 3.3 | 4088 |
| 3821856 | 57.0422  | 123.0111 | -0.0017    | 0.0041     | 4.1 3.0 | 4089 |
| 3821926 | 57.2731  | 122.2204 | 0.0061     | -0.0072    | 3.5 1.5 | 4090 |
| 3823709 | 55.8588  | 123.7294 | 0.0082     | 0.0062     | 2.9 7.1 | 4091 |
| 3824334 | 54.7860  | 127.5882 | 0.0002     | -0.0042    | 2.1 1.6 | 4092 |
| 3825746 | 54.1232  | 124.1282 | 0.0060     | -0.0031    | 2.0 1.6 | 4093 |
| 3831691 | 56.9969  | 116.7287 | 0.0106     | -0.0020    | 3.4 5.1 | 4094 |
| 3832592 | 56.1967  | 117.4585 | -0.0127    | 0.0057     | 2.3 2.2 | 4095 |
| 3832640 | 56.6214  | 116.7628 | 0.0023     | 0.0036     | 2.9 2.2 | 4096 |
| 3833296 | 55.4136  | 119.7271 | 0.0075     | -0.0007    | 2.1 1.7 | 4097 |
| 3834314 | 55.2117  | 119.0864 | 0.0021     | -0.0058    | 2.1 1.3 | 4098 |
| 3836342 | 53.5821  | 119.3208 | 0.0050     | -0.0047    | 1.7 4.0 | 4099 |
| 3838560 | 52.1335  | 117.9244 | 0.0005     | -0.0091    | 2.6 1.2 | 4100 |
| 3844019 | 55.6137  | 112.7316 | 0.0035     | -0.0044    | 2.6 1.7 | 4101 |
| 3849065 | 52.0265  | 113.3179 | 0.0052     | -0.0026    | 1.9 1.2 | 4102 |
| 3900603 | 50.2638  | 142.4832 | -0.0028    | -0.0081    | 2.9 5.1 | 4103 |
| 3903541 | 47.8504  | 143.7892 | 0.0056     | -0.0024    | 1.5 1.7 | 4104 |
| 3904262 | 47.0766  | 146.3474 | 0.0002     | -0.0032    | 2.0 4.1 | 4105 |
| 3904844 | 47.1873  | 140.8723 | -0.0120    | 0.0038     | 2.9 2.6 | 4106 |
| 3913619 | 48.1814  | 133.5346 | 0.0044     | 0.0026     | 3.1 1.2 | 4107 |
| 3922463 | 48.8531  | 127.2403 | -0.0059    | -0.0024    | 3.5 1.6 | 4108 |
| 4005338 | 129.1040 | 143.1313 | -0.0063    | 0.0032     | 2.6 2.4 | 4109 |
| 4013281 | 127.7971 | 136.0033 | -0.0066    | 0.0047     | 4.6 3.4 | 4110 |
| 4015361 | 129.3522 | 135.0395 | -0.0097    | 0.0095     | 2.2 6.7 | 4111 |
| 4016748 | 130.1259 | 130.9977 | -0.0066    | 0.0042     | 2.5 2.6 | 4112 |
| 4017781 | 131.3750 | 131.5957 | -0.0127    | 0.0094     | 9.9 1.6 | 4113 |
| 4024931 | 128.4478 | 121.2356 | 0.0052     | 0.0033     | 3.1 1.6 | 4114 |
| 4030878 | 125.4345 | 112.9349 | -0.0045    | 0.0028     | 3.3 4.4 | 4115 |
| 4037042 | 131.1684 | 120.2755 | -0.0004    | 0.0022     | 9.6 2.9 | 4116 |
| 4040106 | 124.9299 | 110.5578 | -0.0108    | -0.0041    | 4.3 1.3 | 4117 |
| 4043060 | 127.9171 | 111.8929 | -0.0147    | -0.0060    | 2.4 2.8 | 4118 |
| 4045505 | 129.3580 | 107.1801 | -0.0064    | -0.0031    | 6.2 2.8 | 4119 |
| 4048108 | 131.8215 | 110.2892 | -0.0068    | 0.0053     | 4.2 7.3 | 4120 |
| 4056499 | 131.2263 | 99.1078  | 0.0134     | -0.0021    | 2.8 2.6 | 4121 |
| 4073188 | 129.4334 | 84.7402  | 0.0110     | -0.0113    | 2.8 1.8 | 4122 |
| 4084442 | 130.8134 | 74.4022  | -0.0137    | -0.0098    | 2.4 4.8 | 4123 |
| 4086843 | 132.8782 | 70.9446  | -0.0003    | -0.0057    | 2.5 1.2 | 4124 |
| 4089823 | 135.3622 | 70.9577  | -0.0093    | -0.0031    | 2.9 2.4 | 4125 |
| 4092795 | 131.3676 | 63.5443  | 0.0089     | 0.0036     | 1.9 1.7 | 4126 |
| 4097891 | 135.9882 | 63.0650  | 0.0071     | -0.0068    | 1.3 3.0 | 4127 |
| 4102396 | 135.7603 | 143.2661 | 0.0014     | 0.0022     | 1.1 4.2 | 4128 |
| 4102520 | 135.1151 | 142.0939 | -0.0062    | -0.0020    | 3.6 1.4 | 4129 |
| 4102897 | 135.7116 | 138.8242 | -0.0117    | -0.0078    | 2.1 2.4 | 4130 |
| 4103720 | 136.1028 | 140.2821 | -0.0111    | 0.0053     | 6.3 2.5 | 4131 |
| 4114228 | 136.8948 | 135.3021 | -0.0082    | -0.0007    | 4.1 1.6 | 4132 |
| 4115169 | 138.1408 | 136.0995 | -0.0116    | 0.0018     | 3.5 1.7 | 4133 |
| 4115787 | 138.3191 | 131.0411 | -0.0053    | -0.0043    | 3.9 1.7 | 4134 |
| 4121834 | 134.4942 | 121.8382 | 0.0004     | -0.0009    | 9.3 1.9 | 4135 |
| 4122982 | 135.7964 | 121.1290 | -0.0118    | 0.0041     | 3.5 2.3 | 4136 |
| 4127892 | 140.3265 | 121.9614 | -0.0118    | -0.0084    | 3.3 2.9 | 4137 |

## POSITIONS ON THE DISK

10b

| Ref     | x'       | y'       | $\xi$    | $\eta$   | $\zeta$ | Ser  |
|---------|----------|----------|----------|----------|---------|------|
| 3738946 | -70.5672 | -35.0355 | -0.78445 | -0.39609 | 0.47724 | 4065 |
| 3739493 | 71.8777  | -30.4336 | -0.79832 | -0.34254 | 0.49533 | 4066 |
| 3740574 | -64.2575 | -40.1990 | -0.70671 | -0.45415 | 0.54250 | 4067 |
| 3742471 | -65.8979 | -39.0039 | -0.72683 | -0.44073 | 0.52676 | 4068 |
| 3748968 | -69.9896 | -43.6409 | -0.78569 | -0.49803 | 0.36695 | 4069 |
| 3751813 | 63.6742  | -51.0058 | -0.71053 | -0.58240 | 0.39492 | 4070 |
| 3752417 | -64.7904 | -47.9655 | -0.72127 | -0.54657 | 0.42548 | 4071 |
| 3754443 | -66.5017 | -47.5809 | -0.74362 | -0.54298 | 0.39013 | 4072 |
| 3755201 | -67.1312 | -45.6884 | -0.74958 | -0.52069 | 0.40867 | 4073 |
| 3758377 | -69.7029 | -46.8688 | -0.78686 | -0.53678 | 0.30449 | 4074 |
| 3758712 | 68.8193  | -49.8539 | -0.78045 | -0.57251 | 0.52125 | 4075 |
| 3760074 | -63.2255 | -52.7798 | -0.70724 | -0.60352 | 0.36820 | 4076 |
| 3761679 | 62.9430  | -58.1367 | -0.71621 | -0.66948 | 0.19706 | 4077 |
| 3761764 | -62.8286 | -58.5159 | -0.71606 | -0.67426 | 0.18066 | 4078 |
| 3762058 | -64.4724 | -53.0500 | -0.72481 | -0.60768 | 0.32461 | 4079 |
| 3763046 | -65.1849 | -52.8330 | -0.73436 | -0.60561 | 0.30651 | 4080 |
| 3763226 | -64.7430 | -54.5049 | -0.73188 | -0.62580 | 0.26968 | 4081 |
| 3767082 | 68.0700  | -52.2555 | -0.77634 | -0.60176 | 0.18756 | 4082 |
| 3805769 | -76.9351 | -7.6266  | -0.85570 | -0.07880 | 0.51144 | 4083 |
| 3807476 | -78.5484 | -4.7055  | -0.87674 | -0.04577 | 0.47879 | 4084 |
| 3808183 | 79.3633  | -1.8165  | -0.88748 | -0.01278 | 0.46066 | 4085 |
| 3817568 | -78.3436 | -14.3528 | -0.87604 | -0.15772 | 0.45571 | 4086 |
| 3818172 | 79.1897  | -10.3634 | -0.88629 | -0.11177 | 0.44943 | 4087 |
| 3818748 | -78.8566 | -16.0674 | -0.88363 | -0.17802 | 0.43302 | 4088 |
| 3821856 | -73.3406 | -25.5904 | -0.81460 | -0.28641 | 0.50437 | 4089 |
| 3821926 | -73.1054 | -26.3802 | -0.81195 | -0.29555 | 0.50337 | 4090 |
| 3823709 | -74.5284 | -24.8779 | -0.82987 | -0.27866 | 0.48339 | 4091 |
| 3824334 | 75.6225  | -21.0232 | -0.84239 | -0.23410 | 0.48535 | 4092 |
| 3825746 | 76.2668  | -24.4879 | -0.85286 | -0.27505 | 0.44382 | 4093 |
| 3831691 | 73.3520  | -31.8753 | -0.81889 | -0.36030 | 0.44677 | 4094 |
| 3832592 | -74.1564 | -31.1494 | -0.82911 | -0.35221 | 0.43419 | 4095 |
| 3832640 | -73.7278 | -31.8431 | -0.82391 | -0.36014 | 0.43758 | 4096 |
| 3833296 | 74.9521  | -28.8840 | -0.83810 | -0.32597 | 0.43742 | 4097 |
| 3834314 | -75.1506 | -29.5259 | -0.84127 | -0.33366 | 0.42538 | 4098 |
| 3836342 | 76.7821  | -29.2999 | -0.86347 | -0.33209 | 0.37966 | 4099 |
| 3838560 | -78.2237 | -30.7042 | -0.88553 | -0.34999 | 0.30551 | 4100 |
| 3844019 | -74.7141 | -35.8810 | -0.84139 | -0.40871 | 0.35357 | 4101 |
| 3849065 | 78.3059  | -35.3130 | -0.89535 | -0.40604 | 0.18297 | 4102 |
| 3900603 | -80.2270 | -6.1461  | -0.89955 | -0.06341 | 0.43218 | 4103 |
| 3903541 | 82.6484  | -4.8520  | -0.93313 | -0.05009 | 0.35605 | 4104 |
| 3904262 | 83.4363  | -2.2969  | -0.94425 | -0.02113 | 0.32855 | 4105 |
| 3904844 | 83.2960  | -7.7734  | -0.94314 | -0.08460 | 0.32144 | 4106 |
| 3913619 | -82.2618 | -15.1087 | -0.93103 | -0.16935 | 0.32326 | 4107 |
| 3922463 | 81.5558  | -21.4018 | -0.92513 | -0.24278 | 0.29186 | 4108 |
| 4005338 | -1.3595  | -5.0911  | 0.05242  | -0.03811 | 0.99790 | 4109 |
| 4013281 | -2.6284  | -12.2285 | 0.03736  | -0.12051 | 0.99201 | 4110 |
| 4015361 | -1.0674  | -13.1846 | 0.05523  | -0.13155 | 0.98977 | 4111 |
| 4016748 | -0.2716  | -17.2239 | 0.06389  | -0.17825 | 0.98191 | 4112 |
| 4017781 | 0.9748   | -16.6193 | 0.07830  | -0.17126 | 0.98211 | 4113 |
| 4024931 | -1.8975  | -26.9983 | 0.04331  | -0.29150 | 0.95559 | 4114 |
| 4030878 | -4.8671  | -35.3176 | 0.00668  | -0.38821 | 0.92155 | 4115 |
| 4037042 | 0.8293   | -27.9447 | 0.07444  | -0.30248 | 0.95024 | 4116 |
| 4040106 | -5.3590  | -37.6981 | 0.00016  | -0.41594 | 0.90939 | 4117 |
| 4043060 | -2.3779  | -36.3472 | 0.03504  | -0.40017 | 0.91577 | 4118 |
| 4045505 | -0.9109  | -41.0543 | 0.05016  | -0.45501 | 0.88907 | 4119 |
| 4048108 | 1.5367   | -37.9313 | 0.07951  | -0.41861 | 0.90468 | 4120 |
| 4056499 | 1.0018   | -49.1199 | 0.06843  | -0.54928 | 0.83283 | 4121 |
| 4073188 | -0.7141  | -63.5020 | 0.03914  | -0.71849 | 0.69443 | 4122 |
| 4084442 | 0.7223   | -73.8367 | 0.04510  | -0.84155 | 0.53829 | 4123 |
| 4086843 | 2.8066   | -77.2849 | 0.06421  | -0.88314 | 0.46469 | 4124 |
| 4089823 | 5.2915   | -77.2590 | 0.09268  | -0.88290 | 0.46032 | 4125 |
| 4092795 | 1.3355   | -84.6957 | 0.03053  | -0.97489 | 0.22057 | 4126 |
| 4097891 | 5.9605   | -85.1514 | 0.08104  | -0.98121 | 0.17510 | 4127 |
| 4102396 | 5.2987   | -4.9220  | 0.12883  | -0.03620 | 0.99101 | 4128 |
| 4102520 | 4.6596   | -6.0979  | 0.12148  | -0.04975 | 0.99135 | 4129 |
| 4102897 | 5.2740   | -9.3658  | 0.12833  | -0.08747 | 0.98787 | 4130 |
| 4103720 | 5.6574   | -7.9053  | 0.13281  | -0.07062 | 0.98862 | 4131 |
| 4114228 | 6.4767   | -12.8830 | 0.14180  | -0.12812 | 0.98157 | 4132 |
| 4115169 | 7.7189   | -12.0789 | 0.15607  | -0.11885 | 0.98057 | 4133 |
| 4115787 | 7.9246   | -17.1383 | 0.15783  | -0.17735 | 0.97141 | 4134 |
| 4121834 | 4.1480   | -26.3643 | 0.11290  | -0.28417 | 0.95210 | 4135 |
| 4122982 | 5.4545   | -27.0670 | 0.12769  | -0.29234 | 0.94775 | 4136 |
| 4127892 | 9.9819   | -26.2110 | 0.17962  | -0.28252 | 0.94230 | 4137 |

## POSITIONS ON THE DISK

| Ref     | x        | y        | $\delta x$ | $\delta y$ | weights | Ser  |
|---------|----------|----------|------------|------------|---------|------|
| 4136545 | 139.0283 | 115.7272 | 0.0049     | -0.0037    | 2.3 0.9 | 4138 |
| 4136887 | 139.4577 | 112.9708 | -0.0017    | 0.0123     | 3.0 1.4 | 4139 |
| 4150406 | 133.9557 | 99.3302  | -0.0073    | -0.0059    | 8.1 6.8 | 4140 |
| 4154400 | 137.4381 | 99.8801  | -0.0052    | -0.0035    | 6.1 3.3 | 4141 |
| 4162911 | 136.4071 | 87.0121  | 0.0033     | -0.0029    | 4.2 2.1 | 4142 |
| 4165018 | 138.6348 | 94.0962  | -0.0098    | -0.0005    | 4.4 1.9 | 4143 |
| 4165466 | 139.1306 | 90.8336  | 0.0074     | -0.0007    | 2.4 2.9 | 4144 |
| 4168051 | 141.5901 | 94.6816  | 0.0125     | -0.0089    | 2.6 2.0 | 4145 |
| 4172127 | 136.6635 | 84.8048  | 0.0013     | -0.0047    | 3.6 4.1 | 4146 |
| 4173615 | 137.7823 | 80.7601  | -0.0013    | -0.0034    | 9.8 3.8 | 4147 |
| 4175454 | 139.6853 | 82.6376  | 0.0014     | 0.0103     | 3.9 2.9 | 4148 |
| 4183402 | 138.2403 | 74.4112  | -0.0011    | 0.0083     | 3.2 4.0 | 4149 |
| 4184113 | 138.8905 | 76.7544  | 0.0035     | -0.0053    | 2.7 2.4 | 4150 |
| 4188370 | 143.1735 | 75.3596  | -0.0117    | -0.0086    | 4.3 6.9 | 4151 |
| 4189456 | 143.9828 | 74.0340  | 0.0021     | -0.0001    | 2.2 3.1 | 4152 |
| 4189891 | 144.6964 | 71.1237  | -0.0032    | -0.0014    | 2.5 4.2 | 4153 |
| 4194545 | 140.9808 | 65.0580  | 0.0040     | -0.0010    | 2.3 2.0 | 4154 |
| 4205214 | 146.4691 | 144.2818 | -0.0020    | 0.0011     | 3.7 3.6 | 4155 |
| 4206063 | 147.7570 | 146.1345 | -0.0087    | 0.0039     | 7.1 5.7 | 4156 |
| 4206164 | 147.8039 | 145.1912 | 0.0134     | -0.0125    | 4.4 4.8 | 4157 |
| 4207422 | 148.3861 | 142.8066 | 0.0033     | 0.0081     | 2.4 1.8 | 4158 |
| 4210806 | 141.9804 | 130.2322 | -0.0033    | 0.0031     | 4.4 3.1 | 4159 |
| 4219847 | 150.2860 | 130.1532 | -0.0037    | -0.0061    | 1.0 2.3 | 4160 |
| 4220272 | 142.6540 | 127.1729 | -0.0149    | 0.0009     | 2.7 2.2 | 4161 |
| 4221789 | 143.6649 | 122.2851 | -0.0033    | -0.0066    | 2.7 2.9 | 4162 |
| 4222200 | 143.8094 | 127.2637 | -0.0008    | 0.0041     | 3.9 2.1 | 4163 |
| 4225079 | 147.0262 | 128.3013 | -0.0113    | -0.0043    | 5.4 3.9 | 4164 |
| 4235920 | 146.8131 | 112.7168 | 0.0004     | -0.0040    | 6.8 3.6 | 4165 |
| 4241187 | 143.8598 | 110.3834 | 0.0083     | -0.0020    | 2.8 2.6 | 4166 |
| 4243362 | 145.5073 | 109.1450 | 0.0050     | 0.0004     | 4.5 3.2 | 4167 |
| 4245047 | 147.0621 | 111.2021 | 0.0021     | -0.0054    | 2.4 1.5 | 4168 |
| 4255937 | 147.6031 | 94.9917  | 0.0009     | -0.0067    | 3.0 2.3 | 4169 |
| 4256004 | 147.8491 | 102.8788 | -0.0090    | 0.0009     | 6.0 2.1 | 4170 |
| 4263114 | 145.6716 | 93.5451  | -0.0010    | -0.0068    | 4.8 4.1 | 4171 |
| 4264774 | 147.2895 | 88.4632  | 0.0086     | -0.0088    | 1.7 4.0 | 4172 |
| 4269764 | 151.7637 | 88.4362  | 0.0106     | -0.0007    | 3.0 2.0 | 4173 |
| 4275237 | 148.2694 | 84.0193  | 0.0062     | -0.0026    | 3.8 1.6 | 4174 |
| 4275454 | 148.5393 | 82.5367  | -0.0039    | 0.0065     | 3.7 2.1 | 4175 |
| 4277307 | 149.7909 | 83.1895  | -0.0086    | 0.0007     | 5.8 4.0 | 4176 |
| 4278378 | 151.3476 | 83.0251  | 0.0015     | -0.0066    | 3.0 1.1 | 4177 |
| 4281968 | 146.4902 | 69.8524  | 0.0093     | -0.0028    | 2.3 1.2 | 4178 |
| 4282528 | 146.4965 | 73.1324  | 0.0009     | 0.0035     | 3.7 1.7 | 4179 |
| 4285264 | 149.2858 | 75.9165  | -0.0023    | -0.0090    | 3.5 3.0 | 4180 |
| 4286300 | 149.7101 | 75.4184  | 0.0040     | -0.0102    | 2.4 1.3 | 4181 |
| 4286557 | 150.4017 | 73.1526  | 0.0046     | 0.0002     | 2.8 3.4 | 4182 |
| 4287082 | 151.0791 | 77.6481  | 0.0067     | -0.0073    | 2.9 2.2 | 4183 |
| 4291575 | 147.6751 | 65.1757  | -0.0006    | -0.0022    | 4.2 2.1 | 4184 |
| 4292222 | 147.3175 | 67.7653  | 0.0104     | -0.0063    | 3.8 2.0 | 4185 |
| 4302944 | 152.9096 | 138.2359 | -0.0087    | 0.0023     | 2.8 0.9 | 4186 |
| 4304095 | 155.1114 | 145.9211 | -0.0026    | -0.0095    | 2.3 4.1 | 4187 |
| 4304740 | 154.6422 | 140.2979 | -0.0004    | 0.0006     | 5.6 1.1 | 4188 |
| 4310096 | 151.5842 | 137.1780 | 0.0032     | -0.0059    | 4.2 5.1 | 4189 |
| 4321991 | 152.5995 | 121.1554 | -0.0032    | 0.0047     | 5.3 2.2 | 4190 |
| 4323306 | 153.4935 | 125.9408 | 0.0111     | -0.0056    | 6.2 2.5 | 4191 |
| 4324402 | 154.3823 | 125.4179 | -0.0074    | 0.0033     | 3.0 1.4 | 4192 |
| 4332401 | 152.8061 | 116.9299 | -0.0080    | 0.0014     | 3.8 2.9 | 4193 |
| 4341810 | 152.3233 | 104.9177 | -0.0138    | 0.0005     | 4.1 1.8 | 4194 |
| 4343013 | 153.8441 | 111.6246 | -0.0092    | 0.0032     | 3.6 1.9 | 4195 |
| 4346822 | 156.8497 | 104.8188 | 0.0040     | 0.0014     | 6.2 3.1 | 4196 |
| 4347728 | 157.7350 | 105.1597 | 0.0008     | -0.0005    | 1.4 2.9 | 4197 |
| 4351330 | 152.6226 | 100.7296 | 0.0086     | -0.0043    | 4.2 5.3 | 4198 |
| 4352055 | 153.5791 | 102.9396 | -0.0141    | 0.0028     | 2.2 2.0 | 4199 |
| 4352619 | 153.5073 | 97.4063  | -0.0023    | 0.0112     | 2.8 9.9 | 4200 |
| 4358204 | 158.6270 | 101.2069 | -0.0092    | 0.0011     | 2.1 2.8 | 4201 |
| 4358448 | 159.0428 | 99.2467  | -0.0074    | 0.0068     | 5.8 1.8 | 4202 |
| 4358682 | 159.4360 | 97.9728  | -0.0089    | 0.0019     | 4.1 2.2 | 4203 |
| 4361814 | 153.1469 | 87.6066  | -0.0060    | 0.0081     | 5.8 2.5 | 4204 |
| 4362626 | 154.0959 | 89.1797  | 0.0038     | 0.0025     | 3.5 4.1 | 4205 |
| 4363533 | 154.8960 | 90.3409  | -0.0057    | 0.0013     | 4.7 2.0 | 4206 |
| 4371838 | 154.0228 | 78.9027  | 0.0112     | -0.0059    | 2.8 3.1 | 4207 |
| 4372678 | 155.1857 | 80.5603  | -0.0024    | 0.0017     | 1.4 3.5 | 4208 |
| 4372984 | 155.4917 | 78.4342  | -0.0044    | -0.0054    | 3.8 1.5 | 4209 |
| 4374769 | 156.9940 | 79.7133  | 0.0009     | -0.0005    | 3.2 3.4 | 4210 |

| Ref     | x'      | y'       | $\xi$   | $\eta$   | $\zeta$ | Ser  |
|---------|---------|----------|---------|----------|---------|------|
| 4136545 | 8.7169  | -32.4541 | 0.16352 | -0.35499 | 0.92046 | 4138 |
| 4136887 | 9.1614  | -35.2093 | 0.16772 | -0.38705 | 0.90668 | 4139 |
| 4150406 | 3.7310  | -48.8833 | 0.09987 | -0.54653 | 0.83146 | 4140 |
| 4154400 | 7.2118  | -48.3153 | 0.14000 | -0.53995 | 0.82997 | 4141 |
| 4162911 | 6.2500  | -61.1933 | 0.12090 | -0.69129 | 0.71239 | 4142 |
| 4165018 | 8.4403  | -54.0951 | 0.15078 | -0.60777 | 0.77967 | 4143 |
| 4165466 | 8.9539  | -57.3564 | 0.15453 | -0.64614 | 0.74741 | 4144 |
| 4168051 | 11.3935 | -53.4943 | 0.18479 | -0.60083 | 0.77773 | 4145 |
| 4172127 | 6.5184  | -63.4001 | 0.12220 | -0.71738 | 0.68588 | 4146 |
| 4173615 | 7.6596  | -67.4405 | 0.13161 | -0.76534 | 0.63003 | 4147 |
| 4175454 | 9.5532  | -65.5525 | 0.15494 | -0.74300 | 0.65111 | 4148 |
| 4183402 | 8.1521  | -73.7894 | 0.13017 | -0.84119 | 0.52484 | 4149 |
| 4184113 | 8.7899  | -71.4420 | 0.14027 | -0.81309 | 0.56499 | 4150 |
| 4188370 | 13.0821 | -72.8152 | 0.18727 | -0.82982 | 0.52566 | 4151 |
| 4189456 | 13.8989 | -74.1371 | 0.19477 | -0.84578 | 0.49671 | 4152 |
| 4189891 | 14.6285 | -77.0448 | 0.19867 | -0.88101 | 0.42936 | 4153 |
| 4194545 | 10.9442 | -83.1319 | 0.14431 | -0.95572 | 0.25645 | 4154 |
| 4205214 | 16.0062 | -3.8507  | 0.25090 | -0.02416 | 0.96771 | 4155 |
| 4206063 | 17.2845 | -1.9906  | 0.26542 | -0.00278 | 0.96413 | 4156 |
| 4206164 | 17.3366 | -2.9341  | 0.26601 | -0.01366 | 0.96387 | 4157 |
| 4207422 | 17.9319 | -5.3165  | 0.27270 | -0.04116 | 0.96122 | 4158 |
| 4210806 | 11.5917 | -17.9286 | 0.19954 | -0.18660 | 0.96196 | 4159 |
| 4219847 | 19.9010 | -17.9648 | 0.29384 | -0.18741 | 0.93730 | 4160 |
| 4220272 | 12.2821 | -20.9855 | 0.20689 | -0.22202 | 0.95284 | 4161 |
| 4221789 | 13.3199 | -25.8699 | 0.21770 | -0.27868 | 0.93538 | 4162 |
| 4222200 | 13.4375 | -20.8887 | 0.22006 | -0.22094 | 0.95014 | 4163 |
| 4225079 | 16.6499 | -19.8342 | 0.25672 | -0.20887 | 0.94365 | 4164 |
| 4235920 | 16.5210 | -35.4255 | 0.25134 | -0.38988 | 0.88590 | 4165 |
| 4241187 | 13.5792 | -37.7750 | 0.21713 | -0.41710 | 0.88255 | 4166 |
| 4243362 | 15.2340 | -39.0053 | 0.23546 | -0.43152 | 0.87083 | 4167 |
| 4245047 | 16.7783 | -36.9395 | 0.25373 | -0.40753 | 0.87724 | 4168 |
| 4255937 | 17.4072 | -53.1530 | 0.25318 | -0.59717 | 0.76111 | 4169 |
| 4256004 | 17.6106 | -45.2618 | 0.25972 | -0.50470 | 0.82330 | 4170 |
| 4263114 | 15.4828 | -54.6101 | 0.23050 | -0.61416 | 0.75477 | 4171 |
| 4264774 | 17.1288 | -59.6856 | 0.24562 | -0.67406 | 0.69664 | 4172 |
| 4269764 | 21.6049 | -59.6895 | 0.29601 | -0.67451 | 0.67633 | 4173 |
| 4275237 | 18.1331 | -64.1260 | 0.25332 | -0.72668 | 0.63857 | 4174 |
| 4275454 | 18.4112 | -65.6078 | 0.25510 | -0.74429 | 0.61722 | 4175 |
| 4277307 | 19.6597 | -64.9483 | 0.26974 | -0.73658 | 0.62024 | 4176 |
| 4278378 | 21.2179 | -65.1047 | 0.28708 | -0.73860 | 0.60996 | 4177 |
| 4281968 | 16.4299 | -78.3073 | 0.21661 | -0.89663 | 0.38618 | 4178 |
| 4282528 | 16.4184 | -75.0261 | 0.22183 | -0.85676 | 0.46556 | 4179 |
| 4285764 | 19.1938 | -72.2266 | 0.25668 | -0.82338 | 0.50612 | 4180 |
| 4286300 | 19.6209 | -72.7227 | 0.26081 | -0.82940 | 0.49404 | 4181 |
| 4286557 | 20.3250 | -74.9857 | 0.26547 | -0.85680 | 0.44206 | 4182 |
| 4287082 | 20.9784 | -70.4851 | 0.27875 | -0.80273 | 0.52719 | 4183 |
| 4291575 | 17.6405 | -82.9796 | 0.21809 | -0.95524 | 0.19989 | 4184 |
| 4292222 | 17.2688 | -80.3909 | 0.22162 | -0.92242 | 0.31626 | 4185 |
| 4302944 | 22.4819 | -9.8656  | 0.32392 | -0.09393 | 0.94141 | 4186 |
| 4304095 | 24.6430 | -2.1662  | 0.34860 | -0.00524 | 0.93726 | 4187 |
| 4304740 | 24.2040 | -7.7939  | 0.34348 | -0.07013 | 0.93654 | 4188 |
| 4310096 | 21.1617 | -10.9307 | 0.30892 | -0.10615 | 0.94514 | 4189 |
| 4321991 | 22.2640 | -26.9540 | 0.31875 | -0.29176 | 0.90182 | 4190 |
| 4323306 | 23.1325 | -22.1622 | 0.32961 | -0.23624 | 0.91408 | 4191 |
| 4324402 | 24.0245 | -22.6807 | 0.33956 | -0.24232 | 0.90884 | 4192 |
| 4332401 | 22.4936 | -31.1799 | 0.32020 | -0.34087 | 0.88390 | 4193 |
| 4341810 | 22.0756 | -43.1991 | 0.31107 | -0.48092 | 0.81973 | 4194 |
| 4343013 | 23.5607 | -36.4818 | 0.33050 | -0.40266 | 0.85360 | 4195 |
| 4346822 | 26.6043 | -43.2747 | 0.36193 | -0.48221 | 0.79780 | 4196 |
| 4347728 | 27.4881 | -42.9291 | 0.37200 | -0.47826 | 0.79554 | 4197 |
| 4351330 | 22.3976 | -47.3872 | 0.31268 | -0.52994 | 0.78829 | 4198 |
| 4352055 | 23.3426 | -45.1714 | 0.32442 | -0.50408 | 0.80041 | 4199 |
| 4352619 | 23.3007 | -50.7071 | 0.32103 | -0.56894 | 0.75713 | 4200 |
| 4358204 | 28.4018 | -46.8787 | 0.38030 | -0.52457 | 0.76170 | 4201 |
| 4358448 | 28.8284 | -48.8375 | 0.38401 | -0.54759 | 0.74343 | 4202 |
| 4358682 | 29.2286 | -50.1098 | 0.38775 | -0.56256 | 0.73018 | 4203 |
| 4361814 | 22.9931 | -60.5123 | 0.31093 | -0.68438 | 0.65951 | 4204 |
| 4362626 | 23.9340 | -58.9337 | 0.32270 | -0.66583 | 0.67271 | 4205 |
| 4363533 | 24.7281 | -57.7679 | 0.33245 | -0.65216 | 0.68130 | 4206 |
| 4371838 | 23.9165 | -69.2148 | 0.31295 | -0.78792 | 0.53032 | 4207 |
| 4372678 | 25.0708 | -67.5506 | 0.32763 | -0.76821 | 0.55001 | 4208 |
| 4372984 | 25.3885 | -69.6759 | 0.32875 | -0.79367 | 0.51187 | 4209 |
| 4374769 | 26.8844 | -68.3886 | 0.34681 | -0.77850 | 0.52312 | 4210 |

## POSITIONS ON THE DISK

| Ref     | x        | y        | $\delta x$ | $\delta y$ | weights | Ser  |
|---------|----------|----------|------------|------------|---------|------|
| 4376838 | 158.5353 | 78.9280  | -0.0011    | 0.0007     | 2.7 1.6 | 4211 |
| 4377076 | 159.2058 | 85.7372  | -0.0054    | -0.0097    | 2.7 2.2 | 4212 |
| 4377739 | 159.4511 | 79.6795  | -0.0066    | -0.0078    | 2.0 4.1 | 4213 |
| 4378154 | 159.9294 | 85.0574  | -0.0053    | -0.0007    | 3.2 1.6 | 4214 |
| 4378431 | 160.0364 | 82.8531  | 0.0034     | -0.0092    | 3.9 4.6 | 4215 |
| 4379749 | 161.2794 | 79.6939  | 0.0059     | -0.0077    | 5.5 2.2 | 4216 |
| 4381999 | 155.8490 | 69.7713  | 0.0017     | -0.0096    | 3.3 1.7 | 4217 |
| 4382084 | 155.5076 | 77.5682  | -0.0077    | -0.0028    | 3.7 1.2 | 4218 |
| 4382492 | 156.0007 | 74.4577  | -0.0080    | -0.0013    | 3.0 3.0 | 4219 |
| 4387364 | 160.1767 | 75.1330  | -0.0075    | -0.0025    | 2.8 1.9 | 4220 |
| 4388720 | 161.2708 | 72.2802  | -0.0018    | 0.0018     | 3.5 2.3 | 4221 |
| 4389008 | 161.1812 | 77.3168  | -0.0004    | -0.0019    | 3.3 3.5 | 4222 |
| 4389451 | 162.0698 | 74.6469  | -0.0059    | -0.0026    | 2.9 1.6 | 4223 |
| 4389637 | 162.2373 | 72.5422  | -0.0071    | -0.0022    | 5.1 2.8 | 4224 |
| 4389830 | 162.4454 | 71.4790  | -0.0069    | -0.0049    | 3.2 3.0 | 4225 |
| 4391007 | 155.1416 | 69.0836  | -0.0069    | -0.0003    | 3.9 2.2 | 4226 |
| 4392051 | 156.4264 | 69.6073  | 0.0130     | -0.0006    | 3.9 2.1 | 4227 |
| 4393082 | 157.6066 | 69.5838  | -0.0069    | 0.0004     | 3.9 2.2 | 4228 |
| 4399002 | 162.7162 | 69.7229  | -0.0076    | -0.0084    | 2.2 1.7 | 4229 |
| 4399045 | 163.1837 | 69.4806  | -0.0081    | -0.0025    | 3.0 1.2 | 4230 |
| 4400190 | 160.5315 | 145.5559 | -0.0026    | -0.0023    | 3.4 2.1 | 4231 |
| 4403487 | 162.9954 | 142.3449 | -0.0071    | 0.0142     | 4.4 1.8 | 4232 |
| 4422923 | 161.7683 | 121.0781 | -0.0059    | -0.0079    | 2.0 1.3 | 4233 |
| 4432270 | 162.2768 | 118.7603 | -0.0079    | 0.0011     | 4.7 2.4 | 4234 |
| 4432400 | 161.6522 | 117.0049 | -0.0029    | -0.0021    | 6.4 0.8 | 4235 |
| 4432487 | 162.3757 | 116.4097 | 0.0065     | -0.0029    | 3.7 3.5 | 4236 |
| 4433921 | 162.8886 | 112.6716 | 0.0037     | -0.0083    | 3.2 1.5 | 4237 |
| 4434405 | 163.4570 | 116.5737 | -0.0030    | 0.0039     | 3.0 4.2 | 4238 |
| 4441582 | 161.7387 | 107.4527 | -0.0056    | 0.0009     | 2.5 2.0 | 4239 |
| 4444373 | 164.3226 | 109.0374 | 0.0137     | -0.0078    | 4.7 4.0 | 4240 |
| 4446677 | 166.2367 | 106.1418 | -0.0007    | 0.0007     | 2.1 3.4 | 4241 |
| 4447431 | 166.6914 | 108.4336 | -0.0019    | -0.0056    | 4.9 3.3 | 4242 |
| 4447562 | 166.9818 | 107.4002 | -0.0088    | -0.0025    | 2.1 3.9 | 4243 |
| 4449360 | 168.7466 | 109.3313 | 0.0019     | 0.0080     | 4.3 3.7 | 4244 |
| 4449490 | 169.0556 | 108.4943 | -0.0040    | -0.0008    | 3.3 2.2 | 4245 |
| 4450102 | 160.3375 | 102.2659 | -0.0064    | 0.0015     | 2.8 2.6 | 4246 |
| 4460085 | 161.4303 | 94.3606  | -0.0001    | 0.0027     | 5.6 3.3 | 4247 |
| 4460290 | 161.5844 | 93.1376  | 0.0007     | 0.0031     | 3.8 2.6 | 4248 |
| 4461824 | 162.2651 | 87.7112  | -0.0055    | -0.0074    | 2.3 2.7 | 4249 |
| 4463628 | 163.9277 | 89.0893  | -0.0105    | -0.0075    | 3.6 1.8 | 4250 |
| 4476250 | 167.3660 | 84.7246  | -0.0012    | 0.0001     | 3.1 2.3 | 4251 |
| 4476629 | 167.4718 | 80.6420  | 0.0038     | -0.0126    | 3.3 3.1 | 4252 |
| 4476737 | 167.5879 | 79.9978  | -0.0061    | -0.0070    | 2.6 3.0 | 4253 |
| 4477189 | 168.4480 | 84.8611  | -0.0034    | -0.0130    | 2.1 1.2 | 4254 |
| 4478947 | 169.7357 | 78.3817  | -0.0070    | 0.0023     | 3.5 4.2 | 4255 |
| 4481168 | 163.7360 | 76.5469  | -0.0063    | -0.0014    | 4.4 4.1 | 4256 |
| 4482193 | 164.7909 | 76.9439  | -0.0066    | -0.0010    | 2.2 2.3 | 4257 |
| 4482861 | 165.6973 | 71.4936  | 0.0061     | -0.0010    | 2.1 1.7 | 4258 |
| 4484392 | 166.9040 | 75.4949  | -0.0070    | -0.0031    | 2.5 1.8 | 4259 |
| 4485322 | 167.1926 | 75.3966  | -0.0061    | -0.0135    | 2.7 7.6 | 4260 |
| 4486191 | 168.5773 | 77.1823  | -0.0055    | -0.0018    | 2.2 3.3 | 4261 |
| 4487455 | 169.7109 | 74.4919  | -0.0061    | -0.0121    | 1.7 2.9 | 4262 |
| 4488680 | 171.2906 | 73.3761  | -0.0011    | -0.0019    | 2.4 9.9 | 4263 |
| 4505794 | 173.8812 | 140.0574 | -0.0012    | -0.0003    | 4.7 3.0 | 4264 |
| 4514420 | 172.3746 | 134.3983 | -0.0106    | -0.0031    | 1.8 2.0 | 4265 |
| 4514534 | 172.4808 | 133.0904 | -0.0048    | 0.0101     | 3.8 2.2 | 4266 |
| 4532438 | 171.0056 | 116.3892 | -0.0058    | 0.0050     | 6.1 1.2 | 4267 |
| 4534057 | 172.8758 | 119.9470 | -0.0066    | -0.0130    | 2.2 3.0 | 4268 |
| 4536575 | 174.9551 | 115.8704 | 0.0035     | -0.0002    | 2.9 2.4 | 4269 |
| 4541166 | 170.4686 | 110.5568 | 0.0034     | 0.0014     | 4.1 2.9 | 4270 |
| 4541583 | 170.7995 | 107.3999 | -0.0029    | 0.0035     | 3.3 3.7 | 4271 |
| 4544113 | 172.7211 | 110.8171 | 0.0053     | -0.0004    | 2.3 2.2 | 4272 |
| 4547037 | 175.6472 | 111.4160 | -0.0038    | -0.0010    | 5.6 2.8 | 4273 |
| 4547167 | 175.9438 | 110.5459 | -0.0043    | -0.0005    | 2.8 3.6 | 4274 |
| 4547431 | 175.7475 | 108.4593 | -0.0033    | -0.0004    | 2.3 2.2 | 4275 |
| 4548848 | 176.9360 | 104.4979 | -0.0025    | 0.0001     | 2.5 2.2 | 4276 |
| 4549745 | 177.7753 | 105.5651 | -0.0038    | -0.0001    | 2.1 2.1 | 4277 |
| 4549813 | 177.5103 | 104.9277 | -0.0102    | -0.0070    | 2.4 1.6 | 4278 |
| 4550067 | 169.8377 | 102.7601 | 0.0001     | -0.0056    | 2.2 1.9 | 4279 |
| 4555567 | 174.6373 | 98.6176  | -0.0020    | -0.0058    | 3.3 2.3 | 4280 |
| 4556465 | 175.5250 | 99.6198  | -0.0051    | -0.0003    | 8.2 1.6 | 4281 |
| 4557489 | 176.6331 | 99.2484  | -0.0028    | 0.0015     | 2.9 2.1 | 4282 |
| 4557623 | 176.1642 | 98.0958  | -0.0017    | 0.0009     | 5.0 2.6 | 4283 |

## POSITIONS ON THE DISK

12b

| Ref     | x'      | y'       | $\xi$   | $\eta$   | $\zeta$ | Ser  |
|---------|---------|----------|---------|----------|---------|------|
| 4376838 | 28.4306 | -69.1663 | 0.36297 | -0.78808 | 0.49717 | 4211 |
| 4377076 | 29.0645 | -62.3511 | 0.37706 | -0.70694 | 0.59838 | 4212 |
| 4377739 | 29.3427 | -68.4098 | 0.37392 | -0.77918 | 0.50305 | 4213 |
| 4378154 | 29.7921 | -63.0274 | 0.38450 | -0.71508 | 0.58379 | 4214 |
| 4378431 | 29.9110 | -65.2320 | 0.38367 | -0.74133 | 0.55066 | 4215 |
| 4379749 | 31.1716 | -68.3859 | 0.39404 | -0.77925 | 0.48734 | 4216 |
| 4381999 | 25.7928 | -78.3402 | 0.31925 | -0.89895 | 0.29993 | 4217 |
| 4382084 | 25.4091 | -70.5422 | 0.32792 | -0.80406 | 0.49594 | 4218 |
| 4382492 | 25.9192 | -73.6513 | 0.32929 | -0.84162 | 0.42808 | 4219 |
| 4387364 | 30.0931 | -72.9542 | 0.37598 | -0.83408 | 0.40368 | 4220 |
| 4388720 | 31.2031 | -75.8024 | 0.38279 | -0.86919 | 0.31302 | 4221 |
| 4389008 | 31.0862 | -70.7644 | 0.39002 | -0.80783 | 0.44192 | 4222 |
| 4389451 | 31.9896 | -73.4307 | 0.39572 | -0.84036 | 0.37041 | 4223 |
| 4389637 | 32.1686 | -75.5353 | 0.39362 | -0.86621 | 0.30779 | 4224 |
| 4389830 | 32.3825 | -76.5978 | 0.39344 | -0.87947 | 0.26783 | 4225 |
| 4391007 | 25.0888 | -79.0318 | 0.31002 | -0.90736 | 0.28387 | 4226 |
| 4392051 | 26.3713 | -78.5013 | 0.32508 | -0.90113 | 0.28687 | 4227 |
| 4393082 | 27.5521 | -78.5187 | 0.33763 | -0.90172 | 0.27001 | 4228 |
| 4399002 | 32.6629 | -78.3532 | 0.39108 | -0.90184 | 0.18368 | 4229 |
| 4399045 | 33.1319 | -78.5932 | 0.39475 | -0.90526 | 0.15707 | 4230 |
| 4400190 | 30.0672 | -2.5036  | 0.40957 | -0.00956 | 0.91223 | 4231 |
| 4403487 | 32.5494 | -5.7031  | 0.43730 | -0.04669 | 0.89810 | 4232 |
| 4422923 | 31.4368 | -26.9840 | 0.42179 | -0.29291 | 0.85808 | 4233 |
| 4432270 | 31.9581 | -29.3000 | 0.42699 | -0.31988 | 0.84579 | 4234 |
| 4432400 | 31.3427 | -31.0593 | 0.41960 | -0.34027 | 0.84152 | 4235 |
| 4432487 | 32.0697 | -31.6510 | 0.42754 | -0.34723 | 0.83465 | 4236 |
| 4433921 | 32.6031 | -35.3878 | 0.43224 | -0.39081 | 0.81267 | 4237 |
| 4434405 | 33.1506 | -31.4814 | 0.43966 | -0.34538 | 0.82910 | 4238 |
| 4441582 | 31.4809 | -40.6146 | 0.41766 | -0.45165 | 0.78839 | 4239 |
| 4444373 | 34.0573 | -39.0160 | 0.44705 | -0.43330 | 0.78256 | 4240 |
| 4446677 | 35.9878 | -41.9028 | 0.46723 | -0.46729 | 0.75055 | 4241 |
| 4447431 | 36.4303 | -39.6078 | 0.47317 | -0.44053 | 0.76292 | 4242 |
| 4447562 | 36.7264 | -40.6400 | 0.47600 | -0.45264 | 0.75402 | 4243 |
| 4449360 | 38.4814 | -38.6991 | 0.49629 | -0.43021 | 0.75407 | 4244 |
| 4449490 | 38.7951 | -39.5349 | 0.49940 | -0.44002 | 0.74631 | 4245 |
| 4450102 | 30.1073 | -45.8105 | 0.39990 | -0.51226 | 0.76005 | 4246 |
| 4460085 | 31.2432 | -53.7131 | 0.40794 | -0.60519 | 0.68362 | 4247 |
| 4460290 | 31.4040 | -54.9357 | 0.40889 | -0.61961 | 0.66999 | 4248 |
| 4461824 | 32.1143 | -60.3606 | 0.41256 | -0.68382 | 0.60181 | 4249 |
| 4463628 | 33.7701 | -58.9734 | 0.43201 | -0.66767 | 0.60628 | 4250 |
| 4476250 | 37.2334 | -63.3220 | 0.46597 | -0.72001 | 0.51426 | 4251 |
| 4476629 | 37.3613 | -67.4056 | 0.46261 | -0.76892 | 0.44131 | 4252 |
| 4476737 | 37.4809 | -68.0494 | 0.46305 | -0.77670 | 0.42699 | 4253 |
| 4477189 | 38.3151 | -63.1799 | 0.47789 | -0.71856 | 0.50527 | 4254 |
| 4478947 | 39.6383 | -69.6550 | 0.48373 | -0.79678 | 0.36215 | 4255 |
| 4481168 | 33.6462 | -71.5214 | 0.41669 | -0.81761 | 0.39735 | 4256 |
| 4482193 | 34.6994 | -71.1188 | 0.42866 | -0.81302 | 0.39402 | 4257 |
| 4482861 | 35.6356 | -76.5665 | 0.42699 | -0.88058 | 0.20558 | 4258 |
| 4484392 | 36.8211 | -72.5575 | 0.44885 | -0.83121 | 0.32807 | 4259 |
| 4485322 | 37.1104 | -72.6543 | 0.45171 | -0.83250 | 0.32078 | 4260 |
| 4486191 | 38.4859 | -70.8608 | 0.46951 | -0.81106 | 0.34892 | 4261 |
| 4487455 | 39.6345 | -73.5464 | 0.47594 | -0.84461 | 0.24519 | 4262 |
| 4488680 | 41.2209 | -74.6544 | 0.48807 | -0.85970 | 0.15067 | 4263 |
| 4505794 | 43.4518 | -7.9353  | 0.55848 | -0.07376 | 0.82623 | 4264 |
| 4514420 | 41.9752 | -13.6042 | 0.54161 | -0.13909 | 0.82905 | 4265 |
| 4514534 | 42.0886 | -14.9121 | 0.54269 | -0.15424 | 0.82565 | 4266 |
| 4532438 | 40.7031 | -31.6270 | 0.52352 | -0.34807 | 0.77767 | 4267 |
| 4534057 | 42.5548 | -28.0582 | 0.54509 | -0.30682 | 0.78022 | 4268 |
| 4536575 | 44.6570 | -32.1256 | 0.56696 | -0.35451 | 0.74356 | 4269 |
| 4541166 | 40.1975 | -37.4643 | 0.51578 | -0.41606 | 0.74891 | 4270 |
| 4541583 | 40.5456 | -40.6207 | 0.51825 | -0.45299 | 0.72541 | 4271 |
| 4544113 | 42.4494 | -37.1923 | 0.54073 | -0.41324 | 0.73269 | 4272 |
| 4547037 | 45.3734 | -36.5781 | 0.57313 | -0.40658 | 0.71148 | 4273 |
| 4547167 | 45.6749 | -37.4470 | 0.57607 | -0.41679 | 0.70316 | 4274 |
| 4547431 | 45.4898 | -39.5354 | 0.57310 | -0.44117 | 0.69059 | 4275 |
| 4548848 | 46.7002 | -43.4921 | 0.58433 | -0.48777 | 0.64857 | 4276 |
| 4549745 | 47.5340 | -42.4202 | 0.59400 | -0.47537 | 0.64899 | 4277 |
| 4549813 | 47.2724 | -43.0592 | 0.59080 | -0.48281 | 0.64641 | 4278 |
| 4550067 | 39.6085 | -45.2671 | 0.50560 | -0.50725 | 0.69791 | 4279 |
| 4555567 | 44.4324 | -49.3864 | 0.55605 | -0.55656 | 0.61730 | 4280 |
| 4556465 | 45.3150 | -48.3793 | 0.56632 | -0.54489 | 0.61836 | 4281 |
| 4557489 | 46.4255 | -48.7451 | 0.57817 | -0.54945 | 0.60318 | 4282 |
| 4557623 | 45.9627 | -49.9005 | 0.57236 | -0.56295 | 0.59623 | 4283 |

## POSITIONS ON THE DISK

| Ref     | x        | y        | $\delta x$ | $\delta y$ | weights | Ser  |
|---------|----------|----------|------------|------------|---------|------|
| 4560258 | 170.3570 | 92.5503  | -0.0026    | -0.0058    | 0.7 0.7 | 4284 |
| 4562370 | 172.3565 | 92.3381  | -0.0029    | -0.0005    | 0.4 0.4 | 4285 |
| 4564916 | 174.1395 | 86.8099  | -0.0014    | -0.0054    | 7.1 1.9 | 4286 |
| 4565134 | 174.6481 | 93.7125  | -0.0013    | 0.0010     | 4.8 4.6 | 4287 |
| 4565716 | 174.8661 | 88.4813  | 0.0064     | 0.0011     | 4.2 3.7 | 4288 |
| 4570730 | 171.2726 | 80.6576  | -0.0069    | -0.0068    | 3.4 2.7 | 4289 |
| 4571106 | 171.4168 | 85.1015  | -0.0016    | 0.0059     | 3.0 6.3 | 4290 |
| 4571765 | 172.5712 | 80.2628  | -0.0069    | -0.0023    | 3.6 2.1 | 4291 |
| 4571861 | 172.6138 | 79.7155  | 0.0037     | -0.0132    | 3.9 2.7 | 4292 |
| 4573155 | 173.7130 | 85.2657  | -0.0051    | -0.0005    | 1.5 2.6 | 4293 |
| 4573602 | 173.8155 | 81.3938  | -0.0035    | -0.0022    | 2.6 2.6 | 4294 |
| 4573795 | 174.7410 | 80.2939  | -0.0059    | -0.0017    | 4.6 2.0 | 4295 |
| 4575431 | 175.6868 | 83.2111  | -0.0054    | -0.0076    | 2.8 6.2 | 4296 |
| 4575627 | 175.8017 | 80.9931  | -0.0058    | -0.0021    | 4.7 2.9 | 4297 |
| 4577577 | 178.2022 | 81.9215  | -0.0023    | -0.0030    | 4.1 2.5 | 4298 |
| 4578402 | 178.2119 | 83.1292  | 0.0019     | 0.0021     | 3.0 1.9 | 4299 |
| 4578686 | 179.4090 | 81.1768  | -0.0072    | -0.0027    | 4.0 4.9 | 4300 |
| 4578791 | 179.5265 | 80.7658  | 0.0051     | -0.0030    | 1.7 8.3 | 4301 |
| 4579480 | 179.8923 | 83.3207  | -0.0071    | -0.0048    | 4.5 3.2 | 4302 |
| 4600575 | 178.2163 | 141.7262 | -0.0081    | -0.0029    | 4.9 1.3 | 4303 |
| 4602799 | 180.3053 | 139.6831 | 0.0003     | 0.0111     | 3.8 1.2 | 4304 |
| 4610158 | 178.1014 | 136.3123 | -0.0028    | 0.0012     | 3.1 1.0 | 4305 |
| 4611993 | 179.3984 | 129.8354 | -0.0054    | 0.0092     | 2.7 2.3 | 4306 |
| 4621573 | 179.3440 | 124.6658 | 0.0116     | -0.0004    | 2.9 4.2 | 4307 |
| 4621955 | 179.2272 | 121.0169 | 0.0060     | -0.0068    | 3.5 1.4 | 4308 |
| 4624909 | 181.4897 | 120.7463 | -0.0012    | -0.0007    | 3.3 3.3 | 4309 |
| 4626472 | 183.9060 | 125.6617 | 0.0008     | -0.0008    | 2.9 3.4 | 4310 |
| 4628812 | 185.2161 | 122.2075 | -0.0002    | 0.0003     | 1.9 2.9 | 4311 |
| 4629109 | 185.9381 | 127.6252 | -0.0112    | -0.0007    | 0.0 2.1 | 4312 |
| 4633489 | 181.4511 | 116.4280 | 0.0054     | 0.0058     | 5.3 2.2 | 4313 |
| 4634258 | 182.0671 | 118.1716 | -0.0017    | 0.0011     | 8.2 8.7 | 4314 |
| 4639778 | 186.9920 | 114.0439 | -0.0011    | -0.0021    | 2.4 2.7 | 4315 |
| 4640138 | 178.4408 | 110.4675 | -0.0029    | 0.0004     | 2.6 1.5 | 4316 |
| 4640331 | 178.4682 | 109.3641 | -0.0027    | 0.0031     | 2.1 5.6 | 4317 |
| 4641215 | 179.1856 | 109.8783 | -0.0135    | -0.0002    | 2.4 6.3 | 4318 |
| 4641267 | 179.6389 | 109.7138 | -0.0141    | 0.0008     | 2.3 2.8 | 4319 |
| 4641506 | 179.1573 | 107.2394 | -0.0054    | -0.0003    | 3.2 4.0 | 4320 |
| 4645611 | 182.9288 | 106.8241 | -0.0064    | 0.0009     | 2.1 1.3 | 4321 |
| 4646744 | 184.2111 | 105.7963 | -0.0007    | -0.0003    | 2.3 2.6 | 4322 |
| 4646873 | 184.5939 | 105.0634 | -0.0016    | 0.0003     | 4.2 4.4 | 4323 |
| 4648845 | 186.1052 | 104.9045 | -0.0024    | 0.0004     | 3.2 2.7 | 4324 |
| 4649554 | 187.0347 | 107.5735 | -0.0006    | -0.0009    | 2.6 2.2 | 4325 |
| 4649619 | 186.6940 | 106.2318 | -0.0019    | -0.0025    | 3.6 2.6 | 4326 |
| 4650485 | 179.4422 | 99.7573  | 0.0009     | 0.0006     | 2.4 2.0 | 4327 |
| 4651068 | 179.9341 | 102.8899 | -0.0033    | -0.0016    | 4.1 1.7 | 4328 |
| 4653760 | 182.1538 | 97.6142  | -0.0033    | -0.0011    | 3.6 3.9 | 4329 |
| 4654256 | 182.7434 | 101.3387 | -0.0038    | -0.0006    | 5.3 2.8 | 4330 |
| 4654395 | 183.0787 | 100.5667 | -0.0015    | -0.0004    | 2.5 3.1 | 4331 |
| 4654477 | 183.0170 | 99.5864  | -0.0048    | 0.0031     | 2.2 1.7 | 4332 |
| 4654777 | 183.1387 | 97.0175  | -0.0032    | -0.0016    | 2.8 7.1 | 4333 |
| 4654808 | 182.6163 | 96.0524  | 0.0058     | -0.0065    | 2.8 5.0 | 4334 |
| 4655753 | 183.9629 | 97.4177  | -0.0042    | -0.0019    | 4.1 8.1 | 4335 |
| 4659506 | 187.0430 | 98.9229  | -0.0038    | -0.0007    | 7.5 4.0 | 4336 |
| 4660420 | 179.4457 | 91.7037  | 0.0062     | -0.0036    | 3.8 1.9 | 4337 |
| 4661370 | 180.7663 | 92.5479  | -0.0020    | -0.0004    | 2.3 2.1 | 4338 |
| 4661560 | 180.8202 | 90.8457  | -0.0095    | -0.0039    | 3.2 6.8 | 4339 |
| 4663120 | 181.9835 | 94.1769  | 0.0059     | -0.0017    | 7.0 8.3 | 4340 |
| 4666011 | 184.6321 | 95.0033  | -0.0046    | -0.0006    | 2.5 4.6 | 4341 |
| 4666272 | 185.3502 | 93.3012  | -0.0010    | -0.0031    | 4.4 1.4 | 4342 |
| 4669425 | 188.0381 | 91.4431  | -0.0054    | -0.0024    | 3.7 4.2 | 4343 |
| 4671364 | 181.6863 | 83.9235  | 0.0030     | -0.0100    | 4.8 2.8 | 4344 |
| 4671680 | 182.2807 | 81.7968  | 0.0010     | -0.0075    | 2.4 1.7 | 4345 |
| 4676079 | 186.3581 | 86.1567  | -0.0056    | -0.0040    | 3.5 6.7 | 4346 |
| 4702612 | 188.7332 | 141.2082 | 0.0045     | -0.0066    | 4.2 3.2 | 4347 |
| 4703305 | 189.4844 | 143.5930 | 0.0039     | -0.0018    | 2.3 3.1 | 4348 |
| 4703383 | 190.3052 | 143.7704 | 0.0034     | -0.0049    | 2.0 3.9 | 4349 |
| 4709934 | 195.4303 | 138.5974 | 0.0038     | -0.0079    | 2.8 1.1 | 4350 |
| 4716240 | 192.7839 | 136.2944 | 0.0085     | 0.0007     | 3.8 3.1 | 4351 |
| 4721394 | 188.6877 | 126.4149 | -0.0002    | -0.0025    | 2.9 3.7 | 4352 |
| 4722185 | 189.4420 | 128.0064 | 0.0013     | -0.0020    | 3.5 2.6 | 4353 |
| 4723616 | 189.8574 | 123.6449 | 0.0064     | 0.0124     | 3.3 2.9 | 4354 |
| 4724997 | 191.5694 | 121.0466 | 0.0073     | -0.0024    | 4.2 5.6 | 4355 |
| 4731204 | 188.0391 | 118.6621 | -0.0009    | -0.0009    | 3.0 1.2 | 4356 |

| Ref     | x'      | y'       | $\xi$   | $\eta$   | $\zeta$ | Ser  |
|---------|---------|----------|---------|----------|---------|------|
| 4560258 | 40.1832 | -55.4780 | 0.50526 | -0.62753 | 0.59238 | 4284 |
| 4562370 | 42.1847 | -55.6800 | 0.52694 | -0.63035 | 0.57008 | 4285 |
| 4564916 | 43.9982 | -61.2010 | 0.54139 | -0.69641 | 0.47107 | 4286 |
| 4565134 | 44.4697 | -54.2932 | 0.55289 | -0.61447 | 0.56280 | 4287 |
| 4565716 | 44.7161 | -59.5252 | 0.55085 | -0.67663 | 0.48861 | 4288 |
| 4570730 | 41.1635 | -67.3703 | 0.50341 | -0.76961 | 0.39278 | 4289 |
| 4571106 | 41.2837 | -62.9241 | 0.51030 | -0.71625 | 0.47601 | 4290 |
| 4571765 | 42.4647 | -67.7586 | 0.51661 | -0.77476 | 0.36452 | 4291 |
| 4571861 | 42.5103 | -68.3059 | 0.51621 | -0.78142 | 0.35059 | 4292 |
| 4573155 | 43.5799 | -62.7480 | 0.53517 | -0.71479 | 0.45019 | 4293 |
| 4573602 | 43.7034 | -66.6208 | 0.53139 | -0.76142 | 0.37130 | 4294 |
| 4573795 | 44.6352 | -67.7163 | 0.53940 | -0.77508 | 0.32909 | 4295 |
| 4575431 | 45.5656 | -64.7931 | 0.55365 | -0.74001 | 0.38191 | 4296 |
| 4575627 | 45.6926 | -67.0114 | 0.55157 | -0.76694 | 0.32799 | 4297 |
| 4577577 | 48.0890 | -66.0702 | 0.57788 | -0.75654 | 0.30610 | 4298 |
| 4578402 | 48.0921 | -64.8621 | 0.57993 | -0.74184 | 0.33668 | 4299 |
| 4578686 | 49.3003 | -66.8090 | 0.58871 | -0.76623 | 0.25751 | 4300 |
| 4578791 | 49.4200 | -67.2195 | 0.58901 | -0.77137 | 0.24094 | 4301 |
| 4579480 | 49.7722 | -64.6618 | 0.59752 | -0.74018 | 0.30840 | 4302 |
| 4600575 | 47.7796 | -6.2435  | 0.60631 | -0.05487 | 0.79333 | 4303 |
| 4602799 | 49.8805 | -8.2766  | 0.62926 | -0.07870 | 0.77320 | 4304 |
| 4610158 | 47.6939 | -11.6600 | 0.60494 | -0.11746 | 0.78756 | 4305 |
| 4611993 | 49.0265 | -18.1326 | 0.61865 | -0.19264 | 0.76169 | 4306 |
| 4621573 | 49.0000 | -23.3044 | 0.61725 | -0.25265 | 0.74510 | 4307 |
| 4621955 | 48.9029 | -26.9552 | 0.61521 | -0.29507 | 0.73106 | 4308 |
| 4624909 | 51.1678 | -27.2142 | 0.63988 | -0.29853 | 0.70812 | 4309 |
| 4626472 | 53.5584 | -22.2846 | 0.66727 | -0.24169 | 0.70451 | 4310 |
| 4628812 | 54.8877 | -25.7333 | 0.68078 | -0.28208 | 0.67600 | 4311 |
| 4629109 | 55.5807 | -20.3099 | 0.68971 | -0.21919 | 0.69012 | 4312 |
| 4633489 | 51.1525 | -31.5343 | 0.63827 | -0.34885 | 0.68623 | 4313 |
| 4634258 | 51.7593 | -29.7869 | 0.64550 | -0.32861 | 0.68946 | 4314 |
| 4639778 | 56.7085 | -33.8907 | 0.69746 | -0.37767 | 0.60903 | 4315 |
| 4640138 | 48.1733 | -37.5125 | 0.60337 | -0.41805 | 0.67911 | 4316 |
| 4640331 | 48.2066 | -38.6162 | 0.60323 | -0.43096 | 0.67111 | 4317 |
| 4641215 | 48.9215 | -38.0981 | 0.61126 | -0.42505 | 0.66760 | 4318 |
| 4641267 | 49.3759 | -38.2603 | 0.61613 | -0.42704 | 0.66182 | 4319 |
| 4641506 | 48.9075 | -40.7381 | 0.60983 | -0.45595 | 0.64824 | 4320 |
| 4645611 | 52.6827 | -41.1341 | 0.65053 | -0.46148 | 0.60320 | 4321 |
| 4646744 | 53.9711 | -42.1557 | 0.66382 | -0.47381 | 0.57866 | 4322 |
| 4646873 | 54.3580 | -42.8869 | 0.66754 | -0.48251 | 0.56708 | 4323 |
| 4648845 | 55.8707 | -43.0380 | 0.68363 | -0.48471 | 0.54562 | 4324 |
| 4649554 | 56.7862 | -40.3633 | 0.69502 | -0.45354 | 0.55790 | 4325 |
| 4649619 | 56.4526 | -41.7072 | 0.69066 | -0.46923 | 0.55028 | 4326 |
| 4650485 | 49.2330 | -48.2215 | 0.60894 | -0.54395 | 0.57734 | 4327 |
| 4651068 | 49.7081 | -45.0852 | 0.61610 | -0.50715 | 0.60268 | 4328 |
| 4653760 | 51.9572 | -50.3514 | 0.63666 | -0.56983 | 0.51958 | 4329 |
| 4654256 | 52.5269 | -46.6225 | 0.64549 | -0.52597 | 0.55380 | 4330 |
| 4654395 | 52.8665 | -47.3930 | 0.64860 | -0.53515 | 0.54124 | 4331 |
| 4654477 | 52.8101 | -48.3740 | 0.64728 | -0.54671 | 0.53116 | 4332 |
| 4654777 | 52.9457 | -50.9432 | 0.64673 | -0.57713 | 0.49866 | 4333 |
| 4654808 | 52.4284 | -51.9114 | 0.64041 | -0.58844 | 0.49358 | 4334 |
| 4655753 | 53.7681 | -50.5386 | 0.65580 | -0.57260 | 0.49199 | 4335 |
| 4659506 | 56.8413 | -49.0170 | 0.68957 | -0.55560 | 0.46455 | 4336 |
| 4660420 | 49.2801 | -56.2780 | 0.60291 | -0.63931 | 0.47727 | 4337 |
| 4661370 | 50.5966 | -55.4267 | 0.61774 | -0.62960 | 0.47117 | 4338 |
| 4661560 | 50.6597 | -57.1293 | 0.61671 | -0.64989 | 0.44420 | 4339 |
| 4663120 | 51.8055 | -53.7908 | 0.63212 | -0.61054 | 0.47714 | 4340 |
| 4666011 | 54.4506 | -52.9505 | 0.66088 | -0.60144 | 0.44889 | 4341 |
| 4666272 | 55.1782 | -54.6495 | 0.66680 | -0.62196 | 0.41056 | 4342 |
| 4669425 | 57.8772 | -56.4944 | 0.69232 | -0.64528 | 0.32296 | 4343 |
| 4671364 | 51.5636 | -64.0495 | 0.61675 | -0.73362 | 0.28535 | 4344 |
| 4671680 | 52.1697 | -66.1740 | 0.61817 | -0.76022 | 0.19984 | 4345 |
| 4676079 | 56.2252 | -61.7914 | 0.66709 | -0.70876 | 0.22948 | 4346 |
| 4702612 | 58.3034 | -6.7075  | 0.72116 | -0.06221 | 0.68997 | 4347 |
| 4703305 | 59.0420 | -4.3179  | 0.72926 | -0.03477 | 0.68335 | 4348 |
| 4703383 | 59.8622 | -4.1362  | 0.73813 | -0.03286 | 0.67386 | 4349 |
| 4709934 | 65.0172 | -9.2847  | 0.79305 | -0.09369 | 0.60191 | 4350 |
| 4716240 | 62.3823 | -11.6022 | 0.76462 | -0.11982 | 0.63324 | 4351 |
| 4721394 | 58.3379 | -21.5064 | 0.71924 | -0.23373 | 0.65427 | 4352 |
| 4722185 | 59.0839 | -19.9105 | 0.72767 | -0.21536 | 0.65125 | 4353 |
| 4723616 | 59.5230 | -24.2714 | 0.73123 | -0.26618 | 0.62805 | 4354 |
| 4724997 | 61.2498 | -26.8618 | 0.74889 | -0.29683 | 0.59250 | 4355 |
| 4731204 | 57.7310 | -29.2654 | 0.71031 | -0.32392 | 0.62492 | 4356 |

## POSITIONS ON THE DISK

| Ref     | x        | y        | $\delta x$ | $\delta y$ | weights | Ser  |
|---------|----------|----------|------------|------------|---------|------|
| 4731885 | 188.9157 | 113.4374 | 0.0011     | -0.0006    | 4.9 5.6 | 4357 |
| 4732014 | 188.9962 | 120.3691 | -0.0049    | 0.0036     | 5.5 3.5 | 4358 |
| 4738042 | 194.8895 | 120.7026 | -0.0003    | -0.0032    | 2.2 3.5 | 4359 |
| 4740122 | 187.4914 | 111.1443 | -0.0002    | -0.0009    | 7.3 2.6 | 4360 |
| 4740148 | 187.7995 | 110.6114 | -0.0022    | 0.0005     | 3.3 5.4 | 4361 |
| 4741323 | 188.5619 | 109.2934 | -0.0017    | -0.0011    | 3.9 3.3 | 4362 |
| 4746674 | 193.8789 | 106.8077 | -0.0024    | -0.0016    | 2.0 4.2 | 4363 |
| 4750535 | 188.3748 | 99.0367  | 0.0022     | -0.0007    | 3.7 2.2 | 4364 |
| 4750758 | 188.6531 | 97.0645  | 0.0027     | -0.0015    | 2.9 2.2 | 4365 |
| 4751552 | 189.4692 | 99.2727  | -0.0034    | -0.0011    | 5.7 3.1 | 4366 |
| 4753781 | 191.7623 | 97.7866  | -0.0034    | -0.0017    | 2.8 2.9 | 4367 |
| 4757272 | 195.2950 | 101.9414 | -0.0024    | -0.0026    | 3.3 2.3 | 4368 |
| 4761390 | 190.4987 | 92.8076  | -0.0035    | -0.0031    | 2.6 3.0 | 4369 |
| 4806156 | 202.2934 | 145.4421 | 0.0059     | 0.0093     | 2.4 1.5 | 4370 |
| 4806307 | 201.7321 | 143.6361 | 0.0009     | -0.0113    | 3.9 2.9 | 4371 |
| 4806928 | 201.9778 | 138.4117 | 0.0038     | -0.0025    | 3.8 2.5 | 4372 |
| 4809349 | 205.0646 | 143.5310 | 0.0046     | -0.0041    | 3.2 2.9 | 4373 |
| 4809932 | 204.9725 | 139.0120 | 0.0054     | -0.0032    | 4.3 3.8 | 4374 |
| 4811830 | 197.3511 | 131.1702 | 0.0120     | 0.0017     | 2.4 1.6 | 4375 |
| 4819464 | 205.2826 | 134.5052 | 0.0025     | -0.0030    | 2.6 2.8 | 4376 |
| 4824673 | 200.7611 | 124.1839 | 0.0009     | -0.0023    | 3.1 3.0 | 4377 |
| 4827361 | 203.4844 | 127.0185 | 0.0021     | -0.0038    | 2.7 1.3 | 4378 |
| 4828134 | 204.1523 | 128.5084 | 0.0028     | -0.0037    | 3.0 4.5 | 4379 |
| 4828722 | 204.2765 | 123.4809 | 0.0012     | -0.0033    | 3.2 4.2 | 4380 |
| 4835197 | 202.1475 | 119.6266 | 0.0010     | -0.0018    | 3.0 3.1 | 4381 |
| 4837031 | 203.4508 | 121.0092 | 0.0010     | -0.0044    | 2.8 3.3 | 4382 |
| 4838420 | 204.5620 | 117.7426 | -0.0008    | -0.0044    | 5.2 1.5 | 4383 |
| 4843435 | 200.2052 | 108.7077 | -0.0015    | -0.0027    | 2.7 2.1 | 4384 |
| 4844254 | 201.3023 | 110.5150 | 0.0001     | -0.0019    | 3.0 5.8 | 4385 |
| 4845536 | 202.4755 | 107.8851 | -0.0004    | -0.0028    | 2.6 2.9 | 4386 |
| 4906184 | 212.5258 | 146.0084 | 0.0053     | -0.0042    | 2.7 1.3 | 4387 |
| 4907252 | 213.3162 | 145.3790 | -0.0002    | -0.0046    | 3.5 1.8 | 4388 |
| 4907405 | 212.8232 | 143.3793 | 0.0054     | -0.0051    | 2.6 1.8 | 4389 |
| 4910720 | 206.0202 | 132.3253 | 0.0023     | -0.0037    | 5.1 2.2 | 4390 |
| 4911045 | 207.0050 | 137.9386 | 0.0037     | -0.0045    | 3.5 1.7 | 4391 |
| 4912298 | 208.5746 | 135.9699 | 0.0123     | -0.0040    | 3.8 2.8 | 4392 |
| 4914314 | 209.8054 | 135.5266 | 0.0042     | -0.0048    | 2.7 2.4 | 4393 |
| 4915855 | 211.4441 | 131.2518 | 0.0015     | -0.0057    | 2.8 3.3 | 4394 |
| 4922717 | 208.2710 | 123.2712 | 0.0015     | -0.0060    | 4.0 3.8 | 4395 |
| 4923535 | 209.4162 | 125.2149 | 0.0015     | -0.0046    | 2.8 3.3 | 4396 |
| 4930157 | 206.7881 | 119.7748 | 0.0119     | -0.0032    | 3.9 3.6 | 4397 |

| Ref     | $x'$    | $y'$     | $\xi$   | $\eta$   | $\zeta$ | Ser  |
|---------|---------|----------|---------|----------|---------|------|
| 4731885 | 58.6362 | -34.4875 | 0.71785 | -0.38518 | 0.57994 | 4357 |
| 4732014 | 58.6792 | -27.5529 | 0.72112 | -0.30419 | 0.62246 | 4358 |
| 4738042 | 64.5730 | -27.1888 | 0.78407 | -0.30165 | 0.54244 | 4359 |
| 4740122 | 57.2237 | -36.7888 | 0.70162 | -0.41173 | 0.58155 | 4360 |
| 4740148 | 57.5348 | -37.3203 | 0.70468 | -0.41805 | 0.57329 | 4361 |
| 4741323 | 58.3047 | -38.6349 | 0.71220 | -0.43369 | 0.55199 | 4362 |
| 4746674 | 63.6372 | -41.0941 | 0.76680 | -0.46446 | 0.44305 | 4363 |
| 4750535 | 58.1730 | -48.8963 | 0.70364 | -0.55466 | 0.44412 | 4364 |
| 4750758 | 58.4620 | -50.8678 | 0.70483 | -0.57820 | 0.41098 | 4365 |
| 4751552 | 59.2665 | -48.6546 | 0.71527 | -0.55221 | 0.42832 | 4366 |
| 4753781 | 61.5686 | -50.1294 | 0.73753 | -0.57077 | 0.36094 | 4367 |
| 4757272 | 65.0802 | -45.9549 | 0.77745 | -0.52273 | 0.34976 | 4368 |
| 4761390 | 60.3314 | -55.1167 | 0.71884 | -0.63000 | 0.29389 | 4369 |
| 4806156 | 71.8460 | -2.4021  | 0.86547 | -0.01625 | 0.50069 | 4370 |
| 4806307 | 71.2943 | -4.2116  | 0.85966 | -0.03696 | 0.50952 | 4371 |
| 4806928 | 71.5683 | -9.4367  | 0.86205 | -0.09754 | 0.49735 | 4372 |
| 4809349 | 74.6286 | -4.2996  | 0.89414 | -0.03925 | 0.44606 | 4373 |
| 4809932 | 74.5609 | -8.8207  | 0.89301 | -0.09158 | 0.44061 | 4374 |
| 4811830 | 66.9790 | -16.7047 | 0.81265 | -0.18032 | 0.55416 | 4375 |
| 4819464 | 74.8955 | -13.3276 | 0.89562 | -0.14404 | 0.42086 | 4376 |
| 4824673 | 70.4281 | -23.6760 | 0.84664 | -0.26273 | 0.46279 | 4377 |
| 4827361 | 73.1371 | -20.8263 | 0.87552 | -0.23061 | 0.42460 | 4378 |
| 4828134 | 73.7972 | -19.3324 | 0.88276 | -0.21347 | 0.41852 | 4379 |
| 4828722 | 73.9487 | -24.3611 | 0.88229 | -0.27231 | 0.38393 | 4380 |
| 4835197 | 71.8397 | -28.2278 | 0.85907 | -0.31662 | 0.40220 | 4381 |
| 4837031 | 73.1360 | -26.8380 | 0.87290 | -0.30094 | 0.38404 | 4382 |
| 4838420 | 74.2653 | -30.1000 | 0.88222 | -0.33989 | 0.32582 | 4383 |
| 4843435 | 69.9557 | -39.1607 | 0.83262 | -0.44457 | 0.33029 | 4384 |
| 4844254 | 71.0434 | -37.3471 | 0.84496 | -0.42369 | 0.32639 | 4385 |
| 4845536 | 72.2313 | -39.9719 | 0.85388 | -0.45570 | 0.25144 | 4386 |
| 4906184 | 82.0793 | -1.7828  | 0.96787 | -0.01410 | 0.25107 | 4387 |
| 4907252 | 82.8735 | -2.4083  | 0.97511 | -0.02195 | 0.22061 | 4388 |
| 4907405 | 82.3911 | -4.4113  | 0.97056 | -0.04477 | 0.23667 | 4389 |
| 4910720 | 75.6452 | -15.5045 | 0.90266 | -0.16972 | 0.39547 | 4390 |
| 4911045 | 76.6000 | -9.8840  | 0.91355 | -0.10483 | 0.39299 | 4391 |
| 4912298 | 78.1809 | -11.8454 | 0.92891 | -0.12843 | 0.34732 | 4392 |
| 4914314 | 79.4146 | -12.2825 | 0.94087 | -0.13423 | 0.31105 | 4393 |
| 4915855 | 81.0770 | -16.5504 | 0.95502 | -0.18523 | 0.23156 | 4394 |
| 4922717 | 77.9459 | -24.5503 | 0.92141 | -0.27686 | 0.27267 | 4395 |
| 4923535 | 79.0810 | -22.6000 | 0.93330 | -0.25473 | 0.25312 | 4396 |
| 4930157 | 76.4813 | -28.0556 | 0.90513 | -0.31717 | 0.28311 | 4397 |

## LIMB PROFILE POSITIONS

| x        | y       | $\delta r$ | P        | x'       | y'       | Ser  |
|----------|---------|------------|----------|----------|----------|------|
| 130.0642 | 61.7966 | 0.0815     | 180.0932 | 0.0410   | -86.4508 | 4398 |
| 129.4562 | 61.7787 | 0.1038     | 179.6897 | -0.5671  | -86.4719 | 4399 |
| 128.4202 | 61.9227 | -0.0231    | 179.0001 | -1.6043  | -86.3331 | 4400 |
| 128.1472 | 61.8907 | 0.0155     | 178.8193 | -1.8772  | -86.3665 | 4401 |
| 127.5563 | 61.8868 | 0.0367     | 178.4270 | -2.4684  | -86.3735 | 4402 |
| 127.3075 | 61.9497 | -0.0177    | 178.2604 | -2.7176  | -86.3119 | 4403 |
| 127.0335 | 61.9827 | -0.0406    | 178.0775 | -2.9919  | -86.2802 | 4404 |
| 126.8605 | 62.0167 | -0.0677    | 177.9617 | -3.1651  | -86.2471 | 4405 |
| 126.6735 | 62.0237 | -0.0669    | 177.8373 | -3.3522  | -86.2411 | 4406 |
| 126.3045 | 62.0717 | -0.0982    | 177.5906 | -3.7216  | -86.1949 | 4407 |
| 126.1435 | 62.0598 | -0.0785    | 177.4841 | -3.8826  | -86.2078 | 4408 |
| 125.9005 | 62.0968 | -0.1032    | 177.3214 | -4.1259  | -86.1720 | 4409 |
| 125.5165 | 62.1578 | -0.1434    | 177.0640 | -4.5104  | -86.1129 | 4410 |
| 125.2535 | 62.1408 | -0.1112    | 176.8900 | -4.7734  | -86.1313 | 4411 |
| 124.9655 | 62.1598 | -0.1126    | 176.6979 | -5.0616  | -86.1137 | 4412 |
| 124.6926 | 62.1158 | -0.0511    | 176.5186 | -5.3345  | -86.1591 | 4413 |
| 124.4836 | 62.1199 | -0.0411    | 176.3798 | -5.5436  | -86.1562 | 4414 |
| 124.1846 | 62.0639 | 0.0357     | 176.1842 | -5.8424  | -86.2137 | 4415 |
| 123.8456 | 62.0799 | 0.0447     | 175.9589 | -6.1816  | -86.1995 | 4416 |
| 123.4736 | 62.1329 | 0.0208     | 175.7098 | -6.5540  | -86.1483 | 4417 |
| 123.1346 | 62.2889 | -0.1070    | 175.4767 | -6.8940  | -85.9940 | 4418 |
| 122.8086 | 62.2600 | -0.0501    | 175.2623 | -7.2200  | -86.0247 | 4419 |
| 122.3968 | 62.3509 | -0.1036    | 174.9841 | -7.6323  | -85.9358 | 4420 |
| 121.9698 | 62.4049 | -0.1168    | 174.6979 | -8.0598  | -85.8840 | 4421 |
| 121.6108 | 62.3829 | -0.0591    | 174.4618 | -8.4188  | -85.9078 | 4422 |
| 121.2088 | 62.2870 | 0.0782     | 174.2028 | -8.8205  | -86.0059 | 4423 |
| 120.8738 | 62.2460 | 0.1551     | 173.9847 | -9.1554  | -86.0486 | 4424 |
| 120.5738 | 62.3340 | 0.1011     | 173.7804 | -9.4560  | -85.9621 | 4425 |
| 120.2829 | 62.4900 | -0.0203    | 173.5764 | -9.7479  | -85.8076 | 4426 |
| 120.0927 | 62.5472 | -0.0547    | 173.4464 | -9.9385  | -85.7513 | 4427 |
| 119.8167 | 62.5922 | -0.0660    | 173.2606 | -10.2148 | -85.7077 | 4428 |
| 119.4317 | 62.6103 | -0.0359    | 173.0051 | -10.6001 | -85.6917 | 4429 |
| 119.3217 | 62.6323 | -0.0437    | 172.9307 | -10.7103 | -85.6702 | 4430 |
| 118.8937 | 62.7303 | -0.0850    | 172.6400 | -11.1389 | -85.5744 | 4431 |
| 118.5017 | 62.7843 | -0.0854    | 172.3768 | -11.5314 | -85.5223 | 4432 |
| 118.2607 | 62.8743 | -0.1410    | 172.2097 | -11.7730 | -85.4335 | 4433 |
| 117.7607 | 62.9044 | -0.0989    | 171.8775 | -12.2733 | -85.4061 | 4434 |
| 117.2417 | 62.9864 | -0.1025    | 171.5280 | -12.7930 | -85.3267 | 4435 |
| 117.0837 | 63.0024 | -0.0941    | 171.4225 | -12.9511 | -85.3115 | 4436 |
| 116.8907 | 63.0354 | -0.0967    | 171.2922 | -13.1444 | -85.2795 | 4437 |
| 116.6827 | 63.0624 | -0.0905    | 171.1528 | -13.3526 | -85.2535 | 4438 |
| 116.1667 | 63.1554 | -0.0988    | 170.8040 | -13.8693 | -85.1631 | 4439 |
| 115.7237 | 63.2234 | -0.0917    | 170.5059 | -14.3128 | -85.0974 | 4440 |
| 115.0907 | 63.2785 | -0.0359    | 170.0850 | -14.9463 | -85.0456 | 4441 |
| 114.3497 | 63.4235 | -0.0440    | 169.5831 | -15.6884 | -84.9043 | 4442 |
| 114.1337 | 63.4845 | -0.0635    | 169.4344 | -15.9048 | -84.8444 | 4443 |
| 113.6367 | 63.5435 | -0.0264    | 169.1026 | -16.4023 | -84.7879 | 4444 |
| 113.2557 | 63.6456 | -0.0516    | 168.8409 | -16.7840 | -84.6878 | 4445 |
| 112.7687 | 63.7496 | -0.0554    | 168.5098 | -17.2718 | -84.5863 | 4446 |
| 112.2507 | 63.8806 | -0.0762    | 168.1547 | -17.7907 | -84.4579 | 4447 |
| 111.8027 | 63.9376 | -0.0365    | 167.8556 | -18.2392 | -84.4031 | 4448 |
| 111.0687 | 64.0907 | -0.0246    | 167.3572 | -18.9743 | -84.2538 | 4449 |
| 110.9537 | 64.1267 | -0.0338    | 167.2774 | -19.0895 | -84.2184 | 4450 |
| 110.5277 | 64.2247 | -0.0323    | 166.9868 | -19.5162 | -84.1225 | 4451 |
| 110.0718 | 64.2737 | 0.0262     | 166.6845 | -19.9726 | -84.0759 | 4452 |
| 109.7938 | 64.3087 | 0.0581     | 166.4996 | -20.2509 | -84.0423 | 4453 |
| 109.5008 | 64.3178 | 0.1197     | 166.3094 | -20.5441 | -84.0348 | 4454 |
| 109.3348 | 64.3808 | 0.0989     | 166.1924 | -20.7105 | -83.9726 | 4455 |
| 109.0748 | 64.5248 | 0.0230     | 166.0015 | -20.9714 | -83.8299 | 4456 |
| 108.7398 | 64.6138 | 0.0201     | 165.7713 | -21.3070 | -83.7425 | 4457 |
| 108.5078 | 64.6318 | 0.0612     | 165.6191 | -21.5392 | -83.7257 | 4458 |
| 108.2818 | 64.6598 | 0.0917     | 165.4693 | -21.7654 | -83.6989 | 4459 |
| 107.9338 | 64.7778 | 0.0674     | 165.2259 | -22.1142 | -83.5826 | 4460 |
| 107.5928 | 64.8948 | 0.0438     | 164.9869 | -22.4560 | -83.4673 | 4461 |
| 107.4580 | 64.9930 | -0.0152    | 164.8833 | -22.5913 | -83.3697 | 4462 |
| 107.2420 | 65.0731 | -0.0346    | 164.7307 | -22.8078 | -83.2908 | 4463 |
| 106.8850 | 65.1441 | -0.0064    | 164.4895 | -23.1653 | -83.2216 | 4464 |
| 106.5050 | 65.3231 | -0.0742    | 164.2139 | -23.5464 | -83.0445 | 4465 |
| 105.9180 | 65.4591 | -0.0402    | 163.8139 | -24.1344 | -82.9114 | 4466 |
| 105.1300 | 65.7382 | -0.0801    | 163.2587 | -24.9242 | -82.6364 | 4467 |
| 104.3101 | 65.9272 | -0.0165    | 162.7007 | -25.7455 | -82.4515 | 4468 |
| 103.8520 | 66.0612 | -0.0045    | 162.3837 | -26.2045 | -82.3198 | 4469 |
| 103.3661 | 66.1432 | 0.0684     | 162.0599 | -26.6911 | -82.2402 | 4470 |

## LIMB PROFILE POSITIONS

2

| x        | y       | $\delta r$ | P        | x'       | y'       | Ser  |
|----------|---------|------------|----------|----------|----------|------|
| 102.8441 | 66.3613 | 0.0265     | 161.6852 | -27.2145 | -82.0248 | 4471 |
| 102.2601 | 66.5174 | 0.0670     | 161.2846 | -27.7995 | -81.8716 | 4472 |
| 101.7511 | 66.7084 | 0.0539     | 160.9237 | -28.3097 | -81.6832 | 4473 |
| 101.2491 | 66.9134 | 0.0287     | 160.5639 | -28.8130 | -81.4807 | 4474 |
| 100.3401 | 67.2985 | -0.0212    | 159.9088 | -29.7245 | -81.1002 | 4475 |
| 99.6589  | 67.5393 | -0.0065    | 159.4287 | -30.4072 | -80.8628 | 4476 |
| 99.3979  | 67.5773 | 0.0514     | 159.2577 | -30.6685 | -80.8261 | 4477 |
| 99.0179  | 67.7303 | 0.0460     | 158.9857 | -31.0495 | -80.6750 | 4478 |
| 98.7529  | 67.7753 | 0.1008     | 158.8110 | -31.3148 | -80.6314 | 4479 |
| 98.2749  | 67.9753 | 0.0913     | 158.4671 | -31.7941 | -80.4338 | 4480 |
| 98.0799  | 68.0323 | 0.1111     | 158.3329 | -31.9895 | -80.3778 | 4481 |
| 97.3188  | 68.3430 | 0.1116     | 157.7873 | -32.7525 | -80.0709 | 4482 |
| 96.4619  | 68.6989 | 0.1158     | 157.1715 | -33.6118 | -79.7192 | 4483 |
| 95.7599  | 68.9779 | 0.1383     | 156.6704 | -34.3156 | -79.4437 | 4484 |
| 95.3029  | 69.2329 | 0.0894     | 156.3246 | -34.7741 | -79.1910 | 4485 |
| 94.6039  | 69.5189 | 0.1154     | 155.8237 | -35.4749 | -78.9086 | 4486 |
| 93.8289  | 69.8658 | 0.1249     | 155.2602 | -36.2521 | -78.5654 | 4487 |
| 92.9909  | 70.2478 | 0.1384     | 154.6492 | -37.0925 | -78.1877 | 4488 |
| 92.2064  | 70.6799 | 0.0931     | 154.0556 | -37.8796 | -77.7595 | 4489 |
| 91.9154  | 70.8509 | 0.0690     | 153.8321 | -38.1716 | -77.5899 | 4490 |
| 91.5354  | 71.0399 | 0.0703     | 153.5503 | -38.5528 | -77.4028 | 4491 |
| 91.3414  | 71.1458 | 0.0632     | 153.4036 | -38.7475 | -77.2978 | 4492 |
| 91.1214  | 71.2288 | 0.0890     | 153.2484 | -38.9680 | -77.2159 | 4493 |
| 90.9744  | 71.3168 | 0.0777     | 153.1349 | -39.1155 | -77.1286 | 4494 |
| 90.7724  | 71.4298 | 0.0697     | 152.9813 | -39.3182 | -77.0166 | 4495 |
| 90.5844  | 71.5338 | 0.0638     | 152.8387 | -39.5069 | -76.9136 | 4496 |
| 90.4214  | 71.6048 | 0.0762     | 152.7209 | -39.6703 | -76.8434 | 4497 |
| 90.0604  | 71.7668 | 0.1006     | 152.4588 | -40.0323 | -76.6832 | 4498 |
| 89.7354  | 72.0128 | 0.0358     | 152.1915 | -40.3588 | -76.4388 | 4499 |
| 89.4854  | 72.1468 | 0.0359     | 152.0031 | -40.6096 | -76.3061 | 4500 |
| 89.2494  | 72.2738 | 0.0363     | 151.8251 | -40.8464 | -76.1802 | 4501 |
| 88.8084  | 72.4518 | 0.0914     | 151.5115 | -41.2885 | -76.0045 | 4502 |
| 88.5752  | 72.6185 | 0.0581     | 151.3224 | -41.5227 | -75.8389 | 4503 |
| 88.2383  | 72.8205 | 0.0455     | 151.0616 | -41.8609 | -75.6386 | 4504 |
| 87.7053  | 73.1185 | 0.0480     | 150.6560 | -42.3957 | -75.3432 | 4505 |
| 87.4889  | 73.2057 | 0.0796     | 150.5025 | -42.6127 | -75.2571 | 4506 |
| 86.9149  | 73.5187 | 0.0956     | 150.0686 | -43.1886 | -74.9469 | 4507 |
| 86.7269  | 73.5967 | 0.1232     | 149.9348 | -43.3771 | -74.8699 | 4508 |
| 86.2349  | 73.8807 | 0.1287     | 149.5578 | -43.8708 | -74.5883 | 4509 |
| 86.0409  | 73.9997 | 0.1259     | 149.4068 | -44.0655 | -74.4703 | 4510 |
| 85.6829  | 74.2217 | 0.1202     | 149.1273 | -44.4249 | -74.2500 | 4511 |
| 85.4329  | 74.4157 | 0.0842     | 148.9186 | -44.6760 | -74.0572 | 4512 |
| 85.0779  | 74.6177 | 0.0976     | 148.6476 | -45.0322 | -73.8570 | 4513 |
| 84.9099  | 74.7007 | 0.1153     | 148.5238 | -45.2007 | -73.7748 | 4514 |
| 84.6949  | 74.8877 | 0.0700     | 148.3371 | -45.4168 | -73.5889 | 4515 |
| 84.4239  | 75.1577 | -0.0149    | 148.0892 | -45.6894 | -73.3202 | 4516 |
| 84.1039  | 75.3777 | -0.0296    | 147.8313 | -46.0107 | -73.1017 | 4517 |
| 83.9109  | 75.5377 | -0.0606    | 147.6659 | -46.2047 | -72.9427 | 4518 |
| 83.5259  | 75.7427 | -0.0245    | 147.3769 | -46.5909 | -72.7396 | 4519 |
| 83.3509  | 75.8607 | -0.0282    | 147.2366 | -46.7666 | -72.6224 | 4520 |
| 83.1919  | 75.9397 | -0.0075    | 147.1194 | -46.9261 | -72.5442 | 4521 |
| 82.9209  | 76.1717 | -0.0526    | 146.8841 | -47.1985 | -72.3135 | 4522 |
| 82.5929  | 76.3507 | -0.0206    | 146.6366 | -47.5276 | -72.1362 | 4523 |
| 82.3794  | 76.5619 | -0.0775    | 146.4406 | -47.7423 | -71.9260 | 4524 |
| 81.7464  | 76.9909 | -0.0777    | 145.9319 | -48.3779 | -71.5001 | 4525 |
| 81.4524  | 77.2249 | -0.1040    | 145.6826 | -48.6733 | -71.2675 | 4526 |
| 80.6502  | 77.7749 | -0.0955    | 145.0355 | -49.4788 | -70.7214 | 4527 |
| 80.0322  | 78.1479 | -0.0402    | 144.5568 | -50.0990 | -70.3515 | 4528 |
| 79.3941  | 78.5929 | -0.0251    | 144.0398 | -50.7397 | -69.9096 | 4529 |
| 79.0901  | 78.7779 | 0.0062     | 143.8042 | -51.0448 | -69.7261 | 4530 |
| 78.5191  | 79.1619 | 0.0399     | 143.3476 | -51.6181 | -69.3449 | 4531 |
| 78.1641  | 79.4099 | 0.0562     | 143.0601 | -51.9746 | -69.0987 | 4532 |
| 77.8111  | 79.7899 | -0.0311    | 142.7204 | -52.3298 | -68.7203 | 4533 |
| 77.3751  | 80.1252 | -0.0292    | 142.3548 | -52.7678 | -68.3872 | 4534 |
| 76.7981  | 80.6552 | -0.0888    | 141.8353 | -53.3479 | -67.8600 | 4535 |
| 76.3561  | 81.0092 | -0.0892    | 141.4586 | -53.7920 | -67.5081 | 4536 |
| 76.0771  | 81.1652 | -0.0351    | 141.2490 | -54.0719 | -67.3535 | 4537 |
| 75.4511  | 81.6412 | -0.0067    | 140.7266 | -54.7008 | -66.8805 | 4538 |
| 75.1551  | 81.8842 | -0.0046    | 140.4721 | -54.9982 | -66.6390 | 4539 |
| 74.6581  | 82.3082 | -0.0094    | 140.0379 | -55.4977 | -66.2174 | 4540 |
| 74.3900  | 82.6090 | -0.0647    | 139.7726 | -55.7675 | -65.9179 | 4541 |
| 73.7020  | 83.1979 | -0.0605    | 139.1703 | -56.4590 | -65.3322 | 4542 |
| 73.4870  | 83.3289 | -0.0174    | 139.0054 | -56.6748 | -65.2023 | 4543 |

## LIMB PROFILE POSITIONS

| x       | y        | $\delta r$ | P        | x'       | y'       | Ser  |
|---------|----------|------------|----------|----------|----------|------|
| 73.3149 | 83.5839  | -0.0950    | 138.8074 | -56.8483 | -64.9481 | 4544 |
| 72.9009 | 83.9259  | -0.0751    | 138.4505 | -57.2643 | -64.6081 | 4545 |
| 72.0513 | 84.6561  | -0.0449    | 137.7057 | -58.1182 | -63.8820 | 4546 |
| 71.1023 | 85.4971  | -0.0123    | 136.8630 | -59.0722 | -63.0456 | 4547 |
| 70.7302 | 85.8571  | -0.0163    | 136.5190 | -59.4463 | -62.6874 | 4548 |
| 70.4612 | 86.1221  | -0.0207    | 136.2680 | -59.7168 | -62.4237 | 4549 |
| 69.9872 | 86.5101  | 0.0321     | 135.8624 | -60.1931 | -62.0380 | 4550 |
| 69.6232 | 86.8571  | 0.0407     | 135.5284 | -60.5591 | -61.6928 | 4551 |
| 69.4872 | 87.0281  | 0.0153     | 135.3843 | -60.6961 | -61.5224 | 4552 |
| 69.2772 | 87.2391  | 0.0147     | 135.1865 | -60.9074 | -61.3124 | 4553 |
| 69.0632 | 87.4641  | 0.0082     | 134.9802 | -61.1227 | -61.0885 | 4554 |
| 68.6531 | 87.8729  | 0.0143     | 134.5954 | -61.5352 | -60.6816 | 4555 |
| 68.3571 | 88.1919  | 0.0045     | 134.3063 | -61.8330 | -60.3640 | 4556 |
| 68.1681 | 88.4099  | -0.0105    | 134.1148 | -62.0233 | -60.1469 | 4557 |
| 67.8030 | 88.8109  | -0.0230    | 133.7545 | -62.3906 | -59.7477 | 4558 |
| 67.4760 | 89.1680  | -0.0298    | 133.4326 | -62.7197 | -59.3921 | 4559 |
| 67.3650 | 89.2790  | -0.0245    | 133.3283 | -62.8314 | -59.2816 | 4560 |
| 67.1560 | 89.4570  | 0.0073     | 133.1471 | -63.0414 | -59.1047 | 4561 |
| 66.7559 | 89.9040  | -0.0013    | 132.7485 | -63.4440 | -58.6596 | 4562 |
| 66.4889 | 90.1990  | -0.0024    | 132.4841 | -63.7127 | -58.3658 | 4563 |
| 66.2879 | 90.3160  | 0.0683     | 132.3369 | -63.9144 | -58.2498 | 4564 |
| 66.0919 | 90.5070  | 0.0864     | 132.1556 | -64.1116 | -58.0598 | 4565 |
| 65.8579 | 90.7480  | 0.1006     | 131.9328 | -64.3470 | -57.8199 | 4566 |
| 65.5939 | 91.0609  | 0.0910     | 131.6611 | -64.6128 | -57.5082 | 4567 |
| 65.3639 | 91.2849  | 0.1162     | 131.4486 | -64.8441 | -57.2853 | 4568 |
| 65.0969 | 91.5909  | 0.1169     | 131.1791 | -65.1128 | -56.9805 | 4569 |
| 64.8079 | 91.9439  | 0.1056     | 130.8764 | -65.4039 | -56.6289 | 4570 |
| 64.4489 | 92.3129  | 0.1399     | 130.5355 | -65.7650 | -56.2616 | 4571 |
| 64.2396 | 92.6140  | 0.1059     | 130.2933 | -65.9760 | -55.9616 | 4572 |
| 64.0856 | 92.7660  | 0.1265     | 130.1504 | -66.1308 | -55.8103 | 4573 |
| 64.0116 | 92.8889  | 0.1046     | 130.0562 | -66.2055 | -55.6876 | 4574 |
| 63.7556 | 93.1649  | 0.1258     | 129.8068 | -66.4631 | -55.4129 | 4575 |
| 63.6306 | 93.3219  | 0.1226     | 129.6736 | -66.5890 | -55.2565 | 4576 |
| 63.4476 | 93.5109  | 0.1446     | 129.4997 | -66.7732 | -55.0684 | 4577 |
| 63.2056 | 93.8479  | 0.1202     | 129.2249 | -67.0171 | -54.7325 | 4578 |
| 63.0446 | 93.9869  | 0.1584     | 129.0860 | -67.1789 | -54.5943 | 4579 |
| 62.8636 | 94.2289  | 0.1485     | 128.8857 | -67.3613 | -54.3531 | 4580 |
| 62.6746 | 94.4649  | 0.1496     | 128.6851 | -67.5517 | -54.1180 | 4581 |
| 62.6036 | 94.5649  | 0.1433     | 128.6038 | -67.6232 | -54.0184 | 4582 |
| 62.4798 | 94.7010  | 0.1562     | 128.4821 | -67.7478 | -53.8829 | 4583 |
| 62.4058 | 94.8500  | 0.1225     | 128.3740 | -67.8226 | -53.7342 | 4584 |
| 62.1658 | 95.1230  | 0.1439     | 128.1332 | -68.0642 | -53.4623 | 4585 |
| 61.8248 | 95.7450  | 0.0346     | 127.6680 | -68.4087 | -52.8419 | 4586 |
| 61.6268 | 96.0069  | 0.0336     | 127.4498 | -68.6082 | -52.5808 | 4587 |
| 61.2767 | 96.6289  | -0.0601    | 126.9796 | -68.9617 | -51.9604 | 4588 |
| 60.9829 | 96.9433  | -0.0111    | 126.6954 | -69.2574 | -51.6475 | 4589 |
| 60.7409 | 97.2973  | -0.0253    | 126.4105 | -69.5014 | -51.2946 | 4590 |
| 60.6969 | 97.3553  | -0.0239    | 126.3621 | -69.5457 | -51.2368 | 4591 |
| 60.6039 | 97.4383  | 0.0025     | 126.2812 | -69.6392 | -51.1542 | 4592 |
| 60.4527 | 97.6646  | -0.0076    | 126.1004 | -69.7917 | -50.9286 | 4593 |
| 60.2137 | 97.9686  | 0.0093     | 125.8437 | -70.0324 | -50.6257 | 4594 |
| 60.0238 | 98.2916  | -0.0231    | 125.5956 | -70.2242 | -50.3036 | 4595 |
| 59.6278 | 98.7136  | 0.0583     | 125.2149 | -70.6226 | -49.8835 | 4596 |
| 59.3058 | 99.2486  | 0.0184     | 124.8010 | -70.9476 | -49.3500 | 4597 |
| 58.8428 | 99.8796  | 0.0462     | 124.2814 | -71.4142 | -48.7211 | 4598 |
| 58.5648 | 100.3906 | -0.0069    | 123.8965 | -71.6951 | -48.2114 | 4599 |
| 58.0078 | 101.1305 | 0.0527     | 123.2825 | -72.2563 | -47.4740 | 4600 |
| 57.8448 | 101.4295 | 0.0273     | 123.0569 | -72.4210 | -47.1757 | 4601 |
| 57.5048 | 102.0025 | 0.0058     | 122.6144 | -72.7642 | -46.6043 | 4602 |
| 57.3155 | 102.2766 | 0.0200     | 122.3933 | -72.9551 | -46.3310 | 4603 |
| 57.1164 | 102.7282 | -0.0498    | 122.0686 | -73.1567 | -45.8804 | 4604 |
| 56.9044 | 103.1422 | -0.0862    | 121.7602 | -73.3710 | -45.4673 | 4605 |
| 56.6314 | 103.6482 | -0.1155    | 121.3782 | -73.6468 | -44.9625 | 4606 |
| 56.1384 | 104.4501 | -0.1020    | 120.7519 | -74.1444 | -44.1628 | 4607 |
| 55.6985 | 105.2211 | -0.1088    | 120.1613 | -74.5887 | -43.3938 | 4608 |
| 55.2635 | 105.9841 | -0.1069    | 119.5769 | -75.0279 | -42.6328 | 4609 |
| 54.7945 | 106.8071 | -0.0950    | 118.9467 | -75.5016 | -41.8119 | 4610 |
| 54.4315 | 107.4401 | -0.0767    | 118.4615 | -75.8681 | -41.1806 | 4611 |
| 54.2974 | 107.5936 | -0.0306    | 118.3295 | -76.0031 | -41.0277 | 4612 |
| 54.1044 | 107.9726 | -0.0373    | 118.0467 | -76.1982 | -40.6495 | 4613 |
| 53.7265 | 108.6956 | -0.0354    | 117.5044 | -76.5802 | -39.9282 | 4614 |
| 53.4095 | 109.1916 | 0.0219     | 117.1150 | -76.9000 | -39.4337 | 4615 |
| 53.3315 | 109.3556 | 0.0177     | 116.9944 | -76.9789 | -39.2700 | 4616 |

## LIMB PROFILE POSITIONS

4

| x       | y        | $\delta r$ | P        | $x'$     | $y'$     | Ser  |
|---------|----------|------------|----------|----------|----------|------|
| 53.1125 | 109.7486 | 0.0380     | 116.6958 | -77.2001 | -38.8780 | 4617 |
| 52.9325 | 110.3556 | -0.0683    | 116.2810 | -77.3835 | -38.2717 | 4618 |
| 52.6345 | 110.8426 | -0.0118    | 115.9033 | -77.6842 | -37.7861 | 4619 |
| 52.5185 | 111.1776 | -0.0512    | 115.6691 | -77.8021 | -37.4516 | 4620 |
| 52.4003 | 111.4127 | -0.0446    | 115.4942 | -77.9217 | -37.2170 | 4621 |
| 52.3593 | 111.5677 | -0.0734    | 115.3893 | -77.9635 | -37.0622 | 4622 |
| 52.0893 | 112.2447 | -0.1128    | 114.9051 | -78.2372 | -36.3863 | 4623 |
| 52.0313 | 112.3527 | -0.1049    | 114.8237 | -78.2958 | -36.2786 | 4624 |
| 51.9631 | 112.5086 | -0.1074    | 114.7105 | -78.3649 | -36.1230 | 4625 |
| 51.8641 | 112.6626 | -0.0806    | 114.5901 | -78.4648 | -35.9694 | 4626 |
| 51.7881 | 112.8915 | -0.1052    | 114.4304 | -78.5420 | -35.7407 | 4627 |
| 51.5671 | 113.2415 | -0.0456    | 114.1580 | -78.7650 | -35.3918 | 4628 |
| 51.5221 | 113.3595 | -0.0520    | 114.0741 | -78.8107 | -35.2739 | 4629 |
| 51.4441 | 113.4885 | -0.0325    | 113.9747 | -78.8894 | -35.1453 | 4630 |
| 51.4101 | 113.5935 | -0.0435    | 113.9017 | -78.9240 | -35.0405 | 4631 |
| 51.2381 | 113.9045 | -0.0096    | 113.6665 | -79.0977 | -34.7302 | 4632 |
| 51.1092 | 114.3905 | -0.0825    | 113.3358 | -79.2294 | -34.2447 | 4633 |
| 50.8422 | 114.9395 | -0.0493    | 112.9304 | -79.4994 | -33.6969 | 4634 |
| 50.8222 | 115.0935 | -0.0900    | 112.8307 | -79.5202 | -33.5429 | 4635 |
| 50.7092 | 115.3995 | -0.1022    | 112.6139 | -79.6349 | -33.2374 | 4636 |
| 50.6202 | 115.5185 | -0.0649    | 112.5182 | -79.7246 | -33.1188 | 4637 |
| 50.4912 | 115.6565 | 0.0025     | 112.4009 | -79.8544 | -32.9815 | 4638 |
| 50.5022 | 115.8045 | -0.0632    | 112.3124 | -79.8442 | -32.8334 | 4639 |
| 50.4692 | 116.0245 | -0.1148    | 112.1685 | -79.8784 | -32.6134 | 4640 |
| 50.3532 | 116.2115 | -0.0765    | 112.0243 | -79.9954 | -32.4270 | 4641 |
| 50.2272 | 116.4765 | -0.0570    | 111.8296 | -80.1229 | -32.1625 | 4642 |
| 50.1942 | 116.6595 | -0.0933    | 111.7083 | -80.1569 | -31.9796 | 4643 |
| 50.1423 | 116.7495 | -0.0776    | 111.6400 | -80.2094 | -31.8899 | 4644 |
| 50.0653 | 116.8475 | -0.0415    | 111.5607 | -80.2870 | -31.7922 | 4645 |
| 49.9023 | 117.4105 | -0.0917    | 111.1723 | -80.4531 | -31.2299 | 4646 |
| 49.8533 | 117.4915 | -0.0747    | 111.1104 | -80.5025 | -31.1491 | 4647 |
| 49.8012 | 117.7197 | -0.1067    | 110.9561 | -80.5559 | -30.9211 | 4648 |
| 49.6602 | 117.9437 | -0.0534    | 110.7837 | -80.6981 | -30.6977 | 4649 |
| 49.6492 | 118.0407 | -0.0769    | 110.7207 | -80.7096 | -30.6007 | 4650 |
| 49.5972 | 118.1417 | -0.0634    | 110.6457 | -80.7622 | -30.5000 | 4651 |
| 49.4312 | 118.4847 | -0.0261    | 110.3935 | -80.9301 | -30.1577 | 4652 |
| 49.3962 | 118.6457 | -0.0484    | 110.2850 | -80.9660 | -29.9968 | 4653 |
| 49.1882 | 119.1167 | -0.0123    | 109.9436 | -81.1766 | -29.5267 | 4654 |
| 49.1492 | 119.3607 | -0.0572    | 109.7821 | -81.2169 | -29.2829 | 4655 |
| 49.0532 | 119.4537 | 0.0024     | 109.7025 | -81.3135 | -29.1903 | 4656 |
| 49.0073 | 119.5707 | 0.0070     | 109.6191 | -81.3601 | -29.0735 | 4657 |
| 49.0073 | 119.6957 | -0.0342    | 109.5406 | -81.3608 | -28.9485 | 4658 |
| 48.9393 | 119.8316 | -0.0147    | 109.4404 | -81.4295 | -28.8128 | 4659 |
| 48.9253 | 119.9856 | -0.0518    | 109.3406 | -81.4444 | -28.6588 | 4660 |
| 48.9153 | 120.1166 | -0.0850    | 109.2561 | -81.4551 | -28.5278 | 4661 |
| 48.8733 | 120.3086 | -0.1074    | 109.1262 | -81.4981 | -28.3359 | 4662 |
| 48.7333 | 120.6536 | -0.0854    | 108.8790 | -81.6400 | -27.9915 | 4663 |
| 48.6033 | 121.1146 | -0.1076    | 108.5607 | -81.7726 | -27.5311 | 4664 |
| 48.4813 | 121.2836 | -0.0445    | 108.4285 | -81.8955 | -27.3626 | 4665 |
| 48.3373 | 121.6076 | -0.0077    | 108.1941 | -82.0413 | -27.0393 | 4666 |
| 48.3023 | 121.7616 | -0.0215    | 108.0896 | -82.0772 | -26.8854 | 4667 |
| 48.1033 | 122.4306 | -0.0335    | 107.6257 | -82.2798 | -26.2172 | 4668 |
| 47.9453 | 122.9040 | -0.0220    | 107.2941 | -82.4405 | -25.7444 | 4669 |
| 47.9393 | 123.0320 | -0.0536    | 107.2115 | -82.4472 | -25.6164 | 4670 |
| 47.9113 | 123.1430 | -0.0590    | 107.1355 | -82.4758 | -25.5055 | 4671 |
| 47.8923 | 123.2910 | -0.0836    | 107.0376 | -82.4956 | -25.3576 | 4672 |
| 47.8023 | 123.4830 | -0.0524    | 106.8981 | -82.5867 | -25.1660 | 4673 |
| 47.7943 | 123.6330 | -0.0874    | 106.8010 | -82.5955 | -25.0160 | 4674 |
| 47.7333 | 123.7710 | -0.0680    | 106.7014 | -82.6573 | -24.8782 | 4675 |
| 47.6923 | 123.9480 | -0.0784    | 106.5808 | -82.6992 | -24.7014 | 4676 |
| 47.6313 | 124.0320 | -0.0433    | 106.5158 | -82.7607 | -24.6177 | 4677 |
| 47.4763 | 124.6500 | -0.0647    | 106.0924 | -82.9191 | -24.0002 | 4678 |
| 47.3223 | 125.0360 | -0.0205    | 105.8177 | -83.0752 | -23.6149 | 4679 |
| 47.2033 | 125.1850 | 0.0546     | 105.7012 | -83.1951 | -23.4664 | 4680 |
| 47.1554 | 125.3109 | 0.0675     | 105.6121 | -83.2438 | -23.3407 | 4681 |
| 47.1514 | 125.4079 | 0.0458     | 105.5493 | -83.2483 | -23.2436 | 4682 |
| 47.0974 | 125.5109 | 0.0709     | 105.4739 | -83.3029 | -23.1409 | 4683 |
| 47.0794 | 125.6079 | 0.0630     | 105.4086 | -83.3214 | -23.0439 | 4684 |
| 47.0604 | 125.6969 | 0.0582     | 105.3482 | -83.3409 | -22.9550 | 4685 |
| 47.0094 | 125.9329 | 0.0465     | 105.1881 | -83.3932 | -22.7192 | 4686 |
| 46.9484 | 126.0799 | 0.0679     | 105.0833 | -83.4550 | -22.5725 | 4687 |
| 46.9064 | 126.3009 | 0.0524     | 104.9343 | -83.4982 | -22.3516 | 4688 |
| 46.8394 | 126.5329 | 0.0590     | 104.7740 | -83.5665 | -22.1199 | 4689 |

## LIMB PROFILE POSITIONS

| x       | y        | $\delta r$ | P        | x'       | y'       | Ser  |
|---------|----------|------------|----------|----------|----------|------|
| 46.8124 | 126.7409 | 0.0334     | 104.6358 | -83.5946 | -21.9119 | 4690 |
| 46.7444 | 126.9359 | 0.0513     | 104.4991 | -83.6637 | -21.7172 | 4691 |
| 46.7084 | 127.1799 | 0.0267     | 104.3361 | -83.7010 | -21.4733 | 4692 |
| 46.6634 | 127.3589 | 0.0272     | 104.2135 | -83.7470 | -21.2945 | 4693 |
| 46.5953 | 127.5419 | 0.0495     | 104.0847 | -83.8161 | -21.1118 | 4694 |
| 46.5773 | 127.8399 | -0.0035    | 103.8895 | -83.8357 | -20.8138 | 4695 |
| 46.5113 | 128.0049 | 0.0221     | 103.7727 | -83.9026 | -20.6490 | 4696 |
| 46.4463 | 128.2609 | 0.0261     | 103.5972 | -83.9690 | -20.3933 | 4697 |
| 46.4754 | 128.4249 | -0.0397    | 103.4956 | -83.9409 | -20.2291 | 4698 |
| 46.4154 | 128.5219 | -0.0033    | 103.4237 | -84.0014 | -20.1323 | 4699 |
| 46.3774 | 128.6359 | 0.0079     | 103.3442 | -84.0401 | -20.0185 | 4700 |
| 46.3994 | 128.7889 | -0.0479    | 103.2484 | -84.0189 | -19.8653 | 4701 |
| 46.2964 | 129.1889 | -0.0361    | 102.9739 | -84.1241 | -19.4657 | 4702 |
| 46.2434 | 129.3619 | -0.0222    | 102.8540 | -84.1780 | -19.2929 | 4703 |
| 46.2284 | 129.4899 | -0.0352    | 102.7688 | -84.1937 | -19.1650 | 4704 |
| 46.1924 | 129.6099 | -0.0259    | 102.6857 | -84.2304 | -19.0451 | 4705 |
| 46.1484 | 129.8909 | -0.0427    | 102.4970 | -84.2759 | -18.7642 | 4706 |
| 46.0074 | 130.3549 | -0.0015    | 102.1758 | -84.4194 | -18.3008 | 4707 |
| 45.9684 | 130.6989 | -0.0334    | 101.9467 | -84.4603 | -17.9569 | 4708 |
| 45.8374 | 130.9899 | 0.0368     | 101.7398 | -84.5929 | -17.6665 | 4709 |
| 45.7854 | 131.1599 | 0.0543     | 101.6223 | -84.6459 | -17.4967 | 4710 |
| 45.7764 | 131.3698 | 0.0221     | 101.4844 | -84.6560 | -17.2866 | 4711 |
| 45.7135 | 131.5698 | 0.0454     | 101.3460 | -84.7201 | -17.0869 | 4712 |
| 45.6855 | 131.7388 | 0.0407     | 101.2322 | -84.7490 | -16.9180 | 4713 |
| 45.6325 | 132.0778 | 0.0292     | 101.0045 | -84.8039 | -16.5791 | 4714 |
| 45.6515 | 132.2768 | -0.0262    | 100.8768 | -84.7859 | -16.3800 | 4715 |
| 45.6124 | 132.5778 | -0.0424    | 100.6754 | -84.8267 | -16.0791 | 4716 |
| 45.5814 | 132.7428 | -0.0415    | 100.5638 | -84.8586 | -15.9142 | 4717 |
| 45.5284 | 132.9328 | -0.0229    | 100.4332 | -84.9126 | -15.7244 | 4718 |
| 45.4824 | 133.3398 | -0.0482    | 100.1615 | -84.9608 | -15.3175 | 4719 |
| 45.4144 | 133.5548 | -0.0177    | 100.0129 | -85.0300 | -15.1027 | 4720 |
| 45.3804 | 133.7688 | -0.0200    | 99.8689  | -85.0652 | -14.8888 | 4721 |
| 45.3274 | 134.0078 | -0.0071    | 99.7065  | -85.1195 | -14.6500 | 4722 |
| 45.3054 | 134.4438 | -0.0555    | 99.4181  | -85.1438 | -14.2140 | 4723 |
| 45.2005 | 135.2498 | -0.0756    | 98.8778  | -85.2532 | -13.4083 | 4724 |
| 45.1155 | 136.0068 | -0.1010    | 98.3713  | -85.3423 | -12.6514 | 4725 |
| 44.9965 | 136.5968 | -0.0639    | 97.9718  | -85.4645 | -12.0618 | 4726 |
| 44.9465 | 136.7578 | -0.0356    | 97.8613  | -85.5154 | -11.9010 | 4727 |
| 44.9025 | 137.1477 | -0.0424    | 97.6004  | -85.5615 | -11.5111 | 4728 |
| 44.7245 | 137.9126 | 0.0408     | 97.0815  | -85.7438 | -10.7469 | 4729 |
| 44.6475 | 138.6376 | 0.0348     | 96.5973  | -85.8247 | -10.0220 | 4730 |
| 44.5445 | 139.2826 | 0.0690     | 96.1641  | -85.9312 | -9.3773  | 4731 |
| 44.5335 | 139.7896 | 0.0297     | 95.8284  | -85.9450 | -8.8702  | 4732 |
| 44.4795 | 140.0826 | 0.0558     | 95.6312  | -86.0006 | -8.5774  | 4733 |
| 44.4385 | 141.0196 | 0.0148     | 95.0089  | -86.0466 | -7.6402  | 4734 |
| 44.3756 | 142.0456 | -0.0004    | 94.3260  | -86.1152 | -6.6142  | 4735 |
| 44.3065 | 143.2315 | -0.0064    | 93.5366  | -86.1907 | -5.4282  | 4736 |
| 44.3375 | 143.6155 | -0.0582    | 93.2829  | -86.1617 | -5.0439  | 4737 |
| 44.2925 | 143.8925 | -0.0271    | 93.0974  | -86.2082 | -4.7670  | 4738 |
| 44.2615 | 144.4205 | -0.0202    | 92.7459  | -86.2421 | -4.2390  | 4739 |
| 44.2666 | 144.5975 | -0.0326    | 92.6285  | -86.2380 | -4.0619  | 4740 |
| 44.2176 | 144.7525 | 0.0103     | 92.5243  | -86.2879 | -3.9071  | 4741 |
| 44.2476 | 145.3855 | -0.0419    | 92.1046  | -86.2613 | -3.2737  | 4742 |
| 44.1636 | 146.4635 | 0.0150     | 91.3870  | -86.3511 | -2.1958  | 4743 |
| 44.1986 | 147.0975 | -0.0296    | 90.9661  | -86.3195 | -1.5614  | 4744 |
| 44.1695 | 147.5121 | -0.0042    | 90.6904  | -86.3509 | -1.1468  | 4745 |
| 44.1755 | 148.0561 | -0.0121    | 90.3289  | -86.3478 | -0.6026  | 4746 |
| 44.1376 | 148.2331 | 0.0260     | 90.2113  | -86.3867 | -0.4257  | 4747 |
| 44.1346 | 148.3461 | 0.0293     | 90.1363  | -86.3904 | -0.3127  | 4748 |
| 44.1566 | 148.5970 | 0.0084     | 89.9695  | -86.3697 | -0.0615  | 4749 |
| 44.1196 | 149.1050 | 0.0499     | 89.6323  | -86.4094 | 0.4465   | 4750 |
| 44.1866 | 149.6260 | -0.0094    | 89.2856  | -86.3452 | 0.9680   | 4751 |
| 44.1666 | 149.9950 | 0.0180     | 89.0407  | -86.3672 | 1.3371   | 4752 |
| 44.2076 | 150.6050 | -0.0074    | 88.6349  | -86.3295 | 1.9475   | 4753 |
| 44.2366 | 151.3400 | -0.0118    | 88.1461  | -86.3044 | 2.6829   | 4754 |
| 44.1947 | 151.7990 | 0.0487     | 87.8425  | -86.3489 | 3.1418   | 4755 |
| 44.2457 | 152.2510 | 0.0184     | 87.5411  | -86.3003 | 3.5943   | 4756 |
| 44.2626 | 152.5571 | 0.0169     | 87.3374  | -86.2851 | 3.9006   | 4757 |
| 44.3036 | 153.3081 | 0.0181     | 86.8378  | -86.2481 | 4.6521   | 4758 |
| 44.2826 | 154.0671 | 0.0884     | 86.3357  | -86.2732 | 5.4112   | 4759 |
| 44.4046 | 154.5811 | 0.0038     | 85.9895  | -86.1539 | 5.9260   | 4760 |
| 44.4176 | 154.8621 | 0.0125     | 85.8026  | -86.1424 | 6.2072   | 4761 |
| 44.4536 | 155.0561 | -0.0080    | 85.6723  | -86.1074 | 6.4015   | 4762 |

## LIMB PROFILE POSITIONS

6

| x       | y        | $\delta r$ | P       | x'       | y'      | Ser  |
|---------|----------|------------|---------|----------|---------|------|
| 44.4807 | 155.5541 | 0.0068     | 85.3410 | -86.0831 | 6.8998  | 4763 |
| 44.5657 | 156.3720 | -0.0031    | 84.7946 | -86.0025 | 7.7185  | 4764 |
| 44.5657 | 156.7350 | 0.0325     | 84.5547 | -86.0044 | 8.0816  | 4765 |
| 44.6047 | 156.8870 | 0.0091     | 84.4516 | -85.9662 | 8.2339  | 4766 |
| 44.6487 | 157.2170 | -0.0004    | 84.2305 | -85.9240 | 8.5642  | 4767 |
| 44.7335 | 157.7432 | -0.0274    | 83.8768 | -85.8420 | 9.0910  | 4768 |
| 44.7135 | 157.9272 | 0.0133     | 83.7568 | -85.8630 | 9.2750  | 4769 |
| 44.7825 | 158.2872 | -0.0134    | 83.5139 | -85.7959 | 9.6355  | 4770 |
| 44.8205 | 158.5342 | -0.0215    | 83.3479 | -85.7592 | 9.8827  | 4771 |
| 44.8645 | 158.7332 | -0.0409    | 83.2130 | -85.7163 | 10.0820 | 4772 |
| 44.8815 | 158.9172 | -0.0348    | 83.0903 | -85.7003 | 10.2662 | 4773 |
| 44.9265 | 159.2612 | -0.0355    | 82.8597 | -85.6571 | 10.6105 | 4774 |
| 44.9386 | 159.4772 | -0.0192    | 82.7163 | -85.6463 | 10.8267 | 4775 |
| 44.9916 | 159.9381 | -0.0095    | 82.4080 | -85.5957 | 11.2881 | 4776 |
| 45.0126 | 160.1041 | -0.0074    | 82.2968 | -85.5756 | 11.4543 | 4777 |
| 45.1356 | 160.8671 | -0.0194    | 81.7833 | -85.4567 | 12.2182 | 4778 |
| 45.1306 | 161.0671 | 0.0155     | 81.6524 | -85.4627 | 12.4182 | 4779 |
| 45.1986 | 161.2631 | -0.0220    | 81.5168 | -85.3958 | 12.6146 | 4780 |
| 45.3046 | 161.7741 | -0.0471    | 81.1703 | -85.2925 | 13.1264 | 4781 |
| 45.3066 | 161.9871 | -0.0150    | 81.0304 | -85.2916 | 13.3395 | 4782 |
| 45.3716 | 162.2861 | -0.0304    | 80.8273 | -85.2282 | 13.6389 | 4783 |
| 45.4015 | 162.5407 | -0.0176    | 80.6571 | -85.1997 | 13.8937 | 4784 |
| 45.4475 | 162.7277 | -0.0314    | 80.5295 | -85.1547 | 14.0810 | 4785 |
| 45.4725 | 162.8887 | -0.0285    | 80.4212 | -85.1305 | 14.2422 | 4786 |
| 45.6546 | 163.7726 | -0.0513    | 79.8214 | -84.9532 | 15.1274 | 4787 |
| 45.7446 | 164.3446 | -0.0338    | 79.4367 | -84.8662 | 15.7001 | 4788 |
| 45.8406 | 164.7666 | -0.0474    | 79.1492 | -84.7725 | 16.1227 | 4789 |
| 45.8866 | 165.0926 | -0.0288    | 78.9307 | -84.7282 | 16.4491 | 4790 |
| 45.9536 | 165.4236 | -0.0285    | 78.7062 | -84.6630 | 16.7806 | 4791 |
| 46.0856 | 166.1706 | -0.0043    | 78.2023 | -84.5349 | 17.5285 | 4792 |
| 46.1666 | 166.4156 | -0.0317    | 78.0318 | -84.4552 | 17.7740 | 4793 |
| 46.3886 | 167.3486 | -0.0450    | 77.3944 | -84.2382 | 18.7085 | 4794 |
| 46.4146 | 167.7682 | 0.0246     | 77.1189 | -84.2145 | 19.1284 | 4795 |
| 46.6236 | 168.4592 | -0.0182    | 76.6401 | -84.0092 | 19.8207 | 4796 |
| 46.7636 | 169.3052 | 0.0499     | 76.0722 | -83.8737 | 20.6677 | 4797 |
| 46.8536 | 169.6952 | 0.0595     | 75.8066 | -83.7857 | 21.0583 | 4798 |
| 47.1056 | 170.6761 | 0.0671     | 75.1341 | -83.5389 | 22.0410 | 4799 |
| 47.3006 | 171.2211 | 0.0234     | 74.7508 | -83.3468 | 22.5872 | 4800 |
| 47.3506 | 171.4281 | 0.0311     | 74.6095 | -83.2979 | 22.7945 | 4801 |
| 47.4376 | 171.7321 | 0.0301     | 74.3995 | -83.2125 | 23.0990 | 4802 |
| 47.5907 | 172.1831 | 0.0079     | 74.0835 | -83.0618 | 23.5510 | 4803 |
| 47.6756 | 172.5388 | 0.0265     | 73.8409 | -82.9788 | 23.9072 | 4804 |
| 47.7866 | 172.9338 | 0.0330     | 73.5684 | -82.8699 | 24.3029 | 4805 |
| 47.9126 | 173.4428 | 0.0606     | 73.2207 | -82.7466 | 24.8128 | 4806 |
| 48.2446 | 174.3757 | 0.0230     | 72.5635 | -82.4195 | 25.7478 | 4807 |
| 48.3306 | 174.6077 | 0.0121     | 72.3993 | -82.3347 | 25.9803 | 4808 |
| 48.6286 | 175.4177 | -0.0181    | 71.8262 | -82.0410 | 26.7921 | 4809 |
| 48.9067 | 176.5437 | 0.0830     | 71.0588 | -81.7689 | 27.9200 | 4810 |
| 49.0257 | 176.8367 | 0.0678     | 70.8491 | -81.6514 | 28.2137 | 4811 |
| 49.0897 | 176.9517 | 0.0458     | 70.7629 | -81.5880 | 28.3291 | 4812 |
| 49.1907 | 177.2607 | 0.0546     | 70.5472 | -81.4887 | 28.6387 | 4813 |
| 49.3046 | 177.5058 | 0.0307     | 70.3684 | -81.3760 | 28.8845 | 4814 |
| 49.5966 | 178.3038 | 0.0325     | 69.8040 | -81.0882 | 29.6842 | 4815 |
| 50.1116 | 179.6048 | 0.0171     | 68.8747 | -80.5800 | 30.9884 | 4816 |
| 50.2236 | 179.8408 | -0.0005    | 68.7015 | -80.4693 | 31.2250 | 4817 |
| 50.5286 | 180.5457 | -0.0211    | 68.1913 | -80.1680 | 31.9318 | 4818 |
| 50.7386 | 181.1507 | 0.0145     | 67.7664 | -79.9611 | 32.5381 | 4819 |
| 51.0977 | 182.0497 | 0.0330     | 67.1236 | -79.6068 | 33.4393 | 4820 |
| 51.1777 | 182.3237 | 0.0678     | 66.9355 | -79.5283 | 33.7138 | 4821 |
| 51.3276 | 182.6415 | 0.0569     | 66.7023 | -79.3800 | 34.0325 | 4822 |
| 51.4386 | 182.9465 | 0.0780     | 66.4873 | -79.2706 | 34.3381 | 4823 |
| 51.5486 | 183.1215 | 0.0482     | 66.3515 | -79.1615 | 34.5138 | 4824 |
| 51.6016 | 183.3115 | 0.0772     | 66.2219 | -79.1095 | 34.7041 | 4825 |
| 51.6686 | 183.3825 | 0.0450     | 66.1607 | -79.0429 | 34.7755 | 4826 |
| 51.8106 | 183.6625 | 0.0305     | 65.9524 | -78.9023 | 35.0563 | 4827 |
| 51.8336 | 183.7645 | 0.0517     | 65.8844 | -78.8799 | 35.1585 | 4828 |
| 52.1756 | 184.4345 | 0.0206     | 65.3853 | -78.5414 | 35.8305 | 4829 |
| 52.3856 | 184.8225 | -0.0053    | 65.0927 | -78.3334 | 36.2197 | 4830 |
| 52.5681 | 185.2124 | -0.0032    | 64.8067 | -78.1529 | 36.6107 | 4831 |
| 52.7721 | 185.6364 | -0.0035    | 64.4941 | -77.9511 | 37.0359 | 4832 |
| 53.0481 | 186.1254 | -0.0373    | 64.1216 | -77.6777 | 37.5265 | 4833 |
| 53.2941 | 186.6613 | -0.0195    | 63.7298 | -77.4345 | 38.0640 | 4834 |
| 53.5251 | 187.1733 | 0.0048     | 63.3569 | -77.2061 | 38.5773 | 4835 |

## LIMB PROFILE POSITIONS

| x       | y        | $\delta r$ | P       | x'       | y'      | Ser  |
|---------|----------|------------|---------|----------|---------|------|
| 53.8210 | 187.6981 | -0.0190    | 62.9569 | -76.9129 | 39.1038 | 4836 |
| 53.9600 | 188.0251 | 0.0085     | 62.7216 | -76.7757 | 39.4316 | 4837 |
| 54.3610 | 188.8281 | 0.0296     | 62.1255 | -76.3788 | 40.2370 | 4838 |
| 54.4600 | 188.9951 | 0.0214     | 61.9967 | -76.2807 | 40.4046 | 4839 |
| 54.8690 | 189.7401 | 0.0188     | 61.4322 | -75.8756 | 41.1519 | 4840 |
| 55.2881 | 190.5101 | 0.0281     | 60.8499 | -75.4606 | 41.9244 | 4841 |
| 55.5531 | 190.9391 | 0.0098     | 60.5152 | -75.1978 | 42.3549 | 4842 |
| 55.8311 | 191.4811 | 0.0400     | 60.1111 | -74.9226 | 42.8985 | 4843 |
| 55.9961 | 191.8331 | 0.0753     | 59.8541 | -74.7594 | 43.2515 | 4844 |
| 56.1411 | 192.0631 | 0.0673     | 59.6737 | -74.6156 | 43.4823 | 4845 |

### TABLE OF CONTENTS

|        |  |    |
|--------|--|----|
| No. 72 | The Initial Reductions of Measures on Star-Trailed Lunar Photographs.....  | 7  |
|        | by D. W. G. Arthur   |    |
| No. 73 | A Device for Determining the Instantaneous Focal Lengths<br>of Large Telescopes.....   | 13 |
|        | by D. W. G. Arthur   |    |
| No. 74 | Scale Transfer for Lunar Photographs.....  | 17 |
|        | by D. W. G. Arthur   |    |
| No. 75 | The Validity of Selenodetic Positions.....   | 19 |
|        | by D. W. G. Arthur   |    |
| No. 76 | A Method for Determining the Moon's Constants of Rotation from<br>Measurements on Scaled and Oriented Lunar Photographs..... | 31 |
|        | by D. W. G. Arthur   |    |
| No. 77 | Selenodetic Measures on Yerkes Lunar Photograph No. 1269.....  | 37 |
|        | by D. W. G. Arthur   |    |
| No. 78 | Selenodetic Measures on Yerkes Lunar Photograph No. 482.....   | 41 |
|        | by D. W. G. Arthur   |    |