With the positions of 1935 IF, 1935 SA, and 1935 SZ mentioned above I have computed the elements, but the residuals obtained from the comparison of the positions which have not been used for the calculation with the ephemeris are too large. Something seems to be wrong with the positions; probably they do not belong to the same planet. The minor planets 1935 SC, 1935 SE and 1935 SS have been observed also at Uccle. For 1935 SE there are observations from Sept. 24 till Nov. 28; probably the elements have been computed elsewhere. About the positions of 1935 SS Prof. G. Stracke informed me that they will be used elsewhere for the calculation of the orbit.

<table>
<thead>
<tr>
<th>Planet</th>
<th>Magn.</th>
<th>Date U.T.</th>
<th>(\alpha_{1900})</th>
<th>(\delta_{1900})</th>
<th>Comparison stars</th>
</tr>
</thead>
<tbody>
<tr>
<td>1935 KG</td>
<td>13'8</td>
<td>May 24'8791</td>
<td>16 45 13'00</td>
<td>-14° 49' 45&quot;</td>
<td>Tacubaya 16°44'm, -15°: 35, 37, 42</td>
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<tr>
<td>1935 KH</td>
<td>13'8</td>
<td>May 24'8791</td>
<td>16 36 31'27</td>
<td>-14° 54' 33'9</td>
<td>Tacubaya 16°36'm, -15°: 137, 139, 181</td>
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<tr>
<td>1935 MK</td>
<td>13'0</td>
<td>June 3'84768</td>
<td>16 26 38'72</td>
<td>-15° 13 40'2</td>
<td>&quot; 16°24'm, -16°: 45, 90, 115</td>
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<td>1935 ML</td>
<td>13'0</td>
<td>June 25'77383</td>
<td>16 30 35'39</td>
<td>-12° 12 24'1</td>
<td>B. D. -11° 4177, -12° 4546, -12° 4557</td>
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<tr>
<td>1935 SB</td>
<td>13'0</td>
<td>July 8'84938</td>
<td>16 47 11'36</td>
<td>-11° 25 46'0</td>
<td>B. D. -11° 4218, -11° 4225, -11° 4227</td>
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<tr>
<td>1935 SC</td>
<td>13'0</td>
<td>July 8'84938</td>
<td>16 30 14'38</td>
<td>-9° 41 53'1</td>
<td>San Fern. 16°44'm, -9°: 1, 10, 12</td>
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<tr>
<td>1935 SE</td>
<td>14'2</td>
<td>Sept. 24'90677</td>
<td>0 52 26'18</td>
<td>+ 6° 37 10'5</td>
<td>Toulouse 0h32'm, +7°: 108, 110, 116</td>
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<tr>
<td>1935 UD</td>
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<tr>
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<tr>
<td>1935 UT</td>
<td>14'2</td>
<td>Oct. 1'96749</td>
<td>0 55 24'86</td>
<td>+ 5° 28 14'8</td>
<td>&quot; 0h32'm, +5°: 34, 41, 42</td>
</tr>
<tr>
<td>1935 SE</td>
<td>14'2</td>
<td>Sept. 29'95231</td>
<td>1 37 47'72</td>
<td>+ 6° 31 21'6</td>
<td>Toulouse 1h40'm, +7°: 70, 77, 78</td>
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<tr>
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<td>14'2</td>
<td>Oct. 16'8838</td>
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<td>+ 1° 54 29'5</td>
<td>Algiers 0h40'm, +2°: 31, 113, 127</td>
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<td>1935 UR</td>
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<td>Toulouse 1h 8'm, +5°: 4, 9, 1h8'm, +7°: 49</td>
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<tr>
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<td>Algiers 1h36'm, +4°: 68, 90, 95</td>
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<tr>
<td>1935 UT</td>
<td>14'0</td>
<td>Oct. 20'83698</td>
<td>2 5 20'38</td>
<td>+ 4° 14 7'8</td>
<td>Algiers 2h8'm, +4°: 16, 21, 27</td>
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<tr>
<td>1935 UU</td>
<td>13'8</td>
<td>Oct. 20'83698</td>
<td>2 11 43'04</td>
<td>+ 8° 30 14'2</td>
<td>Toulouse 2h12'm, +9°: 52, 55, 65</td>
</tr>
</tbody>
</table>

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Note on the correction for differential refraction in positions of objects on photographic plates, by H. van Gent.

1. In his criticism on the projective method of referring the position of an object on a photographic plate to four surrounding stars the astrophographic positions of which are known, J. Ph. Lagrula remarks (C. R. de l'Ac. des Sc., Paris, Vol. 193, p. 573) that the refraction will always tend to render the result less accurate because it destroys the rigorous projective relationship between object plate and astrophographic plate.

The following consideration indicates that the distortion of the plate field by refraction is of much less effect upon the result than would be expected at first view.

Let Figure 1 represent two optical media I and II, separated by a plane boundary AA. In a plane perpendicular to this boundary four stars are seen from the point C, which may be considered as the centre of an objective by which a photographic plate is taken. The refracted paths of the four rays of light are shown. If the four rays coming from medium I, when produced instead of broken, would meet in one and the same point C', the following property would be valid: the anharmonic ratio of the four rays meeting in C is the same as that of the four produced rays meeting in C'. This would involve a projective relationship between a starfield on a photographic plate affected by refraction and the same field free from refraction, in which case the projective methods of reducing the position of an object from measures on the plate automatically eliminate to its full amount any influence from refraction.
2. Though in actual refraction the four rays in Figure 1, when produced, do not meet in one and the same point $C'$, they very nearly do so; otherwise it would not be possible to see the image of an object immersed in a medium different from that in which our eye is and separated from the latter medium by a plane boundary. In order to have an idea of what the words "very nearly" in the previous sentence mean in terms of seconds of arc in the result the following 12 hypothetical cases have been worked out as numerical examples:

![Figure 1](image1)

![Figure 2](image2)

An object $o$ is photographed in the centre of a plate $PP$ (Fig. 2). Three stars $a$, $b$ and $c$ are found which are with the object $o$ on a straight line on the plate, this straight line being perpendicular to the horizon. The angular distances $ao$, $ob$ and $bc$ are equal to $\phi$. The situation of the stars in a row perpendicular to the horizon has been chosen in order to give maximum effect to the differential refraction.

The observed zenith distances $\xi_a$, $\xi_b$ and $\xi_c$ of the three stars $a$, $b$ and $c$ were now corrected for refraction by the aid of the "Hilfstafeln der Hamburger Sternwarte", Table 44. These tables give corrections accurate to "1; the formula by which they were derived is not given. In order to include the next decimal the formula $R = 58'294 \tan \xi - 0'0668 \tan^2 \xi$ (SMART, Spherical Astronomy, p. 68) was therefore used to compute the refraction in the last three cases, $\xi$ being the observed zenith distance.

This being done the object's position was now referred to the two stars $a$ and $b$ by the dependence method, and to the three stars $a$, $b$ and $c$ by the projective method (B.A.N. No. 216), using the uncorrected positions of the stars and the object on the plate for computing the dependences and the anharmonic ratio $(a \circ b \circ c)$ respectively. The two dependences become exactly $\phi$ in this case, for each one of the 12 examples.

As is well known the dependence method removes only the linear part of the differential refraction (linear in the sense of: in linear relation to distance measured on the plate), leaving the full amount of the non linear part in the result.

The object's position on the plate was now corrected directly for refraction by the aid of the tables and the formula mentioned and compared with the result obtained by dependence method and projective method respectively. The $O-C$'s are shown in the table below.

3. From the table it is clear that the differential refraction, left in the result to its full extent by the dependence method, is removed for the greater part by the projective method, the remaining part decreasing to about 10% or "02 for the case $\xi_a = 75^\circ$, $\phi = 1^\circ$.

The advantages of the projective method of deriving an object's position can be summed up as follows:

1. no knowledge of the scale of the plate is necessary;
2. the orientation of the plate is of no importance;
3. it requires no knowledge of the plate centre;
4. it automatically removes errors due to plate tilt;
5. it is correct independent of the size of the quadrilateral of the four reference stars and their distances to the plate centre;
6. it automatically removes the greater part of the differential refraction.

4. Comparing the different methods, the following may be said:

The dependence method (SCHLESINGER, A. J. 874) or variations thereof (WOOD, J. B. A. A. 39, p. 196; COMRIE, id., p. 203; LAGRULA, J. O. 14, p. 49; RENEAUX, J. O. 15, p. 73) is by far the quickest and most convenient method. It should always be used when the error to be expected is smaller than the accuracy in the dependences computed by the projective method.

<table>
<thead>
<tr>
<th>$\phi$</th>
<th>$O-C$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dependence method</td>
</tr>
<tr>
<td>$\phi = 2^\circ$</td>
<td>$2'55^\circ$</td>
</tr>
<tr>
<td>$\phi = 1^\circ$</td>
<td>$1'11^\circ$</td>
</tr>
<tr>
<td>$\phi = 1^\circ$</td>
<td>$3'7^\circ$</td>
</tr>
</tbody>
</table>

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required. This error can be estimated as far as it is
due to refraction from the table in this paper, and
as far as it is due to size and distance of the triangle
(or polygon) of the reference stars from the plate
centre from the table in B.A.N. No. 216, p. 111. Tables
similar to the latter have been constructed by
LAGRULA (J. O. 14, p. 68) and AREND (B.A.B. Vol. I,
No. 6, p. 128).

If higher accuracy is required than the dependence
method can give, one of the projective methods may
be used. As such can be considered TURNER's method
(M.N. 54, p. 11); the method described by AREND,
who uses projective triangular coordinates (C. R. de
l'Ac. des Sc. Paris 194, p. 2292); or the method ex-
posed in B.A.N. No. 216 by the writer. The first one
involves the computation of plate constants from the
positions of the four reference stars on the object plate
and in the astrogrâphic catalogue, the other two
methods evade this trouble.

Although tilt and great distance to the plate centre
together with big size of the quadrilateral of reference
stars do not limit these methods, the differential
refraction causes them to break down in very un-
favourable cases, as shown in the table. These cases
may arise when for instance a comet has to be photo-
graphed near the horizon on account of being near
the sun; and for Eros plates taken at great hour
angles. In the latter case very accurate star positions
are mostly available so that the natural limit put by
the accuracy of the reference stars may be below the
error of the projective methods, due to a part of the
differential refraction.

In these unfavourable cases nothing else seems to
be left than to use the lengthy procedure indicated
by TURNER (M.N. 54, p. 13) and BAILLAUD (Ann.
Obs. Toulouse, 2, p. 124) or the recent modifications
thereof by HECKMANN (Veröff. Göttingen, 30) and VICK
(A.N. 253, p. 277).

5. The differential aberration has not been dis-
cussed here. Its effect on a star position derived by
the dependence method within a triangle of reference
stars of about 2° size is at most "003. The projective
methods reduce this small amount even further, so
that it can be neglected in our considerations.

It is here the place to mention two other disturbing
causes: dispersion and length of exposure. Dispersion
is kept down by the use of a suitable colour screen
in connection with colour sensitive plates, by which
combination only a small region of the spectrum is
used. This however means wastage of light and in-
volves increase in exposure time. A long exposure
causes the star field on the plate to be compressed
during the exposure in a direction perpendicular to
the horizon, together with a small distortion parallel
to it. All star images except in the neighbourhood of
the guiding star become elongated and as the direc-
tion perpendicular to the horizon changes on the
plate during the exposure, this elongation is slightly
curved.

In order to make the best of such plates it is
advisable to choose the reference stars as much as
possible on a line with the object parallel to the
horizon.