		left
1	31.2	1019.2
2	498.1	410.1
3	2496.6	245.8
4	2948.4	1079.8
5	1816.3	833.9
6	2299.8	1639.8
7	1664.6	1983.1
8	606.6	1703.2
9	302.7	1722.3
10	2267.2	913.0

		right
1	164.7	1051.6
2	731.7	452.0
3	2496.0	200.9
4	3081.6	1052.2
5	1655.1	822.7
6	2343.6	1638.4
7	1539.4	1983.8
8	657.1	1708.1
9	404.6	1727.9
10	2261.1	894.2

```
x0      -29.330   0.00001
y0        1.519   0.00001
foc    4457.796   0.00001
k1  0.028382796   0.00001
k2 -0.018956408   0.00001
k3  0.011558139   0.00001
p1   0.16170141   0.00001
p2  -0.58011127   0.00001
option        2   0
ncol       3456   0
nrow       2304   0
```

```
E =
       12.002       348.44      -98.327
      -58.443       4.4671      -2360.6
       55.032         2345            1
U =
      0.14621     0.043337       0.9883
      0.52941     -0.84737    -0.041163
      0.83567      0.52924     -0.14684
S =
       2376.6            0            0
            0       2358.2            0
            0            0       6.1898
V =
    0.0070705     0.033571      0.99941
      0.84699      0.53107    -0.023831
     -0.53156      0.84666     -0.02468
M2b =
      0.99232     0.017388      0.12243
    -0.017375      0.99985    -0.001176
     -0.12244  -0.00096033      0.99248
ba =
       0.9883
    -0.041163
     -0.14684
```

Numerical example for 8 point algorithm

Before using the image measurements in the 8-point equation, they were refined (origin at P.P. and corrected for lens distortion).

Since there are 10 measured points, we are overdetermined, so solve by LS:

$$\underset{10,8}{B}\ \underset{8,1}{e} = \underset{10,1}{f}$$

$$e = (B^T B)^{-1} B^T f$$

The resulting E matrix and singular value decomposition are given earlier. The four cases are tested to resolve ambiguity. Remember that the M_{2a} and M_{2b} trial matrices are actually $\underline{\underline{M^T}}$ by our conventions. So when you intersect & project by collinearity - you must take that into account. See comparative results below.

	Relative Orientation by coplanarity	8-point Alg. results	8-point Alg. results with <u>scaled</u> b_x, b_y, b_z
b_x	100.000	0.9883	100.000
b_y	-3.9467	-0.041163	-4.165
b_z	-12.262	-0.14684	-14.858
ω_2	0.00446	.0011849	.0011849
ϕ_2	0.12752	.12274	.12274
κ_2	-0.018346	-.017521	-.017521

Comparing column 1 and column 3 we see they are close but not the same. Conclusion: 8-point Algorithm is great for getting approximations, but use coplanarity and nonlinear parameters for the most accurate solutions.