```
Apply[Clear, Names["Global`*"]];
Off[General::spell];
Off[General::spell1];
m = 24;
N1 = 22; N2 = 20; N2p = 35; N4 = 15; N5 = 16;
r1 = m * N1 / 2;
r2 = m * N2 / 2;
r2p = m * N2p / 2;
r3 = r1 + r2 + r2p;
r4 = m * N4 / 2;
r5 = m * N5 / 2;
r6 = r4 + 2 r5;
rA = {0, 0, 0};
rB = {0, r1, 0};
rC = {xC, r1 + r2, 0};
rD = {xD, r1 + r2 + r2p, 0};
rE = {xE, 0, 0};
rF = {xF, r4, 0};
rG = {xG, r4 + r5, 0};
rH = {xH, r4 + 2 r5, 0};
rJ = {xJ, 0, 0};
n3 = 200;(*rpm*)
n6 = 150; (*rpm*)
n03 = -n3;
n60 = n6;


"contour I: 0-A-1-B-2-C-4-E-0"

ω10 = {n10, 0, 0};
ω21 = {n21, 0, 0};
ω42 = {n42, 0, 0};
ω04 = {n04, 0, 0};

"ω10+ω21+ω42+ω04=0 (1)"
eq1x = (ω10 + ω21 + ω42 + ω04)[[1]] == 0; Print[eq1x, " (1)"];
"rB x ω21 + rC x ω42 = 0 (2)"
eq1k = (Cross[rB, ω21] + Cross[rC, ω42])[[3]] == 0; Print[eq1k, " (2)"];

"contour II: 0-A-1-B-2-D-3-E-0"

ω32 = {n32, 0, 0};
ω03 = {n03, 0, 0};

"ω10+ω21+ω32+ω03=0 (3)"
eq2x = (ω10 + ω21 + ω32 + ω03)[[1]] == 0; Print[eq2x, " (3)"];
"rB x ω21 + rD x ω32 = 0 (4)"
eq2k = (Cross[rB, ω21] + Cross[rD, ω32])[[3]] == 0; Print[eq2k, " (4)"];

"contour III: 0-J-6-H-5-G-3-E-0"
```

```
ω60 = {n60, 0, 0};
ω56 = {n56, 0, 0};
ω35 = {n35, 0, 0};


"ω60+ω56+ω35+ω03=0 (3)"
eq3x = (ω60 + ω56 + ω35 + ω03)[[1]] == 0; Print[eq3x, " (5)"];
"rH x ω56 + rG x ω35 = 0 (6)"
eq3k = (Cross[rH, ω56] + Cross[rG, ω35])[[3]] == 0; Print[eq3k, " (6)"];

"contour IIII: 3-D-2-C-4-F-5-G-3"

ω23 = -ω32;
ω54 = {n54, 0, 0};

"ω23+ω42+ω54+ω35=0 (7)"
eq4x = (ω23 + ω42 + ω54 + ω35)[[1]] == 0; Print[eq4x, " (7)"];
"rD x ω23 + rC x ω42 + rF x ω54 + rG x ω35= 0 (8)"
eq4k = (Cross[rD, ω23] + Cross[rC, ω42] + Cross[rF, ω54] + Cross[rG, ω35])[[3]] == 0;
Print[eq4k, " (8)"];
"equations"
eqns = {eq1x, eq1k, eq2x, eq2k, eq3x, eq3k, eq4x, eq4k}
sol = {n10, n21, n42, n04, n32, n56, n35, n54};
"solutions"
solution = N[Solve[eqns, sol]]
Print["n1 = ", n10 /. solution[[1]], " rpm"];
```

```
contour I: 0-A-1-B-2-C-4-E-0

ω10+ω21+ω42+ω04=0 (1)

n04 + n10 + n21 + n42 == 0 (1)

rB x ω21 + rC x ω42 = 0 (2)

-264 n21 - 504 n42 == 0 (2)

contour II: 0-A-1-B-2-D-3-E-0

ω10+ω21+ω32+ω03=0 (3)

-200 + n10 + n21 + n32 == 0 (3)

rB x ω21 + rD x ω32 = 0 (4)

-264 n21 - 924 n32 == 0 (4)

contour III: 0-J-6-H-5-G-3-E-0

ω60+ω56+ω35+ω03=0 (3)

-50 + n35 + n56 == 0 (5)
```

rH x ω56 + rG x ω35 = 0 (6)

-372 n35 - 564 n56 == 0 (6)

contour IIII: 3-D-2-C-4-F-5-G-3

ω23+ω42+ω54+ω35=0 (7)

-n32 + n35 + n42 + n54 == 0 (7)

rD x ω23 + rC x ω42 + rF x ω54 + rG x ω35= 0 (8)

924 n32 - 372 n35 - 504 n42 - 180 n54 == 0 (8)

equations

```
{n04 + n10 + n21 + n42 == 0, -264 n21 - 504 n42 == 0, -200 + n10 + n21 + n32 == 0,
 -264 n21 - 924 n32 == 0, -50 + n35 + n56 == 0, -372 n35 - 564 n56 == 0,
 -n32 + n35 + n42 + n54 == 0, 924 n32 - 372 n35 - 504 n42 - 180 n54 == 0}
```

solutions

```
{{n10 → 670., n21 → -658., n42 → 344.667, n04 → -356.667,
  n32 → 188., n56 → -96.875, n35 → 146.875, n54 → -303.542}}
```

n1 = 670. rpm