

For all equation sets,

$R_{dc} = .5 \cdot B_{plus} / I_{dc}$; B_{plus} is the B+ supply voltage and I_{dc} is the desired triodes' DC current.

R_{dc} is used for calculations only; it's not a circuit component

ra_1 ; triode U1 intrinsic anode resistance
 ra_2 ; triode U1 intrinsic anode resistance
 μ_1 ; amplification factor μ , triode U1
 μ_2 ; amplification factor μ , triode U2

If a resistor value is not specified in an option, it is set to 0 ohms.

SRPP option 0:

$\text{.param } Rk_2 = (2 \cdot RL + ra_2) / \mu_2$
 $\text{.param } Rk_1 = (Rk_2 \cdot gm_2 \cdot ra_2 + ra_2 - ra_1) / (gm_1 \cdot ra_1)$

SRPP option 1:

$\text{.param } Ra = 2 \cdot (2 \cdot RL + ra_2) / (\mu_2 - 2)$
 $\text{.param } Rk_2 = Ra / 2$
 $\text{.param } Rk_1 = Rk_2$

SRPP option 2:

$\text{.param } Ra = (R_{dc} / 2 - RL - ra_2)$
 $\text{.param } Rk_2 = (RL + R_{dc} / 2) / \mu_2$
 $\text{.param } Rk_1 = (R_{dc} \cdot (1 - 0.5 / \mu_2) - ra_1 - RL / \mu_2) / (\mu_1 + 1)$

SRPP option 3:

$\text{.param } Ra = (R_{dc} / 2 - RL - ra_2)$
 $\text{.param } Rk_2 = (2 \cdot RL + R_{dc}) / (2 \cdot \mu_2)$
 $\text{.param } Rp = (R_{dc} \cdot (1 - 1 / \mu_1 - 1 / \mu_2) / 2 + ra_1 / \mu_1 - ra_2 \cdot (1 + 1 / \mu_1) - RL \cdot (1 / \mu_1 + 1 / \mu_2 + 1))$
 $\text{.param } Rk_1 = (2 \cdot RL + R_{dc} - 2 \cdot ra_1 + 2 \cdot ra_2) / (2 \cdot \mu_1)$

SRPP+ option 1:

$\text{.param } Rk_2 = (R_{dc} \cdot \mu_1 - 2 \cdot RL \cdot (\mu_1 + 1) - ra_1 \cdot (2 \cdot \mu_1 + 1)) / ((2 \cdot \mu_1 + 1) \cdot (\mu_1 + 1))$
 $\text{.param } Rp = (2 \cdot RL + R_{dc}) / (2 \cdot \mu_1 + 1)$
 $\text{.param } Rk_1 = (R_{dc} - ra_1) / (\mu_1 + 1)$

SRPP+ option 2:

$\text{.param } Ra = ((RL + 0.5 \cdot R_{dc}) \cdot (\mu_1 / \mu_2 + 1) + 2 \cdot RL \cdot \mu_1 + R_{dc} \cdot \mu_2 + (1 + \mu_1) \cdot ra_2 - (1 + \mu_2) \cdot ra_1) / (\mu_2 \cdot (\mu_1 + 1))$
 $\text{.param } Rk_2 = ((0.5 \cdot R_{dc} - RL) \cdot \mu_1 + ra_1 - ra_2 \cdot (1 + \mu_1) - (RL + 0.5 \cdot R_{dc}) \cdot (\mu_1 / \mu_2 + 1)) / (\mu_2 \cdot (\mu_1 + 1))$

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.param Rp      = (RL + Rdc/2)/mu_2
.param Rk_1    = (Rdc*(1 -0.5/mu_2) - ra_1 - RL/mu_2)/(mu_1 + 1)
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White CF without Ck_1:

```
.param Ra      = 1/(mu_1/(2*RL + Rdc) - 1/Rg)
.param Rk_2    = (2*RL*(Rdc + Rg - ra_2) + Rdc*(-ra_2 + Rdc + Rg*(1 -mu_1)) +
Rg*mu_1*ra_2)/((mu_2 + 1)*(2*RL + Rdc - Rg*mu_1))
.param Rp      = (((Rdc+ 2*RL)*(Rdc*(mu_2-mu_1) + Rg*mu_2) + Rg*mu_1*(2*RL*mu_2
+ Rdc*mu_1))/(mu_1*Rg - Rdc - 2*RL) +((mu_2+1)*ra_1 -
(mu_1+1)*ra_2))/(mu_1*(mu_2 + 1))
.param Rk_1    = mu_2*(Rg*(2*RL + Rdc)/(2*RL + Rdc - Rg*mu_1) + Rdc + ra_2/mu_2
- ra_1*(1/mu_2+1))/(mu_1*(mu_2 + 1))
```

White CF with Ck_1 option 0:

```
.param Ra      = 1/(mu_1/(ra_1 + 2*RL) - 1/Rg)
.param Rk_1    = (Rdc - ra_1)/(mu_1+1)
.param Eg      = (.5*B_plus*(1-1/mu_2) +Idc*(Ra+ra_2)/mu_2)
```

White CF with Ck_1 option 1:

```
.param Ra      = 1/(mu_1/(2*RL + ra_1) - 1/Rg)
.param Rk_1    = (2*Rdc + ra_1*(Rg*(2*mu_1+1) - 2*ra_1 + 2*RL*(Rg/ra_1 -
2))/(2*RL + ra_1 - Rg*mu_1))/((2*mu_1 + 1))

.param Eg_1    = (2*mu_1 + 1)*(ra_1*ra_2 + Rg*(mu_2*ra_1 - mu_1*ra_2)) - (mu_2
+ 1)*ra_1*ra_1 ; one term in the expression for the DC bias voltage for the
more voltage-positive triode
.param Eg_2    = 2*RL*((2*mu_1 + 1)*ra_2 - (mu_2 + 1)*ra_1 + Rg*(mu_1*mu_2 +
mu_2 - mu_1)) ; one term in the expression for the DC bias voltage for
the more voltage-positive triode
.param Eg_3    = mu_1*mu_2 + mu_2 - mu_1
; one term in the expression for the DC bias voltage for the
more voltage-positive triode
.param Eg      =(Idc*(Eg_1+Eg_2)/(2*RL + ra_1 - Rg*mu_1) +
B_plus*Eg_3)/(mu_2*(2*mu_1 + 1)) ; DC bias voltage for the more
voltage-positive triode
```

White CF with Ck_1 option 2:

; Solution 1 partial calculations: Assume Rp can be replaced
with a short.

```
.param Ra_k    = Rg*(2*RL + ra_1)/(mu_1*Rg - ra_1 -
2*RL)
.param Rk_1_k  = (.5*B_plus/Idc - ra_1)/(1 + mu_1)
.param Rk_2_k  = Rk_1 - Ra
.param Eg_k    = (Idc*(ra_2 + Ra + Rk_2) -
B_plus/2)/mu_2 + B_plus/2 + Idc*Rk_2
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; Solution 2 partial calculations: : Assume Rk_2 can be replaced
with a short.

```

        .param J      = ra_1 + 2*RL
        .param K      = Rg*mu_1 - J
        .param M      = B_plus/(2*Idc) - ra_1
        .param N      = Rg*(1 + 1/mu_1)
        .param T      = N + M/mu_1 - K
        .param U      = J*N - M*K/mu_1
        .param Rp_p   = 0.5*(-T - SQRT(T*T - 4*U))
        .param Rk_1_p = (B_plus/(2*Idc) - ra_1 - Rp_p)/(mu_1 +
1)
        .param Ra_p   = 1/(mu_1/(ra_1 + Rp_p + 2*RL) - 1/Rg)
        .param Eg_p   = (Idc*(ra_2 + Ra_p) - B_plus/2)/mu_2 +
B_plus/2

```

; Completed solution:

```

ELSE    Ra_k)      .param Ra      if(Rp_p > 0 THEN      Ra_p
ELSE    Rk_2_k)    .param Rk_2    if(Rp_p > 0 THEN      0
ELSE    0)         .param Rp      if(Rp_p > 0 THEN      Rp_p
Rk_1_k)          .param Rk_1    if(Rp_p > 0 THEN      Rk_1_p ELSE
Eg_k)            .param Eg      if(Rp_p > 0 THEN      Eg_p ELSE

```