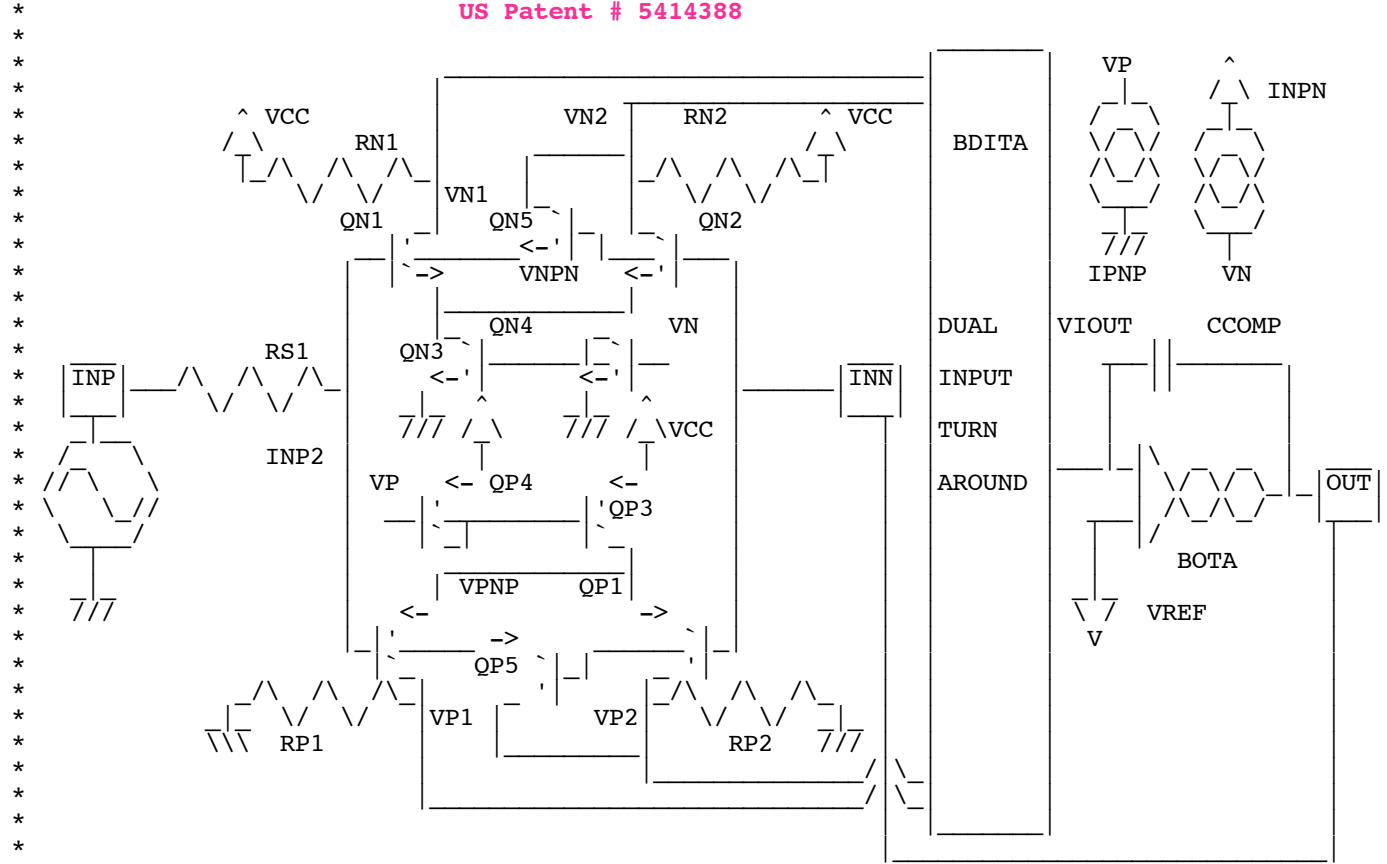


RRIO_Clamp_2Slew

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US Patent # 5414388



.OPTIONS method=trap

VIN	INP	0	PULSE(1 9 1n 1n 1n 10u 20u)		
RS1	INP	INP2	7000		
QP5	VP2	OUT	INP2	PNPV	1
QN5	VN2	OUT	INP2	NPNV	1
QP1	VP1	INP2	VPNP	PNPV	1
QP2	VP2	OUT	VPNP	PNPV	1
QP3	VPNP	VP	VCC	PNPV	1
QP4	VP	VP	VCC	PNPV	1
RP1	VP1	0	5K		
RP2	VP2	0	5K		
QN1	VN1	INP2	VNPN	NPNV	1

```

QN2      VN2  OUT  VNPN  NPNV  1
QN3      VNPV VN    0      NPNV  1
QN4      VN  VN    0      NPNV  1
RN1      VCC  VN1  5K
RN2      VCC  VN2  5K

VCC      VCC  0      12
VREF     VREF 0      6
IPNP     VP   0      20u
INPN     VCC  VN    20u

BDITA    VIOUT 0      I = ( V(VP2) - V(VP1) + V(VN2) - V(VN1) )/5000
BOTA     OUT  0      I = -1*( V(VIOUT) - V(VREF) )/50
CCOMP    OUT  VIOUT 20p

.tran    100n  50u    0      100n
.model   NPNV npn BF=150
.model   PNPV pnp BF=150

.control
run
set      pensize = 2
plot     v(out) v(inp)

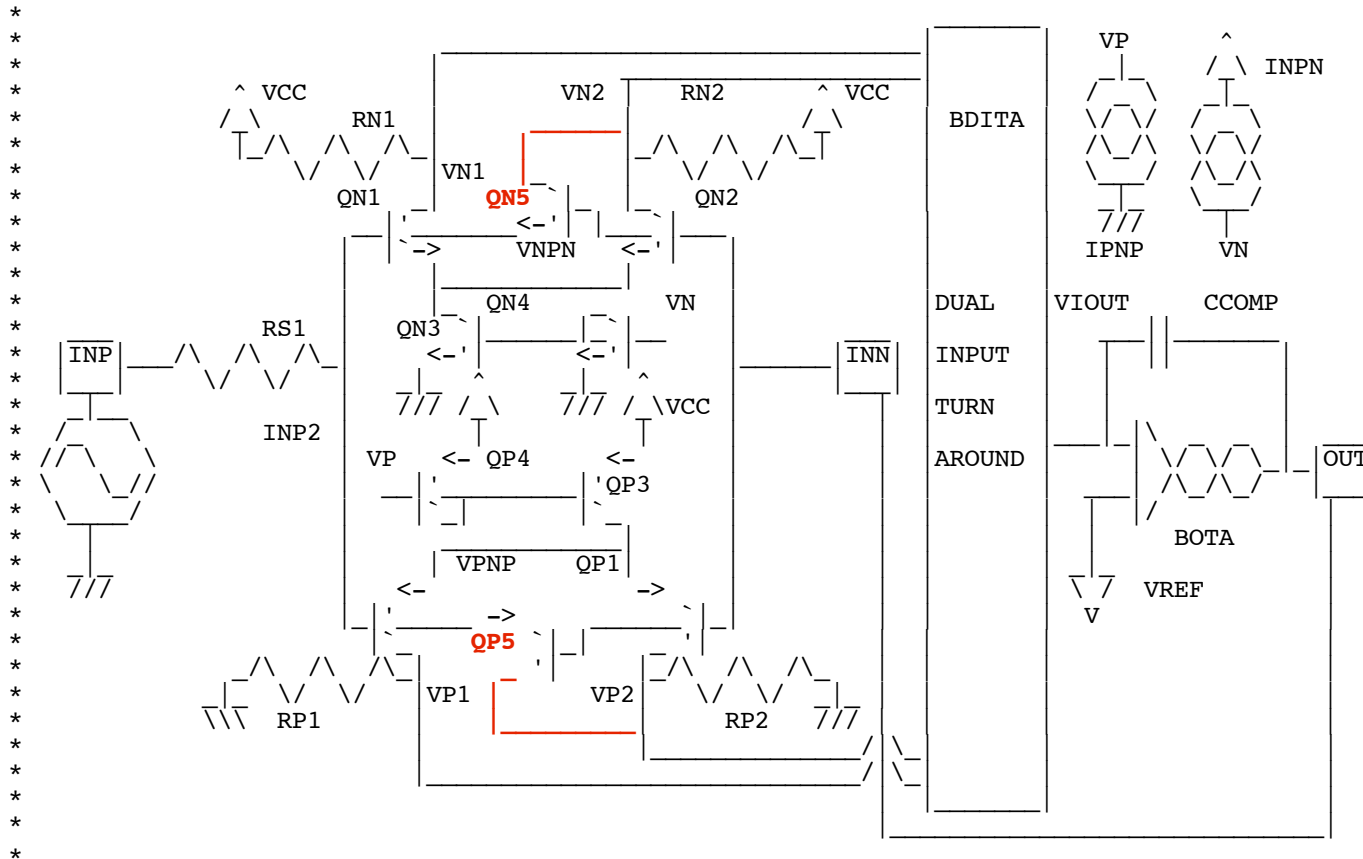
.endc
.end

```

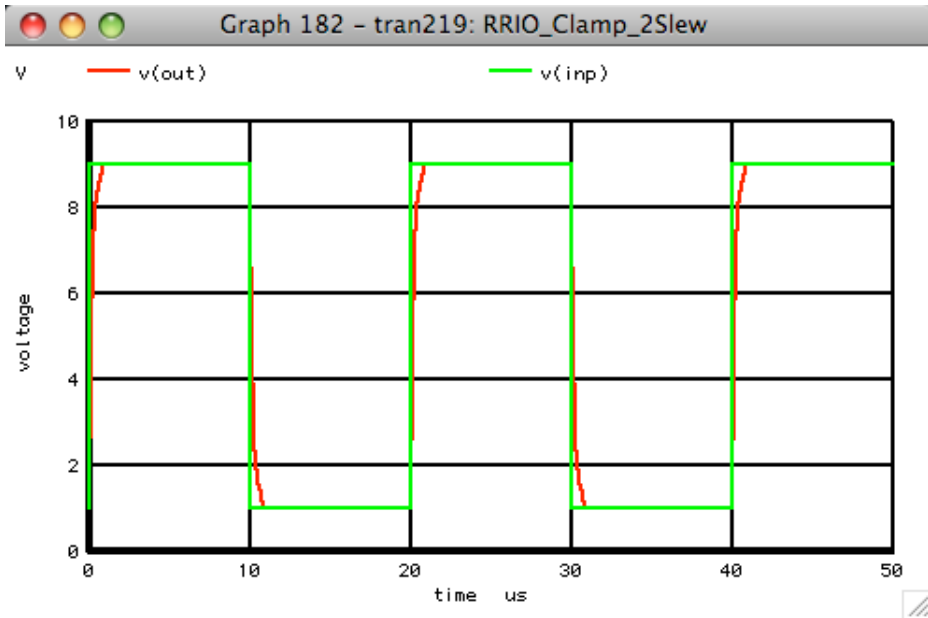
* =====END=====

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Sometime good things come for free. In the case of the LM6142, input clamp diodes were needed. But diodes are just transistors which have there collector and base leads shorted together.



What would happen if the collectors were connected to the signal path instead. So not only do they protect the inputs, they greatly increase the slew rate.



This had another interesting effect in terms of settle time. The clamping current only come in when the input stage is being overdriven by about a volt. For following a square wave, the slew is fast up until the output starts approaching the input. The the clamping stops and the settle time proceeds as normal.