Darlington and Quasi Darlington

By G8MNY (Updated May 06)

(8 Bit ASCII Graphics use code page 437 or 850)

This simple way to improve the current gain of a transistor just use 2 in cascade, often used in PSU's & AF output stages & even the odd RF signal amp. Two separate devices can be used or in a single package.

NORMAL

Collector

DARLINGTON

T1

Base

1V

Current

1-1.5V

Saturated

Gain HFE = T1 x T2

Emitter

This method has the 2 transistors of the same type, & has the disadvantage of higher bias voltage.

QUASI

Collector!

DARLINGTON

T1

Base

Saturated

Gain HFE = T1 x T2

This is often used where T1 is a PNP & T2 is a cheaper high power NPN.

To speed up the 2nd transistor turn off, a low Û is often used base to emitter in either configuration.

AS USED IN A PUSH PULL AMP

Quasi

Complementary

Class B Output

Rc / T3

NPN

Fuse

From Bridge

Rectifier

Cbs

D1

Bias

1000 Û

Re

4A Pk

Rnfb

D2

Re

u1

+ ===

AF>— Rin

Input

Cin

T1

1000 Û

NPN

<0v

CLASS A STAGE

QUASI COMPLIMENT

ZOBAL

LOAD

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COMPONENT VALUES
Input Z = Rin, eg. 10k
XCin = Rin @ 10Hz, eg. 2μF
Rb sets 35V on the O/P, ((Rc+Rs) x T1Hfe), eg. 330k
Gain = (Rnfb//Rb)/Rin, eg. 10x = 150k
XCnfb = Rnfb @ < 10Hz, eg. 1μF
T1= 100mA 100v 100x 1W
T2 & T3 = 1A 100V 30x 5W, eg. TIP29/30
T4 & T5 = 15A 100V 20x 115W on heatsink, eg. 2N3055
100Ω in T4 & 5 base-emitter, ensure they turn off properly.
D1 & D2 drop the 1.3V needed to just under bias the O/Ps, eg. 1N4148
Re maintain thermal stability, e.g. 0.22μ 2W
Rc sets the peak +ve O/P current (eg. ½ x LS x T5Hfe x T3Hfe) eg. 2k2 2W
Cbs & Rbs make a bootstrap to maintain current through Rc.
  Rbs = Rc/2  eg. 1k 1W
  XCbs = Rbs @ < 10Hz  eg. 30μF @ 50V
  XCl = LS @ < 10Hz  eg. 1000μF @ 50V
  XCpower = LS @ < 20Hz, assuming 100Hz supply from bridge, e.g. 4700μF @ 80V
Zobal network keeps the O/P terminated at HF when the LS is O/C, for stability.

In practice there would be more gain stages in front providing 3V RMS & more
N.F.B. for lower distortion, but this circuit should work OK.

Why don't U send an interesting bul?

73 De John, G8MNY @ GB7CIP