



Shri Vile Parle Kelvani Mandal's

DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING

Approved by AICTE and Affiliated to the University of Mumbai



Department of Electronics & Telecommunication Engineering

Mini Project Report On

“Darlington Emitter-Follower Buffer”

Student Name: Atulya Kumar

SAP ID: 60002160052

Class/Sem: 4th Sem

Teacher's Name: Prof T. D. Biradar



Shri Vile Parle Kelvani Mandal's

DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING

Approved by AICTE and Affiliated to the University of Mumbai



Department of Electronics & Telecommunication Engineering

CERTIFICATE

This is to certify that M/S. _____,
SAP ID _____ of SE EXTC 1 / 2: has submitted their
Mini Project for Subject Name for the Academic Year 2017-2018.

Guide

Examiner

Head of Department

EXTC Department



Shri Vile Parle Kelvani Mandal's

DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING

Approved by AICTE and Affiliated to the University of Mumbai



Department of Electronics & Telecommunication Engineering

Index

<u>Sr. No.</u>	<u>Title</u>
1.	Introduction
2.	Circuit Diagram
3.	Working Principle
4.	Observations
5.	Conclusions
6.	References



Department of Electronics & Telecommunication Engineering

Introduction:

A Darlington pair is two transistors that act as a single transistor but with a much higher current gain. This means that a tiny amount of current from a sensor, micro-controller or similar can be used to drive a larger load.

An emitter follower (also known as a common collector amplifier) is one of three basic single-stage bipolar junction transistor (BJT) amplifier topologies, typically used as a voltage buffer.

Advantages and Disadvantages of Darlington Transistor Pair:

The Darlington transistor pair has many advantages and disadvantages depending on its use. They are

Advantages :

1. The current gain of this transistor is high
2. The input impedance of this circuit is high
3. These are widely available in a single package
4. The circuit configuration is easy and very convenient

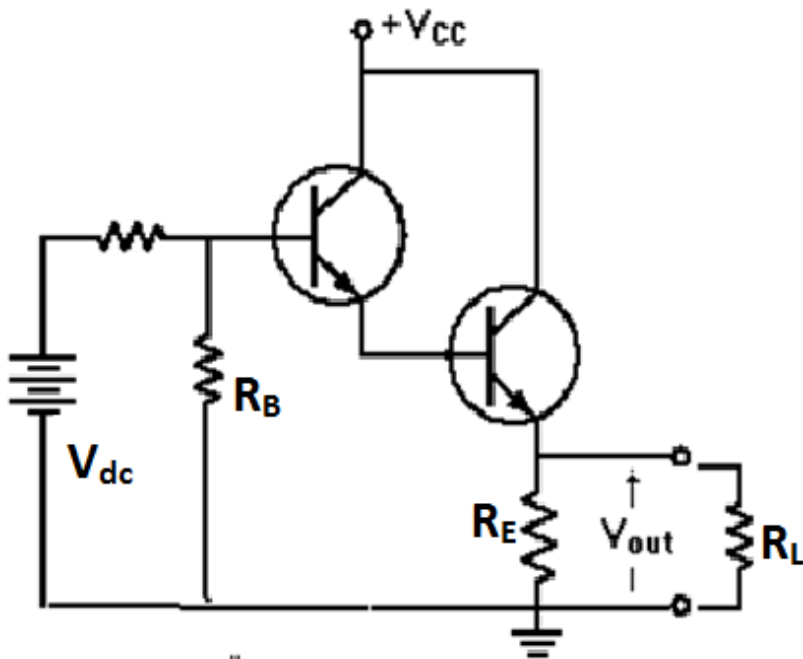
Disadvantages :

1. Switching speed is slow
2. Narrow Bandwidth
3. Base emitter voltage is high
4. Saturation voltage is high which can lead to high levels of power dissipation in certain applications.



Department of Electronics & Telecommunication Engineering

Circuit Diagram:



In the circuit above, R_B is the base resistance, R_E is the emitter resistance and R_L is the resistance of the appliance being used.

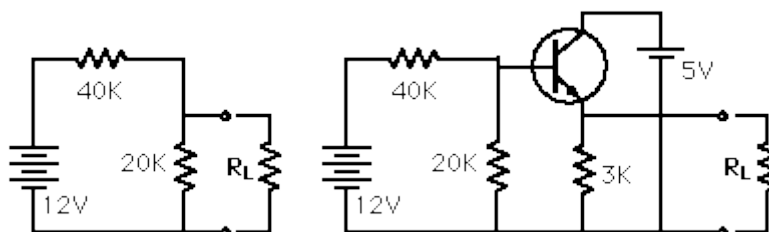
The two BJTs during operation time act as one.

A constant dc voltage is supplied to the circuit during operation.

V_{out} is measured across R_L . For an emitter follower buffer circuit, the V_{out} is constant for any R_L used.

**Department of Electronics & Telecommunication Engineering****Working Principle :**

An emitter follower can serve as a buffer for a voltage source. The voltage divider at left is a poor voltage source because it is so strongly affected by the value of the load resistor. The same voltage divider with the transistor buffer at right will supply power to keep the voltage constant over its range of operation.



The simple voltage divider will give a 4V output for an open circuit, but quickly drops when larger loads (smaller load resistors) are connected. The buffer helps to keep the output voltage more nearly constant. You can change the value of the load resistor below to explore the effect of the buffer.

A 0.6 V diode drop was assumed for the transistor. The input impedance to the transistor buffer is assumed to be so high as to present essentially an open circuit.



Shri Vile Parle Kelvani Mandal's

DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING

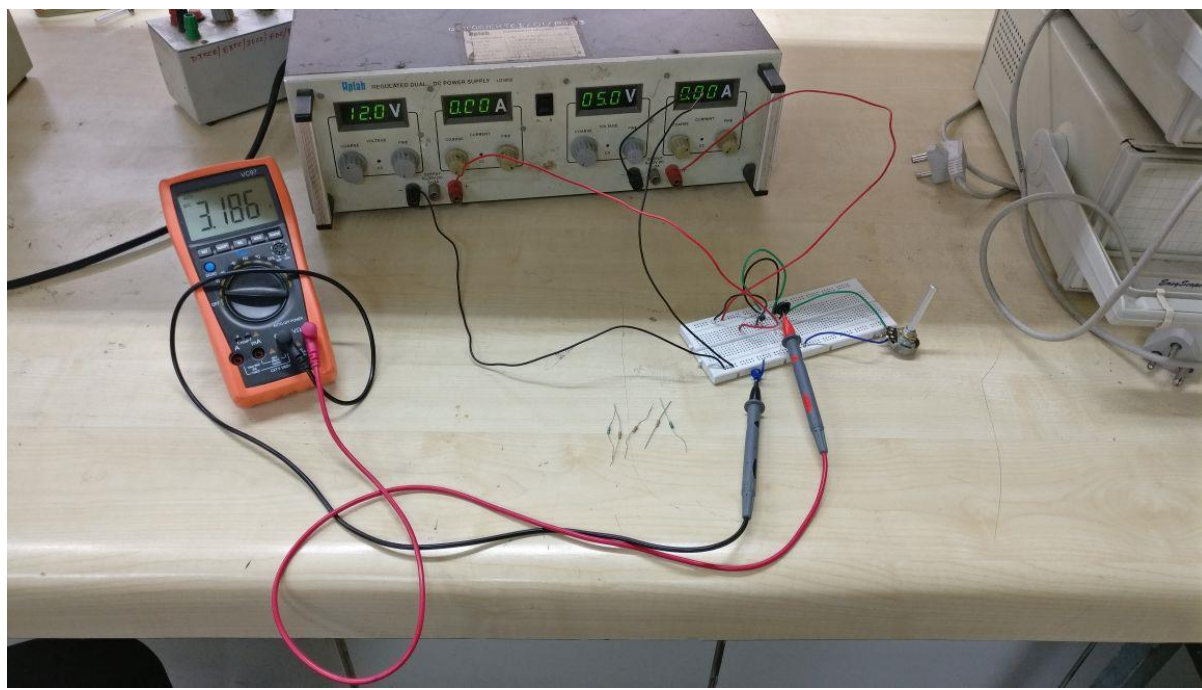
Approved by AICTE and Affiliated to the University of Mumbai



Department of Electronics & Telecommunication Engineering

Observation Table:

Load Resistance (R_L)	Load Voltage (V_L) Of Emitter Follower Buffer	Load Voltage (V_L) Of Voltage Divider Circuit
1K	3.10 V	0.29 V
2.2K	3.13 V	0.59 V
5K	3.14 V	1.15 V
10K	3.16 V	1.79 V
20K	3.09 V	2.61 V
50K	3.167 V	3.4V





Department of Electronics & Telecommunication Engineering

Conclusions:

We have successfully designed and implemented a Darlington Emitter-Follower Buffer using two transistors (BC 147).

The applications of Darlington transistor pair involve where a high gain is required at a low frequency like Power regulators, Audio amplifier output stages, Display drivers, Motor controllers, Touch and light sensors and solenoid control.

References:

1. Electronic Devices and Circuit Theory -- Robert L. Boylestead and Louis Nashelsky
2. Electronics Circuits (Analysis and Design) – Donald A. Neamen
3. Electronic Devices – J.B Gupta