

Name _____
Date _____
Instructor _____

EXPERIMENT

18

Common-Base
and Emitter-
Follower
(Common-
Collector)
Transistor Amplifiers

OBJECTIVE

To measure DC and AC voltages in common-base and emitter-follower (common-collector) amplifiers. To obtain measured values of voltage amplification (A_v), input impedance (Z_i) and output impedance (Z_o).

EQUIPMENT REQUIRED

Instruments

Oscilloscope
DMM
Function generator
DC power supply

Components

Resistors

(1) 100- Ω
(1) 1-k Ω
(2) 3-k Ω
(2) 10-k Ω
(1) 33-k Ω
(1) 100-k Ω

Capacitors

(2) 15- μ F
(1) 100- μ F

Transistors

(2) NPN (2N3904, 2N2219, or equivalent general purpose)

EQUIPMENT ISSUED

<i>Item</i>	<i>Laboratory serial no.</i>
DC power supply	
Function generator	
Oscilloscope	
DMM	

RÉSUMÉ OF THEORY

The common-base (CB) transistor amplifier configuration is used primarily for higher frequency operation. It provides large voltage gain at low input and moderate output impedance. Its voltage gain is

$$A_v = \frac{R_C}{r_e} \quad (18.1)$$

AC Input Impedance: The ac input impedance is

$$Z_i = r_e \quad (\text{grounded based terminal}) \quad (18.2)$$

AC Output Impedance: The AC output impedance is

$$Z_o = R_C \quad (18.3)$$

The common-collector (CC) or emitter-follower (EF) transistor amplifier configuration is used primarily for impedance matching operation. It provides voltage gain near unity, high input and low output impedance.

AC Voltage Gain: The AC voltage gain of a CC amplifier is calculated as

$$A_v = \frac{R_E}{R_E + r_e} \quad (18.4)$$

AC Input Impedance: The AC input impedance is calculated as

$$Z_i = R_1 || R_2 || \beta(R_E + r_e) \quad (18.5)$$

AC Output Impedance: The AC output impedance is

$$Z_o = r_e \quad (18.6)$$