

Swamped Amplifiers

Name

Purpose:

- * To bias a Common Emitter amplifier in Class A, Class B & Class C & examine the differences.
- * To demonstrate the effects of Swamping on a CE amplifier.

<u>Equipment:</u>

- * 1 Dual dc Power Supply
- * 1 Digital Multimeter (DMM)
- * 1 Variable ac Signal Generator
- * 1 Dual Trace Oscilloscope
- * 1 2N3904 npn Transistor
- * 1 10 k Ω Potentiometer (103)
- * 7 Resistors 1 -150 Ω 2 3.6 k Ω
 - 1 820Ω 2 10k Ω
 - 1 1 k Ω 1 47 k Ω
 - 2 2.2 k Ω
- * 2 10 μ F Capacitors
- * 1 470 μ F Capacitors



Section

<u>Prelab:</u>

1) Perform the dc analysis and ac analysis calculations in <u>*Part C*</u> of this Lab

Lab Procedure <u>Part A</u> <u>Amplifier Classes</u>

- 1) Adjust the 10 k Ω potentiometer until $V_{\rm B}$ is approximately 1.8 Volts.
- 2) Adjust the signal generator to the values illustrated in the schematic.
- 3) Connect the oscilloscope with Channel 1 across the input and Channel 2 connected to the collector. Set the time-base so that approximately two complete cycles are shown on the screen. Draw the waveforms (both input and output) on the sheet provided. Be sure to completely label it.
- 4) Adjust the 10 k Ω potentiometer until V_{B} is approximately 0.6 Volts.
- 5) Draw the waveforms (both input and output) on the sheet provided. Be sure to completely label it.
- 6) Adjust the 10 k Ω potentiometer until $V_{\rm B}$ is approximately -0.1 Volts.
- 7) Draw the waveforms (both input and output) on page 2.





Answer Group for Procedure 3

- 1) Sketch 2 cycles of both the input and output waveforms.
- 2) Label each waveform.

Time / Div.

CH 1 Volts/Div. ____

Volts/Div. **CH 2**

Amplifier Class

Answer Group for Procedure 5

1) Sketch 2 cycles of both the input and output waveforms.

2) Label each waveform.

Time / Div.

CH 1 Volts/Div.

CH 2 Volts/Div.

Amplifier Class

Answer Group for Procedure 7

1) Sketch 2 cycles of both the input and output waveforms.

2) Label each waveform.

____ Volts/Div. **CH 1**

CH 2 Volts/Div.

Amplifier Class

Time / Div.

		-	-		
		-	-		
		1 1 1	-		
		-	-		
		-	-		
		-	-		



Part B The Swamped Amplifier

1) In Figure 2, if C₃ is removed from the circuit, the gain will be affected. Calculate the new value of v_{out} .

2) Swamping an a advantages.	amplifier reduces its voltage gain, but gives it other ad-	vantages. What are two of these
2		

3) Why does swamping improve stability?



ac Analysis Worksheet

Find v_{out} for Figure 2. In order to achieve this we must find the ordinary voltage gain of the amplifier.

<u>Find</u> A_V We know that this is a swamped amplifier and that the formula for voltage gain is We need to find r_c and $r_c = R_c \parallel R_L$. Find r_c for Q_1 .

 $A_{V} = \frac{r_{c}}{r_{E} + r_{e}'}$

r_c = _____

□ You found r'_e when you did the dc analysis. Use it now to find A_V . In this case r_E is the emitter resistor that is not bypassed, – the 150 Ω -- R_5

 $A_V =$ _____

 \Box Find \mathcal{V}_{out} for Q₁. This is \mathcal{V}_{out} multiplied by the voltage gain for Q₁. Use the formula

 $V_{out} = A_V V_{in}$

 $v_{out} =$ _____