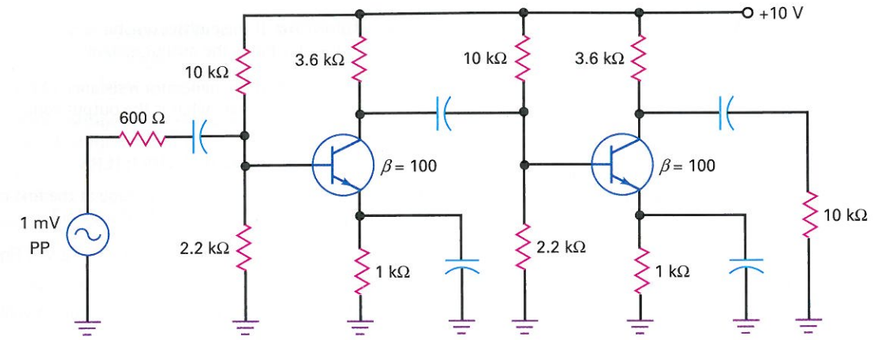
Figure 10-15



SEC. 10-4 SWAMPED AMPLIFIER

10-10 MultiSim The generator voltage of Fig. 10-16 is reduced by half. What is the output voltage? Ignore r'_e.

10-11 MultiSim If the generator resistance of Fig. 10-16 is 50 Ω, what is the output voltage?

10-12 MultiSim The load resistance of Fig. 10-16 is reduced to 3.6 kΩ. What is the voltage gain?

10-13 MultiSim The supply voltage triples in Fig. 10-16. What is the voltage gain?

SEC. 10-5 TWO-STAGE FEEDBACK

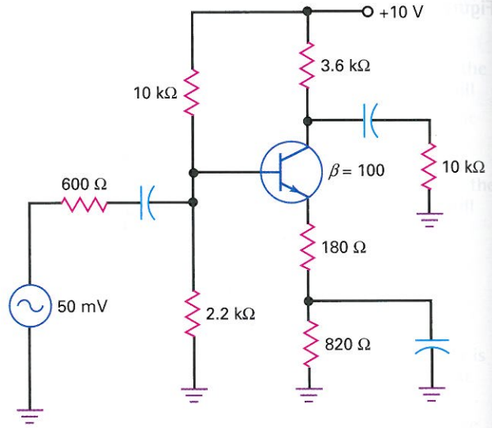
10-14 A feedback amplifier like Fig. 10-10 has $r_f = 5$ kΩ and $r_e = 50$ Ω. What is the voltage gain?

10-15 In a feedback amplifier like Fig. 10-11, $r_e = 125$ Ω. If you want a voltage gain of 100, what value should r_f be?

SEC. 10-6 TROUBLESHOOTING

10-16 In Fig. 10-15, the emitter bypass capacitor is open in the first stage. What happens to the dc voltages of the first stage? To the ac input voltage of the second stage? To the final output voltage?

Figure 10-16



10-17 There is no ac load voltage in Fig. 10-15. The ac input voltage to the second stage is approximately 20 mV. Name some of the possible troubles.

Critical Thinking

10-18 All resistances are doubled in Fig. 10-13. What is the voltage gain?

10-19 If all resistances are doubled in Fig. 10-14, what is the output voltage?

10-20 In Fig. 10-15, all resistances are doubled. What is the output voltage?

10-21 If the load resistor of Fig. 10-15 is disconnected, what is the Thevenin resistance of the second stage?

Troubleshooting

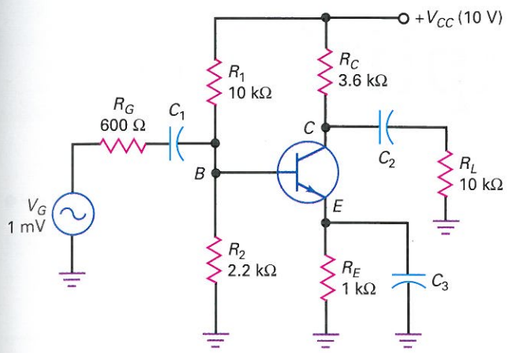
Refer to Fig. 10-17 for the following problems.

10-22 Find Troubles 1 to 4.

10-23 Find Troubles 5 to 8.

10-24 Find Troubles 9 to 12.

Figure 10-17 Troubleshooting.



	V_B	V_E	V_C	v_b	v_e	v_c
OK	1.8	1.1	6	0.6 mV	0	73 mV
*T*1	1.8	1.1	6	0	0	0
*T*2	1.83	1.13	10	0.75 mV	0	0
*T*3	1.1	0.4	10	0	0	0
*T*4	0	0	10	0.8 mV	0	0
*T*5	1.8	1.1	6	0.6 mV	0	98 mV
*T*6	3.4	2.7	2.8	0	0	0
*T*7	1.8	1.1	6	0.75 mV	0.75 mV	1.93 mV
*T*8	1.1	0.4	0.5	0	0	0
*T*9	0	0	0	0.75 mV	0	0
*T*10	1.83	0	10	0.75 mV	0	0
*T*11	2.1	2.1	2.1	0	0	0
*T*12	1.8	1.1	6	0	0	0

Job Interview Questions

1. Draw a VDB amplifier. Now, tell me how it works. Include voltage gain and input impedance in your discussion.
2. Draw a swamped amplifier. What is its voltage gain and input impedance? Why does it stabilize voltage gain?
3. In a multistage amplifier, what effect does the input impedance of a stage have on the preceding stage? What effect does a change in β have?
4. What are three improvements that negative feedback makes in an amplifier?
5. You want a circuit like Fig. 10-12 to operate down to 0 Hz. What changes would you have to make?
6. What effect does a swamping resistor have on the voltage gain?
7. What characteristics are desirable in an audio amplifier, and why?
8. What is a swamping resistor, and what does it do?
9. If no value of β is given, what is a reasonable value for a technician to assume?
10. Explain the usefulness of capacitors in multistage voltage amplifiers.
11. What is a swamping resistor? Name three improvements it makes.

Self-Test Answers

1.	c	**5.**	d	**9.**	c	**13.**	a	**17.**	d	**21.**	b	**25.**	a
2.	b	**6.**	c	**10.**	c	**14.**	d	**18.**	b	**22.**	c	**26.**	a
3.	a	**7.**	c	**11.**	d	**15.**	a	**19.**	a	**23.**	b	**27.**	b
4.	c	**8.**	b	**12.**	b	**16.**	a	**20.**	d	**24.**	a	**28.**	c

Practice Problem Answers

10-1 $A_V = 104$

10-2 $V_{out} = 277$ mV

10-3 $V_{out} = 226$ mV

10-4 $V_{out} = 167$ mV

10-5 $V_{out} = 2.24$ V

10-6 $V_{out} = 547$ mV

10-7 Calculated value approximately equal to MultiSim

10-9 $r_f = 4.9$ kΩ

10-12 V_B would increase slightly. $V_E = 0$ V and $V_C = 10$ V. AC measurements would show a slight increase of V_{in} at the base, along with no emitter or collector ac values.