

Overview

In this unit your students should:

- find out how an op-amp can be made into a voltage follower
- understand that a voltage follower has a voltage gain of +1
- understand that a voltage follower can provide power gain
- meet the transfer characteristic of an op-amp voltage follower

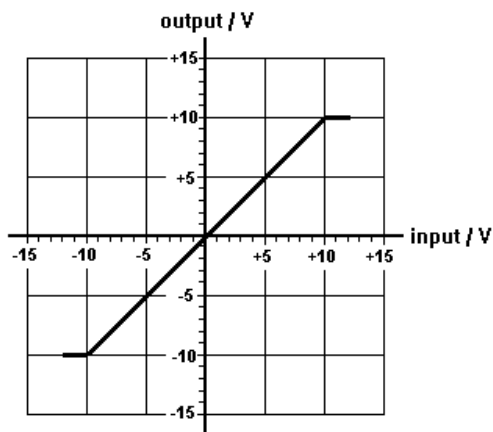
This should not require more than 3 hours of class time.

Hour	Suggested Activity
1	<p>Launch students straight into the Loading a voltage divider practical. This should give them some idea about the usefulness of a voltage follower.</p> <p>As they finish, get them to start questions 1 and 2 of the Voltage Followers exercises.</p> <p>Ask students to complete questions 1 to 3 of the Voltage Followers exercises before the next session.</p>
2	<p>Discuss their answers to questions 1 to 3 of the Voltage Followers exercises.</p> <p>Set them to do the Transfer characteristic of a voltage follower practical. Note that the TL084 op-amp output saturates high when the non-inverting input goes below about -4 V, so this is a region to be avoided.</p> <p>As they finish, let them start answering question 4 of the Voltage Followers exercises.</p> <p>Ask them to answer question 1 on page 97 of the text book before the next session.</p>
3	<p>Get students to work through question 4 of the Voltage Followers exercises.</p> <p>Then go through the derivation of the gain formula for a non-inverting amplifier, emphasising how this leads to an amplifier which is automatically linear provided that it doesn't saturate.</p> <p>Ask them to answer question 2 on page 98 of the text book before the next session.</p>

Model Answers

- 1 (a) Any difference in voltage between the input and output results in a change in the output which reduces that difference. The only stable setting is for the output and input to sit at the same voltage.

(b)



- 2 (a) $I = V/R = 5 / 100 \times 10^3 = 5.0 \times 10^{-5} \text{ A}$ or $50 \mu\text{A}$
 (b) $P = VI = 5 \times 5.0 \times 10^{-5} = 2.5 \times 10^{-4} \text{ W}$ or 0.25 mW
 (c) $I = V/R = 5 / 16 = 3.1 \times 10^{-1} \text{ A}$
 $P = VI = 5 \times 3.1 \times 10^{-1} = 1.6 \text{ W}$
 (d) power gain = $1.6 / 2.5 \times 10^{-4} = 6.4 \times 10^3$ or 6400