

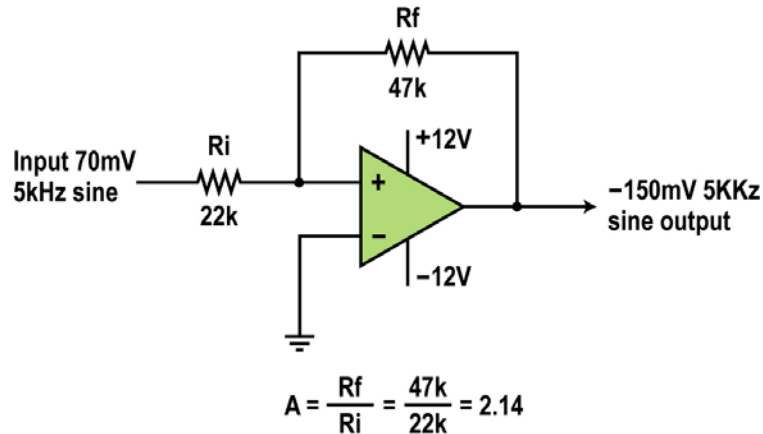
KNOWLEDGE PROBE 3: TROUBLESHOOTING

Troubleshooting Techniques

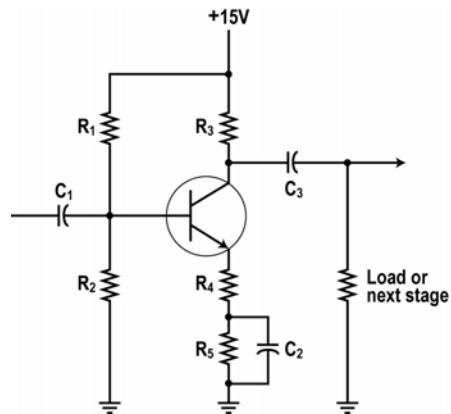
Learning Objectives

- Describe troubleshooting by signal injection.
- Describe troubleshooting by signal tracing.
- Describe troubleshooting by substitution.
- Identify tools, equipment, and documentation needed for troubleshooting.

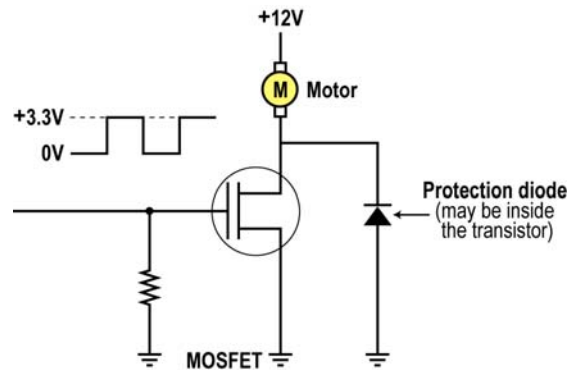
1. Electronic equipment may be easy to use but usually very complex internally. Before you begin troubleshooting, you most definitely should have
 - a. A bachelors degree in electronics
 - b. A full set of appropriate tools
 - c. Appropriate test equipment
 - d. Complete documentation
2. If you are going to troubleshoot a specific type of equipment or system on a regular basis, you definitely should have
 - a. A full set of appropriate tools
 - b. Appropriate test equipment
 - c. Complete documentation
 - d. Formal training on the equipment
3. Which of the following is a good source of troubleshooting information?
 - a. Equipment manuals
 - b. Help desk and call centers
 - c. Manufacturer websites
 - d. All of the above
4. One of the fastest but somewhat expensive troubleshooting approaches is
 - a. Intelligent guessing
 - b. Signal injection
 - c. Signal tracing
 - d. Substitution
5. What troubleshooting method has you observing inputs and outputs of circuits and modules?
 - a. Intelligent guessing
 - b. Power measurement
 - c. Signal tracing
 - d. Substitution



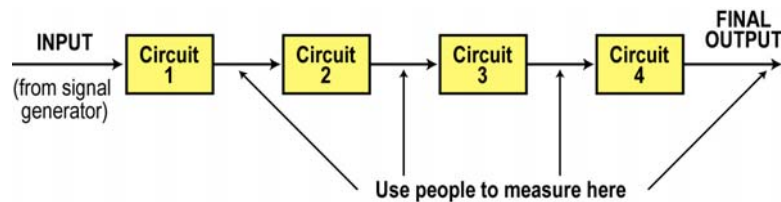
6. The output of the op amp shown here is supposed to be a sine wave of 16 volts peak-to-peak. Instead, an oscilloscope shows the output to be a square wave of 24 volts peak-to-peak. The most likely problem is:
- Input voltage too high
 - Power supply failure
 - R_i open
 - Shorted R_f



7. In the amplifier circuit shown here, an input signal of 200 mV is present as it is supposed to be. The output across the load is a distorted sine wave. A DC voltage of 9 volts appears across the load as well. What may be the problem?
- C_2 is shorted.
 - C_3 is shorted
 - R_2 is open.
 - Transistor is bad



8. The input signal to the MOSFET gate is +3.3 volts. The motor is not on. The voltage at the MOSFET drain to ground is zero. The supply voltage is +12 volts. The most likely problem is
- Diode is open
 - Diode is shorted
 - MOSFET is defective
 - Motor winding is open



9. The input signal to the circuit is correct. There is no final output. The correct signals do occur at the outputs of stages 1, 2, and 3. The problem lies in
- DC power supply
 - Stages 2 and 3
 - Stage 1
 - Stage 4
10. Signal injection is more difficult than signal tracing because
- It is NOT more difficult
 - More different types of signal sources are needed
 - Multiple oscilloscopes are needed
 - Multiple signal sources are needed simultaneously to do it correctly