Noise In Wire Wound Potentiometers. A precision potentiometer is an electro-mechanical transducer dependent upon the relative position of a moving electrical contact (wiper) and a resistance element for its operation. It delivers a voltage output that is some specified function of applied voltage and shaft position. The wire wound potentiometer is manufactured in its simplest form as a three terminal device, as shown schematically in Fig. 1-26. Turns of resistance wire are wound on a form (mandrel), and the wiper can traverse from a point of zero resistance to a resistance value equal to the total resistance of the wire wound element, thus functioning as a voltage divider.

Each turn of the resistance wire in a potentiometer has a finite resistance resulting in the situation pictured in Fig. 1-28. As the wiper is moved from one turn to the next, the resistance and output voltage change in steps rather than changing in a smooth linear manner. This steplike change is called “resolution noise.” Resolution noise must be added to the noise caused by other factors, as previously covered.

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**Fig. 1-26.** Potentiometer circuit (voltage divider).

**Fig. 1-27.** Wire wound resistance element from a potentiometer. Mandrel is round.

**Fig. 1-28.** Representation of a wiper on a wire wound potentiometer element.