

Cathode Rays Tube

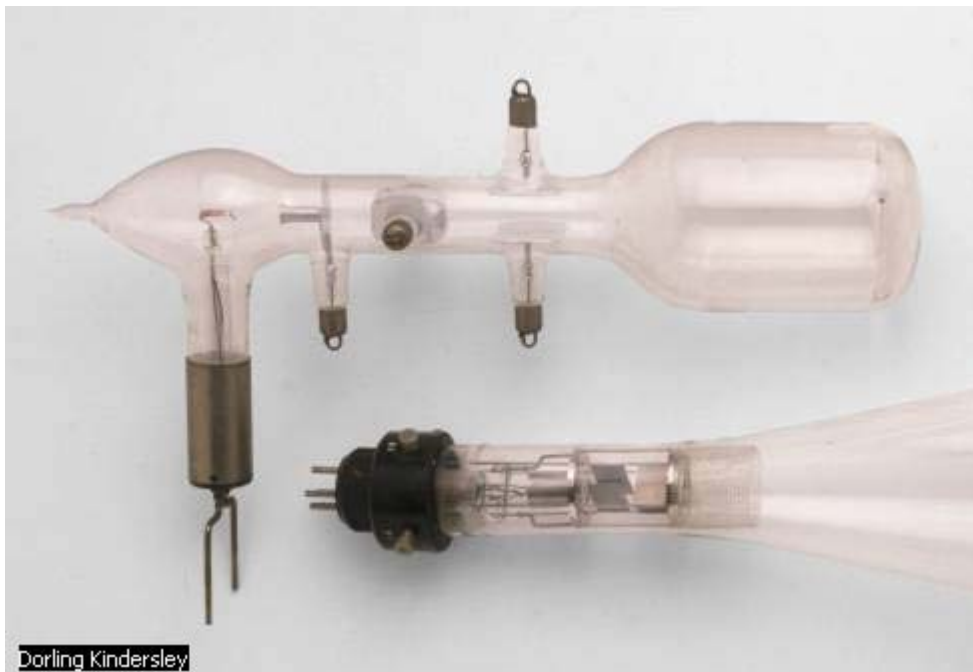
Cathode-Ray Tube, an electron tube, or evacuated glass container, having at one end a cathode, or negative electrode, and a device called an electron gun that projects a beam of electrons against a luminescent screen at the opposite end of the tube. A bright spot of light appears wherever the electrons strike the screen. Cathode-ray tubes, or CRTs, are used as picture tubes in television receivers and as visual display screens in radar-receiving equipment, computer installations, and oscilloscopes (*see* Computer; Oscilloscope; Radar; Television).

Electrons are emitted from a heated cathode in the electron gun. A series of grids having a positive potential with respect to the cathode accelerate the electrons as they pass. The electrons next pass through a series of doughnut-shaped anodes that focus the stream of electrons so that they strike the luminescent screen as a fine point. Between the electron gun and the screen are either two sets of electric deflecting plates or two sets of magnetic deflecting coils. Electric deflecting plates are used in small CRTs, whereas magnetic deflecting coils are used in large CRTs in which a large deflection is required, as in television tubes.

In CRTs containing electric deflecting plates, a horizontal pair of plates controls the up-and-down motion of the electron beam, and a vertical pair controls the left-to-right motion of the beam. In each pair of plates, one plate has a negative charge of electricity, and the other plate has a positive charge. If the charges are equal in value, the beam will strike the center of the luminescent screen. If the charges are unequal, the electron beam will be deflected. The amount of deflection depends on the voltage applied to the plates. As the signal applied to the horizontal plates varies, so will the spot of light on the face of the tube, which will move up or down in response to the changes in voltage. If the voltage of the vertical plates is varied, the beam of electrons can be made to sweep horizontally across the face of the tube.

Magnetic deflecting coils work in an analogous manner, except that the electron beam is deflected by variations in the strength of the magnetic fields through which it must pass.

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Cathode-Ray Tubes

Pictured here are two cathode-ray tubes (CRTs) that played an important role in the development of CRT technology. An early CRT constructed by Ferdinand Braun in 1897, *above*, has an electron source at the left end, and two pairs of metal plates used to deflect the electron beam. The first color television tube, *below*, was built in 1953. It has three electron beam sources for each of the three colors blue, green, and red.

Dorling Kindersley

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