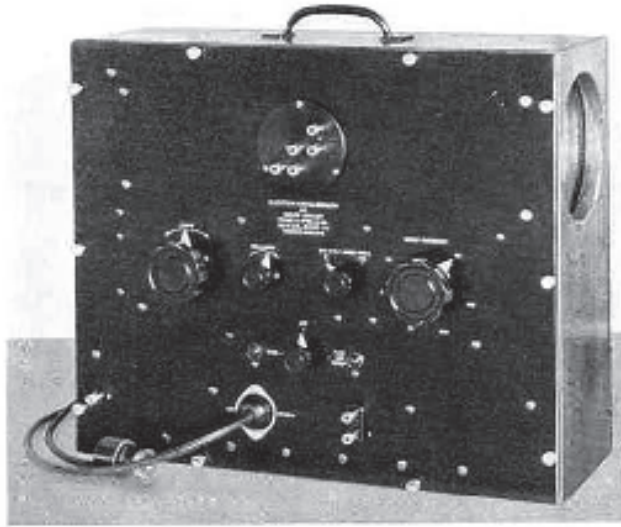


TYPE 687-A ELECTRON OSCILLOGRAPH AND BEDELL SWEEP CIRCUIT



The TYPE 687-A Electron Oscilloscope is designed to present in a simple, portable, and inexpensive form all of the elements required for using the cathode-ray tube as an oscilloscope. The unit includes a power supply providing for all voltage requirements as well as a sweep circuit which furnishes a saw-tooth deflecting voltage.

This instrument will be found to meet the great majority of requirements for a general-purpose oscilloscope. It can be used in the examination of all types of waveform. In this application the sweep circuit is connected to the horizontal plates and performs the function of the revolving mirror in the mechanical type of oscilloscope. The equipment is as convenient to use as a voltmeter. It requires only connection to the line and to the source of voltage which is being examined.

This General Radio cathode-ray oscilloscope has two particular advantages. The internal sweep circuit is of the self-synchronizing type, that is, it will lock in step with a recurrent waveform of any audio frequency. The steady screen pattern so obtained is invaluable in careful visual study, measurement, and photography of complex waveforms with simple camera equipment.

The short, direct leads from the deflecting-plate cap terminals to the panel remove the normal frequency limitations and make the oscilloscope ideal for measurements up to 130 megacycles (2.3 meters). These accessible panel terminals permit the operation of either or both pairs of plates balanced or unbalanced to ground.

As a radio-frequency voltmeter the deflection sensitivity is constant over the same wide frequency range, making the oscilloscope ideally suited for modulation measurements. If the linear sweep circuit is used, a continuous check upon modulation is provided, since a single glance at the modulation-envelope pattern will show whether or not over-modulation is taking place. With the modulating voltage applied to the horizontal plates, the familiar trapezoidal modulation patterns are obtained on which accurate measurements may be made for steady state conditions.

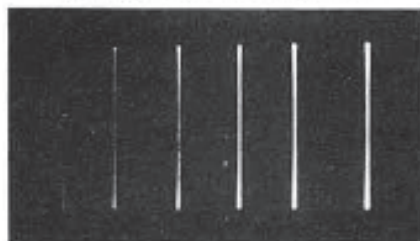
The power supply is designed to provide all necessary voltages for the cathode-ray tube which is provided as initial equipment. Mechanically, the equipment is assembled in a carrying case of convenient dimensions with a handle, making it easily portable.

SPECIFICATIONS

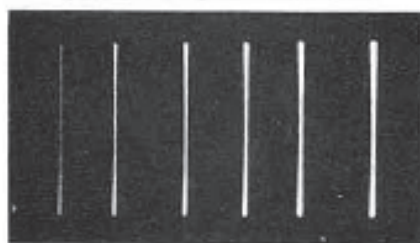
Tube: All tube specifications are the manufacturers' latest published data.

Spot Intensity: A so-called fast-screen tube (TYPE 687-P2) will be furnished unless otherwise specified. This type of screen is recommended for photography and is essential when rapid transients are involved. The figures below show the relative photographic brilliancy of the two types. Length of trace, sweep frequency, shutter speed, and emulsion are identical for each trace.

TYPE 687-P1 Slow-Screen Tube



TYPE 687-P2 Fast-Screen Tube



$f/22$ $f/16$ $f/11$ $f/8$ $f/5.6$ $f/4.5$

Lens Aperture

Maximum Spot Speed: With TYPE 687-P1, 6400 inches per second; with TYPE 687-P2, 16,500 inches per second.*

Screen Diameter: 5 inches.

Voltage Sensitivity: 75 volts per inch (vertical), 90 volts per inch (horizontal).

Impedance of Deflecting Plates: Capacitance is approximately 15 micromicrofarads between deflection terminals (measured at the instrument panel).

Frequency Characteristic: The circuits of the deflecting plates show no frequency effects below 130 megacycles.

Power Supply: All voltages necessary are obtained from the self-contained power supply. These are *Anode Voltage*, 1500 volts; *Focusing Anode Voltage*, 0 to 400 volts, positive; *Grid*, 0 to -40 volts; *Heater Voltage*, 2.5 volts; *Heater Current*, 2.1 amperes. The power supply operates from the 115-volt, 50-60 cycle, a-c line. It draws 50 watts when the sweep circuit is operating and 20 watts when the sweep circuit is not operating.

Terminals: Jack-top binding posts, mounted on the panel of the oscillograph as shown in the illustration.

Tubes Required: The following tubes are required and are supplied as initial equipment: one 80-type, one 885-type, one 38-type, one General Radio TYPE 143-D, and one General Radio TYPE 687-P2.

Sweep Circuit: Self-contained Bedell Sweep Circuit range: 30 to 3000 sweeps per second, permitting observation of frequencies up to 21,000 cycles. Sweep is stabilized, requiring a control voltage of 5 to 100 volts r.m.s. Impedance of the control circuit is about 200,000 ohms.

Mounting: The instrument is mounted in a walnut case with carrying handle. There is an opening for the tube screen at one end of the case. The control panel is situated at the side.

Dimensions: (Length) $19\frac{5}{8}$ x (width) $8\frac{1}{4}$ x (height) $17\frac{3}{4}$ inches, over-all.

Net Weight: $37\frac{1}{4}$ pounds.

Type	Code Word	Price
687-A	CRISP	

*These values are maximum workable spot speeds S for Verichrome film, on the basis of a hypothetical aperture $f/1.0$ and with the screen at infinite distance from the lens. The maximum speed S' for any other aperture f/N and a ratio k between length of trace on screen and on the camera plate is:

$$S' = \frac{S}{N \left(\frac{1+k}{k} \right)^2}$$

REPLACEMENT TUBES

Type	Description	Code Word	Price
687-P1	Slow-Screen Tube	ACCESSBOBY	
687-P2	Fast-Screen Tube	ACCESSOCAT	
143-D	Rectifier Tube	FAIRY	