

# Cathode Ray Tubes - - - Oscillographs With Unusual Features

THE cathode ray oscillograph tube is an instrument which is exceptionally useful for the observation and recording of phenomena, especially where high frequencies and very short time intervals are involved. The advantage over other types of oscillographs lies in the fact that the moving element consists of a beam of electrons, therefore, distortion due to inertia and resonance effects, such as is encountered with mechanical vibrating elements, is eliminated. Furthermore, as the electron beam is usually deflected by electro-static means, the amount of power necessary for deflection is extremely low

For a considerable period of time this laboratory has been experimenting with these tubes with the idea in mind of further improving their characteristics and life and also devising ways and means for producing them with more uniform characteristics and at lower cost. It was felt that, whereas the usual tubes have proved invaluable for laboratory work, the cost of these tubes and their associated equipment has prevented their use to any great extent. The tubes described below are equally well adapted to the laboratory and can also be readily used in the field, class room and factory in one or more of the applications mentioned further on. This has been made possible by designing the tubes to operate on relatively low voltages and at the same time obtaining a very brilliant spot of light for the trace. Furthermore the filament has been designed to operate on alternating current, and this feature enables complete A. C. operation.

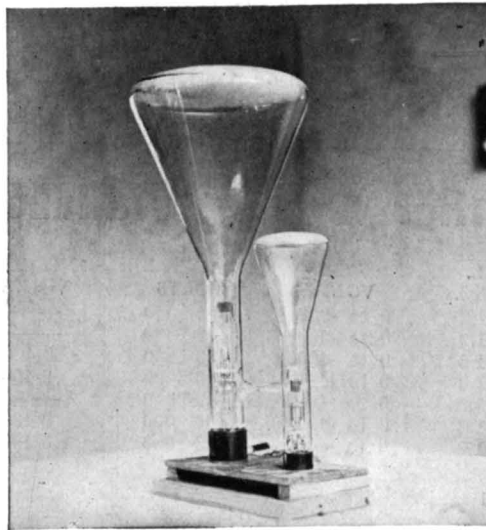
The fluorescent screen ordinarily supplied in these

tubes gives a brilliant pattern in daylight and also lends itself to photographic work where a record of the results is desired. This screen has a very rapid decay period.

*A special screen developed by this laboratory gives an intensity approximately four times as brilliant as any screen previously known. In addition, this screen has a decay period well over one minute which allows waves to be studied after all voltages have been removed. It is particularly valuable for studying transient phenomena. The long time decay period however does not effect the use of the tube for oscillograph work because of the high ratio between the initial intensity and the afterglow which is only noticeable in a darkened room. Under this condition however it is bright enough to be readily seen or photographed.*

In the tubes supplied for oscillograph work the focusing of the spot is obtained by varying the potential of an electrode surrounding the filament. By proper adjustment the spot can be made less than 1/64 of an inch in diameter. However, for certain applications, such as for television reception, in one of the types, the spot is constantly in focus and the intensity is varied by changing the potential on the electrode surrounding the filament. In another type, the intensity is varied in a similar

manner but the size of the spot can be varied by changing the potential on an auxiliary electrode. In both of these cases the position of the spot remains constant as the potential is varied. All of the tubes are of the high vacuum type, which permits of their use without distortion at the higher frequencies.



Type 94

Type 34

## — Some Uses —

Radio set measurements.  
Audio frequency measurements.  
Sound analysis.  
Circuit analysis.  
Class room demonstrations.  
Vacuum tube measurements.  
Hysteresis curves.

Comparisons of current and voltage.  
Insulation efficiency.  
Transient phenomena.  
Operation of switching equipment and relays.  
Resistance measurements.  
TELEVISION RECEPTION  
Medical work (cardiograph)

Voltmeter on all frequencies.  
Magnification of small mechanical movements.  
Broadcasting Modulation meter  
Corona discharge analysis.  
Electrical & Mechanical synchronization.  
Comparison of inductances or capacities.

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## DuMont Cathode Ray Tube Type 22



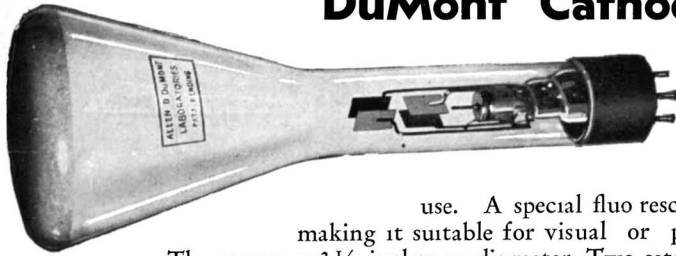
This small cathode ray tube is contained in an envelope the same size as a-10 type power tube. It is equipped with a single set of deflection plates. It can be used for oscillograph work in conjunction with a rotating mirror to provide the time axis. Excellent for student experimentation. Has a standard six prong base.

### Essential characteristics:

Filament voltage 0.5-0.8  
 Filament current in amperes 1.2  
 Accelerating electrode voltage 250-1000  
 Focusing electrode voltage 0 to -250  
 Sensitivity 0.1 mm/volt

Price \$10.00

## DuMont Cathode Ray Tube Type 34



This is a general purpose cathode ray tube and is ideal for laboratory or industrial

use. A special fluo rescent screen is used making it suitable for visual or photographic work.

The screen is 3 1/2 inches in diameter. Two sets of deflection plates are provided. An electrical sweep circuit should be used on one set of deflection plates for the linear time axis. Has a standard six prong base.

### Essential characteristics:

Filament voltage 0.5-0.8  
 Filament current in amperes 1.2  
 Accelerating electrode voltage 300-1000  
 Focusing electrode voltage 0 to -250  
 Sensitivity 0.80 mm/volt

Price \$25.00

## Other Types Available

TYPE	SIZE SCREEN	NUM. OF PLATES	FIL. VOLTS	FIL. AMPS.	FOCUS VOLTS	ACC. VOLTS	2ND. ACC. VOLTS	SENSIT AT MIN. ACC. VOLTS	USE	PRICE
30	3 1/2	0	0.5-8	1.2	0 to -250	300-1000	—	1.0*	Television	\$20.00
54	5	4	0.5-8	1.2	0 to -400	400-2000	—	1.0	Oscillograph	60.00
50S	5	0	0.5-8	1.2	0 to -400	400-2000	2-4000	1.0*	Television	70.00
54S	5	4	0.5-8	1.2	0 to -400	400-2000	2-4000	1.0	Telev & Osc.	80.00
94	9	4	0.5-8	1.2	0 to -400	400-2000	—	1.0	Oscillograph	80.00
90S	9	0	0.5-8	1.2	0 to -400	400-2000	3-4000	1.0*	Television	90.00
94S	9	4	0.5-8	1.2	0 to -400	400-2000	3-4000	1.0	Telev & Osc.	100.00

\* sensitivity in mm per ampere turn

S denotes silver anode in addition to the standard anode

Above prices are for tubes with standard screen. An extremely high intensity screen with a decay period of over one minute can be supplied on any type for \$5 00 additional.

All DuMont cathode ray tubes have bases which fit into standard six prong sockets.

## DuMont Mercury Vapor Discharge Tube Type 128



This tube which is used in the type 127 cathode ray sweep circuit has an indirectly heated cathode permitting operation of the filament from alternating current. The filament consumes 1.5 amperes at the

rated voltage of 2.5 volts. The de-ionization time is extremely rapid and the tube is particularly stable in operation. A standard five prong base is used.

Price \$10.00

## Adaptors

The type 131 adaptor permits using either the type 34, 54 or 94 cathode ray tube in connection with the Type 496-BM General Radio power supply. When this type adaptor is used it is necessary to have the tube in one of our Type 125 tube holders. PRICE \$2.50.

The type 132 adaptor permits the use of our type 54 tube in the Type 497-A General Radio tube mounting. PRICE \$2.50.



Type 131



Type 132



Type 125

## Bench Type Tube Holder Type 125

The type 125 cathode ray tube holder is an extremely handy and useful piece of equipment in that it provides magnetic shielding for the cathode ray tube and at the same time protects the tube from breakage. It also provides for any motion or elevation of the tube

that may be desired. A four wire shielded cable makes all the necessary connections to the power supply equipment and binding posts are provided on the holder for applying the voltages under observation to the deflection plates.

### PRICES

Type 125-3 For 3 inch tube.....\$30.00

Type 125-5 For 5 inch tube.....\$60.00

Type 125-9 For 9 inch tube.....\$90.00

## Panel Type Tube Holder Type 133



Type 133

This holder is designed so that it can be mounted on a standard 19 inch relay rack. A cable is provided for connecting the necessary voltages from the power supply to the tube and the voltages to the deflection plates are

applied to combination binding posts and jacks on the front of the panel. A magnetic shield surrounds and supports the tube and a removable bakelite cap in the front of the panel permits waves or figures to be traced on graph paper.

### PRICES

Type 133-5 For 5 inch tube. Panel size

Type 133-9 For 9 inch tube. Panel size

19 x 8 3/4 inches .....\$90.00

19 x 14 inches .....\$110.00

## Power Supply Type 126



Type 126

The type 126 power supply furnishes all the voltages necessary for the operation of the cathode ray tube. It obtains its power from the 110 volt 60 cycle A.C. mains. The filament control is continuously variable and the filament current is indicated on an ammeter in the panel. The focus control is also continuously variable. A separate power supply provides the focus voltage which can be

varied from minus 50 to minus 450 volts. The brilliance control is variable in steps and applies either 0, 500, 1000, 1500, 2000 or 2500 volts to the accelerating electrode. A separate rectifier supplies this voltage. The unit is entirely self-contained in a shielded cabinet and a safety switch is provided which removes all voltages when the cover is removed from the unit.

### PRICES

Type 126-R For all type tubes. Rack mounting. Panel size 19 x 8 3/4 inches. Without rectifier tubes .....\$125.00

Type 126-B For all type tubes. In handsome walnut case. Panel size 12 x 8 3/4 inches. Without rectifier tubes. ....\$135 00

## Sweep Circuit Type 127



Type 127

The type 127 cathode ray sweep circuit provides a linear time axis which is extremely useful in observing and photographing either recurrent or transient phenomena. The sweep circuit has a range of from 10 to 5000 cycles per second. The power supply contained in this unit furnishes all the necessary voltages for the sweep circuit except the bias voltage of the mercury vapor discharge tube which is obtained from a standard 4 1/2 volt "C" battery. The linear sweep frequency is obtained by the charging of a condenser thru a constant current device. The actual constant current device used is a screen grid tube operated with the plate voltage well above the screen voltage, so that the

plate volts Vs. plate current curve is practically flat over the working region. This arrangement secures not only ease of control (varying grid bias) but also comparative freedom from line voltage variation. The "quick return" discharge is obtained by means of a mercury vapor discharge tube. The use of this tube permits controllable amplitude and ideal synchronization. A position control, amplitude control, rough and fine frequency control and a synchronizing control is provided on this unit. The unit is entirely self-contained in a shielded cabinet and a safety switch is provided which removes all voltages when the cover is removed from the unit.

### PRICES

Type 127-R For all type tubes. Rack mounting. Panel size 19 x 8 3/4 inches. Without tubes .....\$160.00

Type 127-B For all type tubes. In handsome walnut case. Panel size 12 x 8 3/4 inches. Without tubes .....\$170.00

## Deflection Coils for Cathode Ray Tubes Type 129

In certain measurements it is advantageous to use coils for deflection purposes either alone or in connection with the deflection plates of the cathode ray tube. Four coils are provided suitably mounted in a bakelite holder. There are 6000 turns on each set of coils. The resistance of each set of coils is approximately 2500 ohms. Binding posts are provided to each set of coils.

Type 129 Deflection Coils in bakelite holder PRICE .....\$15 00

## Relay Racks

Type 134 Bench type rack. 19 1/2 x 27 1/2 inches.

PRICE.....\$20.00

Type 135 Standard relay rack. 19 1/2 x 72 inches.

PRICE.....\$40.00

# Portable Cathode Ray Oscillograph



The type 130 unit has been designed to fill the need for an easily portable oscillograph unit comprising both the power supply and sweep circuit which can be used for class room demonstrations, industrial checks, transmitter modulation determinations and general laboratory measurements. A single power supply provides 800 volts to the accelerating electrode of the cathode ray tube and the power supply also furnishes all the other voltages necessary for the operation of the cathode ray tube and sweep circuit. Controls are provided for adjusting the filament current, focusing bias, brilliance, position of the spot, amplitude of the sweep voltage, frequency of the sweep and synchronization of the observed wave. The spot is of sufficient intensity so that it may be readily observed in daylight.

Apparatus	Type	Price
Portable Cathode Ray Oscillograph	130	\$200.00
Tube Holder	125-3	30.00
Cathode Ray Tube	34	25.00
Mercury Vapor Discharge Tube	128	10.00
Regulator Tube	-57	1.65
Rectifier Tube	-80	1.05

\$267.70

*Special price for complete unit*

\$250.00

# Laboratory Rack Type Cathode Ray Oscillograph



The rack type oscillograph shown in this picture is without a doubt one of the finest units yet offered for laboratory oscillograph work. The material and workmanship are of the finest and the arrangement of the controls is such that delicate adjustment may easily be made. The connections from the cathode ray tube are so arranged that any desired voltages may readily be applied to it. Because of the high accelerating electrode voltage available, it is possible to photographically record single transients of the spot moving across the screen at velocities well over 1000 inches per second.

APPARATUS	FOR 5" TUBE		FOR 9" TUBE	
	TYPE No.	PRICE	TYPE No.	PRICE
Panel type tube holder	133-5	\$ 90.00	123-9	\$110.00
Sweep Circuit	127-R	\$160.00	127-R	\$160.00
Power supply	126-R	\$125.00	126-R	\$125.00
Cathode ray tube	54	60.00	94	80.00
Bench type rack	134	20.00	134	20.00
Rectifier tube for Sweep Circuit	-80	1.05	-80	1.05
Regulator tube	-57	1.65	-57	1.65
Mercury Vapor Discharge tube	128	10.00	128	10.00
Rectifier tube for power supply	-66	5.00	-66	5.00
Rectifier tube for power supply	-80	1.05	-80	1.05

\$473.75

\$513.75

*Special price for complete unit*

\$455.00

\$495.00

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