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WESTINGHOUSE

WESTECTORS

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Instructions for use

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Westectors are small copper-oxide rectifier assemblies designed for use in high frequency circuits. All types operate satisfactorily at frequencies up to 1,500 kC per second, the WX type at a maximum current of 100 microamperes, while the type W is capable of carrying 250 microamperes and is more commonly used in higher power level circuits of lower impedance. They will operate exactly like a diode, but, since they have neither heater nor cathode, are more simple to use in an identical circuit and may be more easily used in complicated circuits. Both types are suitable for a maximum peak reverse voltage of 6 volts per element.

IDENTIFICATION

All Westectors with W type elements have the negative end of the assembly dotted green, the positive end being red.

All Westectors with WX type elements have the negative end of the assembly dotted black, the positive end being red.

The number of elements in the Westector is marked on the body.

MOUNTING

Westectors may be supported by their wiring, in the same way as a normal ½-watt resistor.

OPERATING DATA

Type.	*Maximum peak voltage.*	*Maximum output current*
W.1	6 volts	250 microamps.
W.2	12 volts	250 microamps.
W.3	18 volts	250 microamps.
W.4	24 volts	250 microamps.
W.6	36 volts	250 microamps.
WX.1	6 volts	100 microamps.
WX.2	12 volts	100 microamps.
WX.3	18 volts	100 microamps.
WX.4	24 volts	100 microamps.
WX.6	36 volts	100 microamps.

These figures are applicable where the frequency does not exceed 1,500 kC per second. Westectors may, however, be used in higher frequency circuits provided the additional loading on the input circuit, due to the self-capacitance of the elements, can be tolerated, and variations in efficiency with frequency are permissible.

Both types of elements are suitable for maximum peak reverse voltages of 6 volts per element. This figure refers to the actual reverse voltage across the Westector. When used in a half-wave circuit, with reservoir condenser, the maximum R.M.S. input voltage is 2·3 volts per element. It will be noted that all the circuits in the following pages fall into this category.

If used in voltage-doubler circuit, the maximum permissible R.M.S. input is also 2·3 volts per element per Westector.

TESTING

The reverse resistance of a Westector must not be measured with a " Megger " or similar insulation tester as this would result in the destruction of the elements. It is also quite impracticable to use an ohmmeter, as the resistance of the rectifier varies to a large extent with the current passed through it and the readings given by such an instrument are, therefore, meaningless.

The following are recommended DC test figures and should not be confused with electrical ratings. The tests should only be applied momentarily.

Type W Assemblies. At 3 mA in the forward direction, the voltage drop should not exceed 2 volts per element at 20°C. With 6 volts per element, the reverse current should not exceed 50 microamps at 20°C.

Type WX Assemblies. At 0·3 mA in the forward direction, the voltage drop should not exceed 2 volts per element at 20°C. With 6 volts per element, the reverse current should not exceed 15 microamps at 20°C.

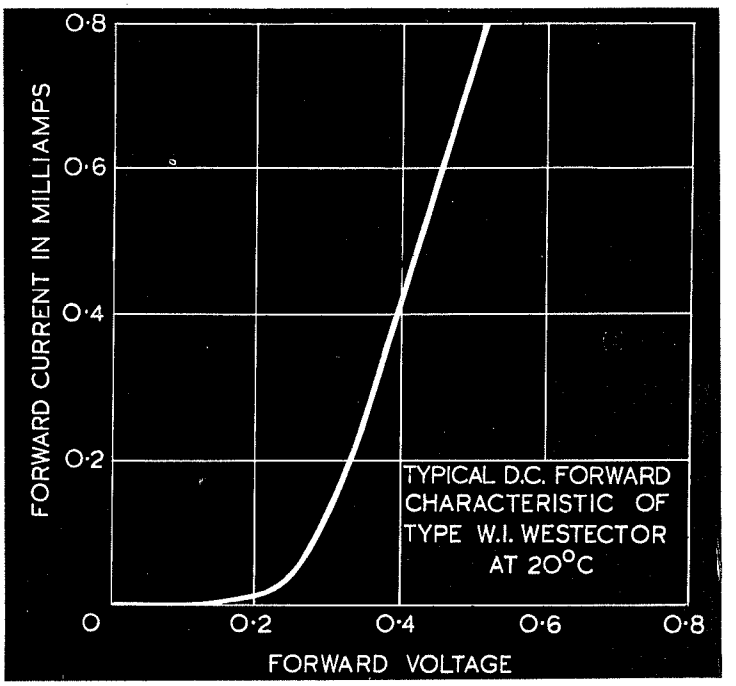


Fig. 1(a)

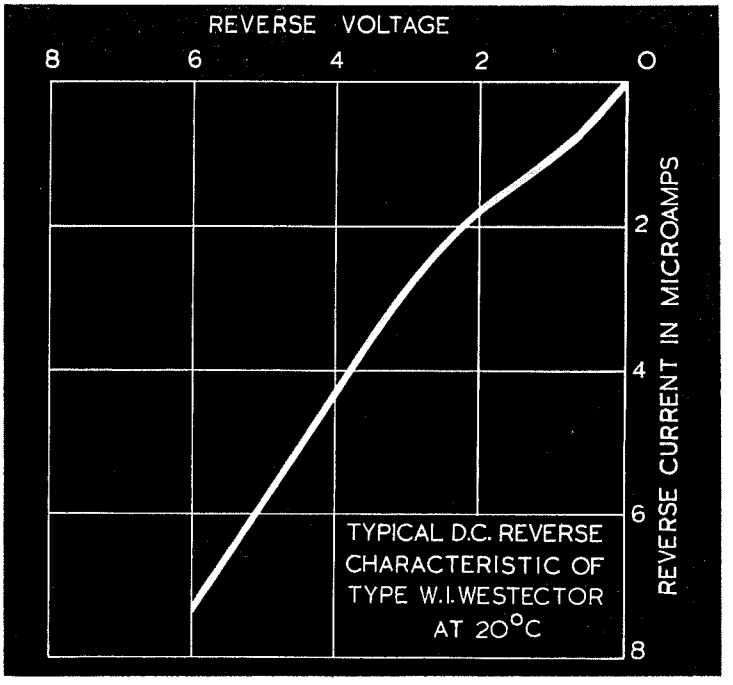
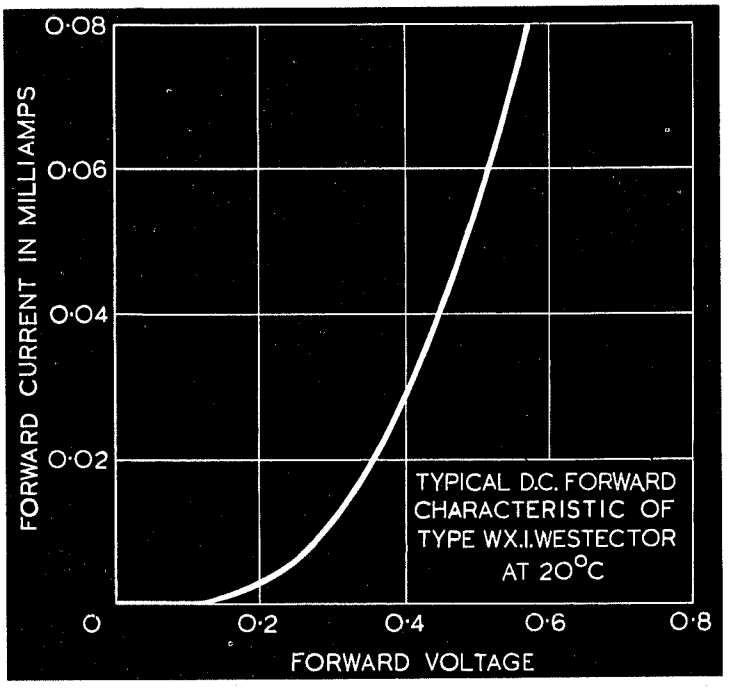


Fig. 1(b)

Figs. 1(a) and 1(b) show typical DC static characteristic curves of type W.1 Westectors.

The same scale shapes apply to other type W Westectors, but the voltage scales must be multiplied by the number of elements in series, *e.g.*, for a W.6 Westector the voltage scales in Figs. 1(*a*) and 1(*b*) should be multiplied by 6.

Fig. 2(a)



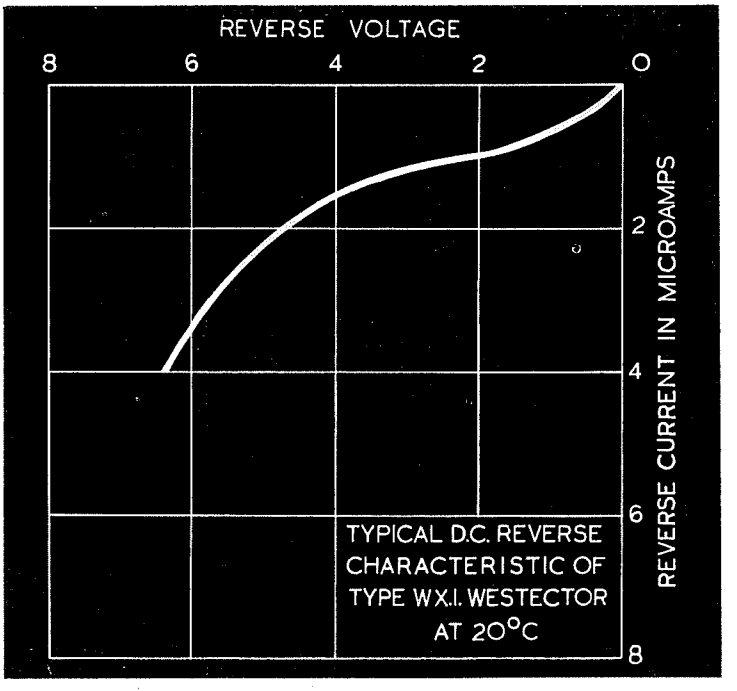


Fig. 2(b)

Figs. and 2(a) 2(b) show typical DC static characteristic curves of type WX.1 Westectors.

The same scale shapes apply to other type WX Westectors, but the voltage scales must be multiplied by the number of elements in series, e.g., for a WX.6 Westector the voltage scales in Figs. 1(*a*) and 1(*b*) should be multiplied by 6.

APPLICATIONS

T. R. F. Receivers

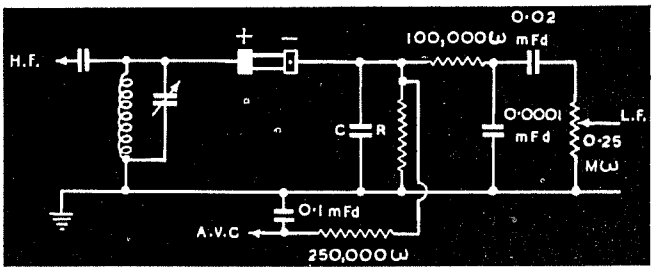


Fig. 3.

It is recommended that the type WX Westector should be used in a half-wave circuit, as shown in Fig. 3, the choice of model being determined by the H.F. voltage available at the detector stage, and reference should be made to the table on page 2. For general use, however, it is recommended that the WX.6 Westector should be preceded by two good high frequency stages. The H.F. voltage input to the Westector is then unlikely to drop below 3 volts even when receiving distant stations and satisfactory linear operation of the detector will be obtained on even the weakest station.

In view of the high impedance of the detector stage, it is advisable to follow the Westector by a capacity and resistance coupling to the low frequency amplifier. Suitable values of coupling capacitor and grid leak are 0·02 mfd. and 250,000 ohms respectively. Values of R and C are given in the table below.

It is essential that a DC conducting path be provided on the input side and hence an H.F. transformer coupling should be employed, as shown in Fig. 3.

Superheterodyne Receivers

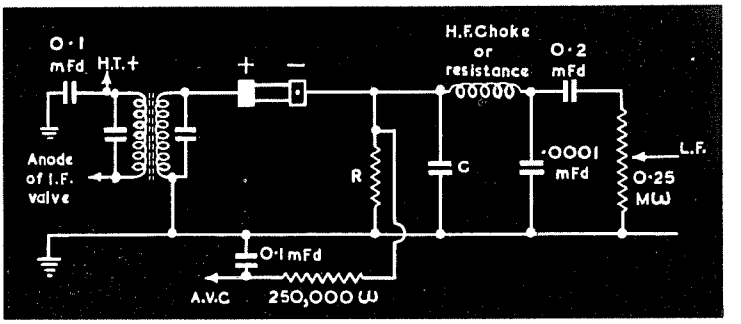


Fig. 4.

For intermediate frequencies of 100-200 kC, the type W Westector should be used, but should the intermediate frequency be higher, then the type WX Westector should be employed. Fig. 4 shows the circuit arranged for a resistance coupled output, but a transformer coupling can be used if desired.

It is essential that a DC conducting path be provided on the input side and hence an I.F. transformer coupling should be employed, as shown in Fig. 4.

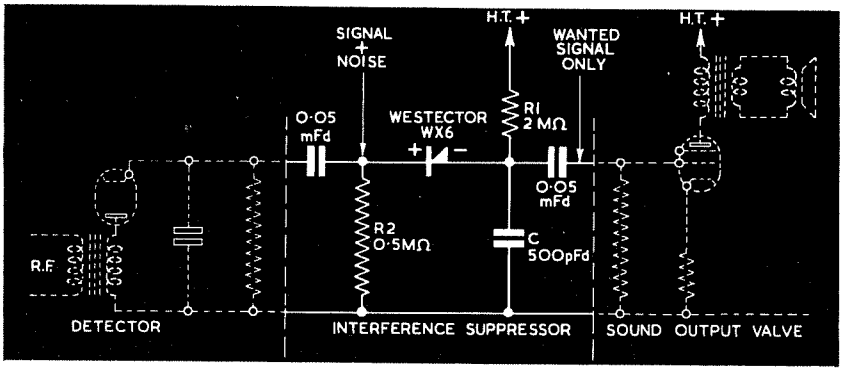
Westector.	Load resistor. *R*	Reservoir capacitor. *C*
Type W	100,000 ohms.	0·0001 mFd.
	250,000 ohms.	0·0001 mFd.
Type WX	500,000 ohms.	0·00005 mFd.

Automatic Volume Control

Simple automatic volume control is obtainable by feeding back the rectified carrier (arranged negative with respect to earth) to the grids of the preceding valves, as shown in Figs. 3 and 4.

Noise Limiters

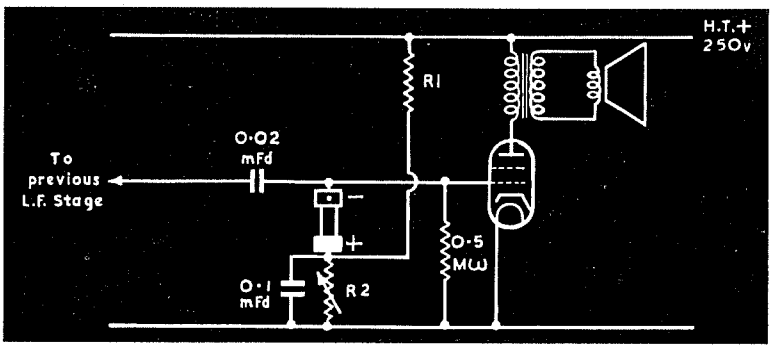
Fig. 5.



Westectors may be used in many forms of noise limiter, and three typical circuits are shown. The circuit of Fig. 5 is particularly suitable for use in television sound receivers, but cannot be used in normal medium wave receivers. The operating principle is that the time-constant of R_1C is made short enough to follow the highest modulation frequencies in the wanted sound signal, but cannot follow the extremely rapid " pulse " interference produced, for example, by car ignition systems. When such an interfering pulse is received the Westector type WX6 therefore becomes " cut off " by the reverse voltage, and mutes the receiver for the duration of the pulse.

To preserve the relative " sharpness " of the interference pulses, the bandwidth of the sound receiver should be at least 100 kC/s, and if an intermediate L.F. stage is included between the detector and the output valve, the correct values should be chosen to maintain the frequency response up to at least 50kC/s.

Fig. 6.



The circuit of Fig. 6 is applicable to any sound receiver, but only " clips " the positive peaks of the interference, the values of R_1 and R_2 being chosen so that the steady voltage across R_2 is the desired limiting voltage. Interference peaks above this value will cause the Westector to conduct and limit the peaks to a value approximately equal to the bias voltage, (depending on the impedance of the audio input from the previous stage). R_2 can conveniently be made variable to adjust the limiting level.

Types W or WX Westectors can be used, depending on the impedance of the circuit (type W following a low impedance anode load and WX for high impedance circuits), while the type chosen must be such that the limiting voltage does not exceed 4 volts per element.

Typical values to suit a cut-off at 6-volts peak are :—

R_1—1 megohm

R_2—30,000 ohms variable

Westector—W.2 for low impedance, or WX.2 for high impedance circuit.

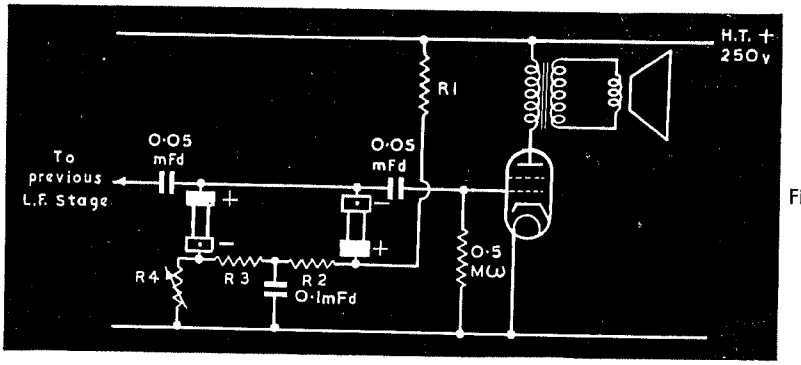


Fig. 7

In Fig. 7 is shown a circuit, using two Westectors, for clipping both positive and negative peaks, the Westectors being arranged in opposition, one being biassed negatively and the other positively. Equal bias (but in a reverse direction) is applied to each Westector, the total bias being developed across R_2 and R_3. The limiting bias will be half the total bias, since R_2 and R_3 are normally made equal in value.

Typical values, to cut both positive and negative peaks exceeding 4 to 7 volts, are :—

R_1—25,000 ohms.

R_2— 1,000 ohms.

R_3— 1,000 ohms.

R_4—25,000 ohms. variable.

Westector—W.2 for low impedance, or WX.2 for high impedance circuit.

AC Measuring Instruments

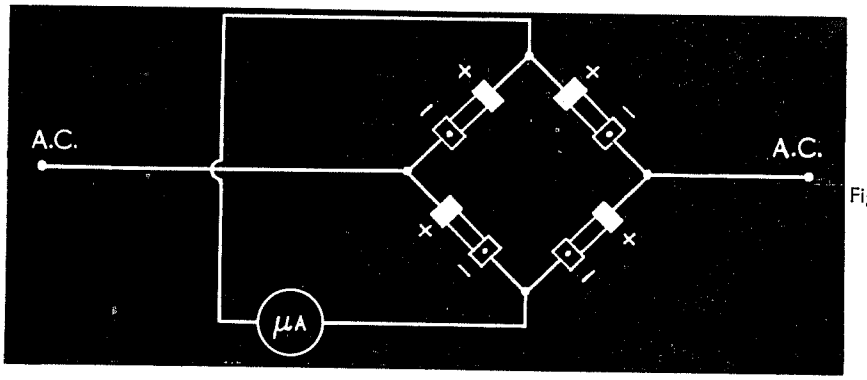


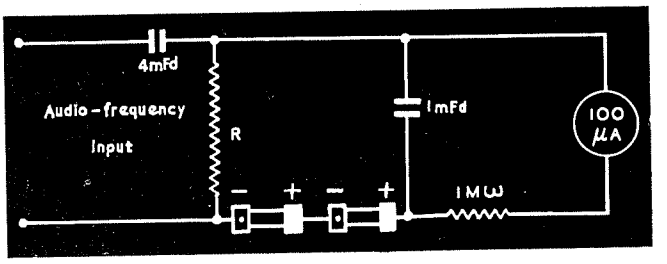
Fig. 8.

Four type WX.1 Westectors may be used in a bridge circuit or instruments with a full scale deflection of 100 microamperes. The circuit is shown in Fig. 8 and the effect is to adapt the DC instrument to act as an AC microammeter with 11 per cent. higher full scale range. Thus, the 100 microampere DC meter reads 111 microamperes AC. The scale shape of the DC instrument will not be distorted, and the calibration will hold good so long as the waveform is reasonably good.

In Fig. 9 is shown the circuit for a peak output meter using two WX.6 Westectors in conjunction with a 100 microampere meter. It will be noticed that it is fundamentally a half-wave rectifier circuit, in which the reservoir condenser is charged to the peak of the alternating voltage, the charge on the condenser being used to maintain the instrument reading through the resistance leak circuit. Thus, the meter rapidly reads the peak voltage, but drops back very slowly after

the peak has been reached and peak voltages can be easily read. If the condenser is made very large, it may not be charged sufficiently quickly by the short peaks, while if the resistance is very high in value, the instrument will have to be very sensitive to measure the very small current. The component values given in the diagram are suitable for reading up to 100 volts peak. The scale may be calibrated either in peak volts, peak watts or decibels above and below a certain standard value of peak watts.

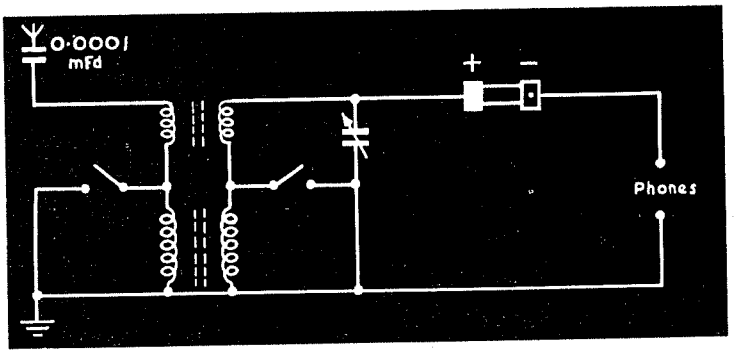
Fig. 9.



Resistance " R " is load resistance

Signal Detectors

Fig. 10.



The type WX.1 Westector is suitable, as it has a low self-capacity and needs but a small signal input for efficient operation. The Westector is absolutely constant in its characteristics, is unaffected by climatic conditions and requires no battery or adjustment. It can be used, therefore, in " local station " sets intended solely for use with headphones.

In common with crystal detectors, the Westector does not amplify, but simply acts as a signal detector. It is necessary to use an efficient aerial-earth system and to work the receiver within a few miles of a transmitter. The aerial must be as high as possible and both aerial and lead-in kept well away from earthed objects such as trees and houses. The earth connection must be short and direct to a good buried earth-tube or main water pipe.

A typical circuit, using a standard dual-range coil, is given in Fig. 10.

Radio Transmitters

In amateur radio experimental work, numerous applications can be found for Westectors.

For example, a WX.6 may be used in conjunction with a 100 microampere instrument for monitoring, to give an indication of the quality of a telephony transmission ; as an over-modulation indicator ; or to compare output or amplitude, and for checking frequency stability when employed in an artificial aerial.

Patents

Many of the circuits illustrated and described in this leaflet are the subject of Letters Patent.

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