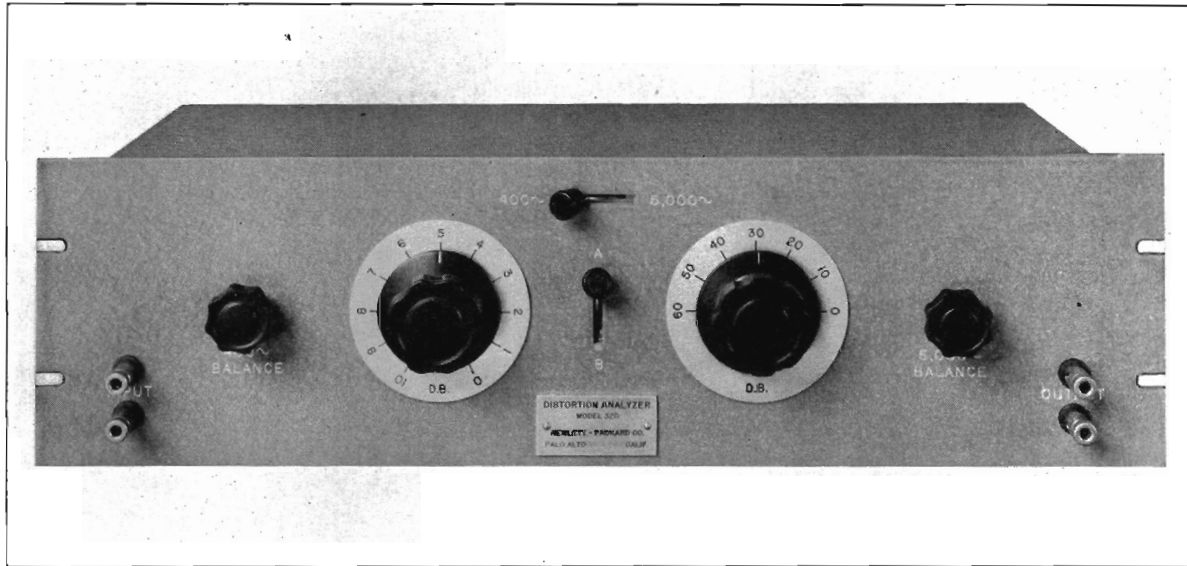


● DISTORTION ANALYZER

MODEL 320A



The Model 320AR

- A NEW INSTRUMENT FOR DISTORTION MEASUREMENTS
- SHOWS TYPE OF DISTORTION AS WELL AS AMOUNT
- STANDARD MODELS FOR MEASUREMENTS AT TWO OR SIX FREQUENCIES
- ANY FREQUENCIES FROM 50 TO 10,000 CYCLES AVAILABLE
- SAVES TIME IN DEVELOPMENT AND PRODUCTION TESTING

USES: The Model 320A Distortion Analyzer is a simple and convenient device for studying and measuring the harmonic distortion in audio frequency apparatus. It is particularly suitable for development work because with it the character and type of distortion can be determined at the same time the distortion is being measured. It is excellent for production work because it is easy to operate and provides a rapid and accurate check for normal operation.

The Model 320 is essentially a comparison device used to compare the distortion content of the wave with the fundamental voltage. When this comparison is made with a cathode ray oscilloscope the type of distortion can be observed. The various order harmonics will show up on the oscilloscope pattern, the hum voltage and noise voltage will appear, and a great deal of information about the voltage being analyzed can be obtained. In this way the Model 320 is a valuable instrument not only when used alone but also when used with other equipment which measures the total r.m.s. distortion directly.

DESCRIPTION: The distortion analyzer consists of two band elimination filters, one for measurements at 400 cycles and one for measurements at 5,000 cycles, and a calibrated attenuator. With the voltage to be analyzed adjusted to the proper frequency the fundamental is eliminated completely. The residual voltage containing the harmonics can then be observed with an oscilloscope or measured with a sensitive meter. When the frequency has been adjusted so the fundamental is eliminated, the elimination filter is switched out and a calibrated attenuator is introduced. Then the attenuation of the fundamental is increased until the fundamental voltage has the same magnitude as the residual harmonics alone.

MEASUREMENTS: With the proper adjustment, the setting of the attenuator on the instrument gives directly the amplitude of the harmonic voltage in decibels below the fundamental. When an oscilloscope is used for the detector, measurements of the harmonic voltage require

some exercise of judgment. The residual harmonic voltage will contain sharp peaks in many cases. These peaks contain very little energy and this should be taken into account in estimating the r.m.s. or average value of the residual harmonic voltage.

If more accurate measurements are desired a meter may be used in place of the oscilloscope or in conjunction with it. With such a meter the distortion measurements may be made with as good accuracy as can be obtained with the more expensive distortion meters.

DISTORTION ANALYSIS: For distortion analysis an oscilloscope should be used as the detector. As the frequency is adjusted to eliminate the fundamental, the sec-

ond, third, and higher order harmonics will appear superposed on the fundamental voltage, and from the trace obtained the relative importance of these components can be determined.

By placing the residual harmonic voltage on the vertical plates of the oscilloscope and the fundamental voltage on the horizontal plates, the particular part of the cycle at which the distortion occurs can be determined.

This instrument is very useful for development or maintenance observed while changes are being made in the circuit under test. Common forms of distortion such as peak clipping, sharp cut-off, transformer saturation, and parasitics can be discovered quickly and corrected.

SPECIFICATIONS

FREQUENCY RANGE: The Model 320A is designed for measurements at 400 and 5000 cps. The Model 320B is designed for measurements at 50, 100, 400, 1000, 5000, and 7500 cps. Filters for other frequencies can be supplied on special order.

INPUT IMPEDANCE: The input impedance is at least 20,000 ohms. A bridging transformer may be used to increase the input impedance.

DISTORTION RANGE: The filter circuits will provide more than 60 db of attenuation of the fundamental. Distortion values as low as 0.1% of the fundamental may be measured with a detector of sufficient sensitivity.

DETECTOR SENSITIVITY: The sensitivity of the instrument is determined by the detector. The detector should give a readable indication on 0.1% of the fundamental if harmonics of 0.1% are to be measured. The detector need not be calibrated because it is used for comparison only. The usual oscilloscope with a one stage amplifier is sufficiently sensitive to measure 0.3% of a 30 volt fundamental. For proper operation of the instrument the input impedance of the detector must be 100,000 ohms or greater. An amplifier may be used between the instrument and the detector to increase the sensitivity. The only requirements on such an amplifier are that it must pass the highest harmonic which is of interest and that it have a high impedance input. It need not be free from distortion otherwise.

MOUNTING: The Model 320A is mounted in an attractive oak cabinet with the panel finished in wrinkle grey. The Model 320AR fits the standard 19" relay rack with 3/4" spacing. The panel is finished in wrinkle grey with machine engraved designations.

Model	Mounting	Length	Height	Depth	Weight	Price
320A	Cabinet	12"	8"	6"	8#	\$60.00
320AR	Relay Rack	19"	5 1/4"	5 1/2"	8#	\$65.00
320B	Cabinet	16"	8"	6"	15#	\$145.00
320BR	Relay Rack	19"	7"	10"	20#	\$150.00

Prices are net f.o.b. Palo Alto, California.
Prices and data subject to change without notice.

December 10, 1940.

HEWLETT-PACKARD COMPANY