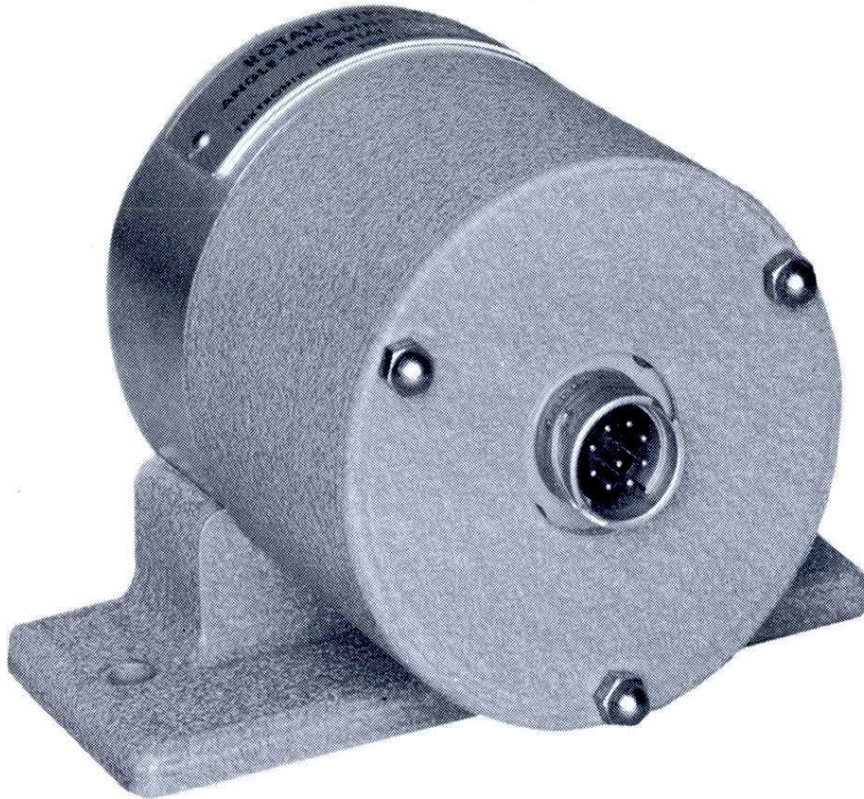


TYPE 182B ANGLE-ENCODING TRANSDUCER



GENERAL DESCRIPTION

The Type 182B Angle-Encoding Transducer converts increments of shaft angle rotation into pulses of light, then into electrical pulses at the output.

To convert rotational increments into electrical pulses, the Type 182B incorporates a disc fixed internally to the transducer shaft. The transducer shaft couples mechanically to the rotating device under test. The disc rotates in relation to a stationary disc, which is a photographic negative of the rotating disc. Shaft rotation can be from essentially zero to 20,000 rpm.

A series of Type 182B Angle-Encoding Transducers with a suitable switching arrangement can be used for multiple shaft monitoring. This application of the Type 182B proves particularly useful when looking for backlash and play in several shafts rotating at the same speed or geared for the same speed.

The Type 182B can also be used in conjunction with a suitable pulse generator and RC operational networks to provide continuous analog voltages proportional to rotational velocity or acceleration. These analog voltages can be displayed on an oscilloscope, plotted against time, against total shaft rotation, or against each other (producing an acceleration-versus-velocity characteristic curve).

The Type 183B Rotational Analyzer, designed for use in conjunction with the Type 182B, provides operating voltages for the transistors and exciter lamps.

MAIN FEATURES

Signal Output

Three output channels for 1°, 10° and 360° pulses;

0.2 v peak-to-peak, up to 120,000 per second (1° channel).

Angular Velocity Range

Minimum, essentially zero RPM (usefulness below 1 RPM may be limited by oscilloscope sweep generator).

Maximum, approximately 20,000 RPM.

Mechanical Loading

Moment of inertia loading nominally 10 grams/cm².

Marker Accuracy

Maximum overall angular marker error, 15 minutes of arc.

Thermal Compensation

Temperature-compensated circuitry allows reliable operation up to 75°C (MAX) ambient temperature.

OTHER CHARACTERISTICS

Power Requirements

Input voltages are supplied by the Type 183B.

Exciter lamps: —4.8 v dc.

Transistors: —4.8 v dc, and —13 v dc.

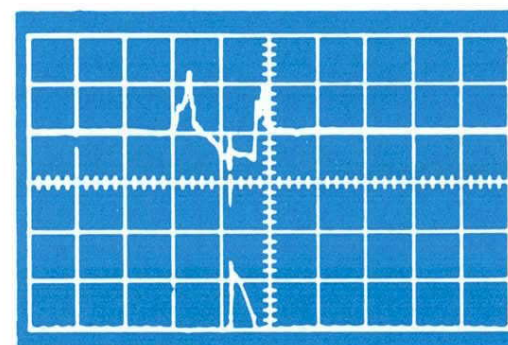
Semiconductor Circuitry

Three phototransistors, one for each output channel.

Three temperature-compensating transistors.

DC-Operated Exciter Lamps

Three exciter lamps operate on —4.8 v dc to minimize ripple in the transducer outputs.



Vibration vs. crank angle. 360° display of a 4-cycle, 1-cylinder gasoline engine.

MECHANICAL SPECIFICATIONS

Construction — Aluminum alloy with a precision ground steel shaft.

Finish — Blue vinyl-finish cover.

Dimensions — Length including shaft 5 3/8"

Shaft length exposed 1 5/8"

Shaft diameter 1/4"

Width at base 4 1/2"

Height 3 1/4"

Weight: Net—3 pounds approx.

ROTAN SYSTEM

TYPE 183B ROTATIONAL ANALYZER

GENERAL DESCRIPTION

The Type 183B Rotational Analyzer amplifies and shapes the output pulses of the Type 182B.

Signals from the 183B, injected into the Miller sweep generator of a Tektronix oscilloscope*, generate a horizontal sweep representing shaft angle at all shaft speeds from zero to 20,000 rpm.

These pulses also can be used as amplitude markers on the oscilloscope, as triggering signals for other electronic equipment, or for z-axis modulation.

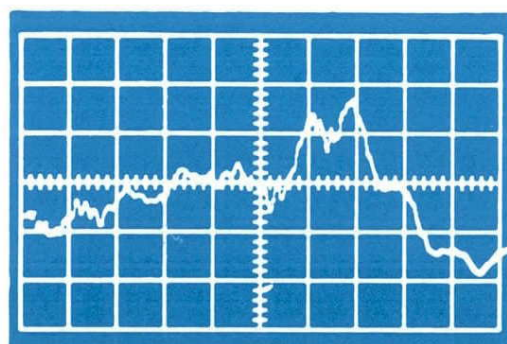
Data such as pressure, velocity, acceleration or vibration applied to the oscilloscope vertical system will give a display in the form of a graph. This data is correctly referenced to instantaneous shaft angle displacement.

The Type 183B allows magnified displays or normal displays with or without markers superimposed. The single-sweep feature of the Rotational Analyzer facilitates photographic recording of the trace during one revolution cycle.

In the ALTERNATE mode of operation either the power stroke or the intake stroke of four-cycle reciprocating engines can be displayed, observed, and analyzed.

The Type 183B supplies the necessary transistor and exciter lamp voltages to the Type 182B.

*Most Tektronix oscilloscopes require only minor modification to install an input jack in the sweep generator circuit for Rotan applications. The modification does not impair normal oscilloscope operation.



Ignition vs. crank angle. 360° display with 10° intensity markers. The upper trace is the secondary voltage and the lower trace is the secondary current.

MAIN FEATURES

Marker Pulses

Two output connectors provide 1°, 10° or 360° increments at not less than a 10 v peak.

Trigger Pulses

Available as successive or alternate pulses at 1°, 10°, or 360° increments at not less than 7 v peak.



Sweep Increment

Special increment output circuitry serves to charge the oscilloscope timing capacitor in small, uniform steps representing increments of shaft rotation. Steps representing 1°, 10° or 360° shaft rotation can be selected, for normal displays of 1, 10, or 360 revolutions across the 10 cm oscilloscope screen.

Calibrator Control

Provides continuously adjustable horizontal calibration of the associated oscilloscope in terms of shaft rotation. Normally set to provide 360° (1 revolution) across the 10 cm screen.

OTHER CHARACTERISTICS

Power Supply — Operates nominally at 117 v ac.

MECHANICAL SPECIFICATIONS

Construction — Aluminum alloy chassis and three-piece cabinet.

Finish — Photo-etched anodized panel, blue vinyl-finish cabinet.

Dimensions — 10" long, 4 1/4" wide, 6 3/8" high.

Weight: Net — 9 pounds approx.

Shipping — Type 182B/183B Rotan system — 18 pounds approx.

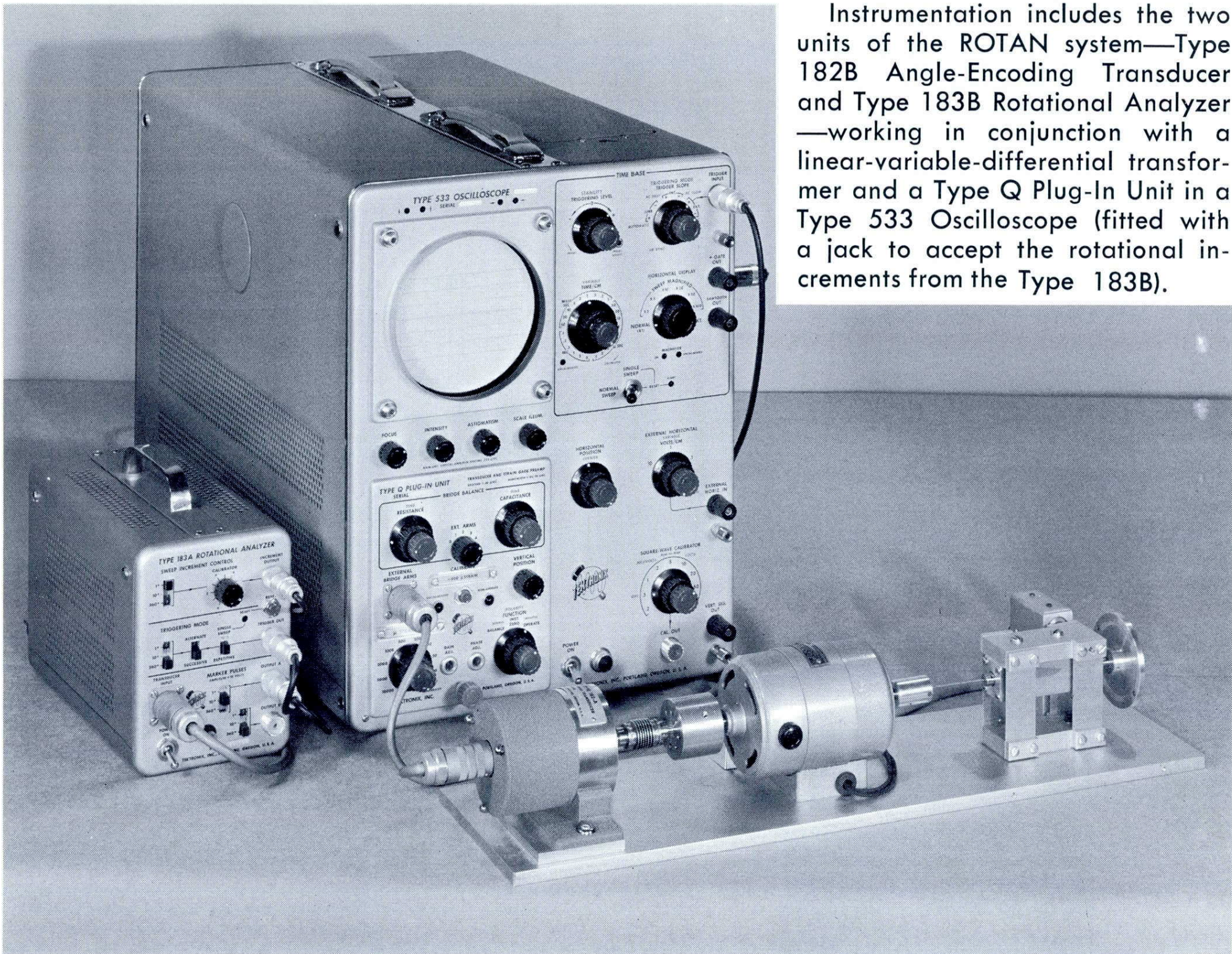
Type 182B/183B Rotan System \$850

Prices f.o.b. factory. (Please refer to **Terms and Shipping, GENERAL INFORMATION** page).

DYNAMIC BALANCING APPLICATION

with the Tektronix angular-transducer-instrument system

Instrumentation includes the two units of the ROTAN system—Type 182B Angle-Encoding Transducer and Type 183B Rotational Analyzer—working in conjunction with a linear-variable-differential transformer and a Type Q Plug-In Unit in a Type 533 Oscilloscope (fitted with a jack to accept the rotational increments from the Type 183B).



A Type 182B Angle-Encoding Transducer and a Type 183B Rotational Analyzer comprise the new Tektronix ROTAN system. Designed to study rotation-associated phenomena in machinery, the two ROTAN units adapt an oscilloscope to provide horizontal trace deflection proportional to angular displacement of a rotating shaft. The ROTAN system generates a horizontal sweep representing shaft angle—at speeds from essentially zero to 20,000 rpm. Transduced data, such as velocity, pressure, acceleration, or vibration (applied to the oscilloscope vertical input), appears on the crt screen correctly referenced to this instantaneous angular position.

In the wheel-balancing application shown, the Type Q Unit, in conjunction with a linear-variable-differen-

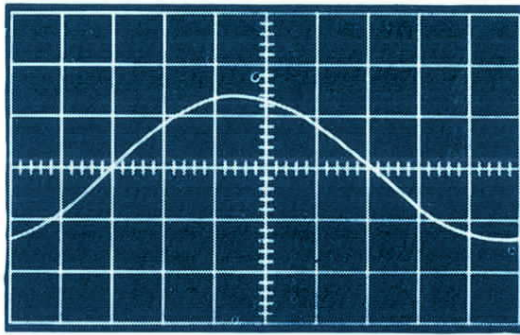
tial transformer, senses and measures the amount of unbalance on a wheel and presents this rotation-related phenomena on the vertical axis. In normal use, 360° rotation of the wheel equals ten major graticule divisions—with start of the trace occurring at the same point on each revolution cycle. The horizontal axis display appears continuous, but actually combines both digital and analog information.

This instrumentation allows magnified displays or normal displays with or without markers superimposed. The single-sweep feature of the Rotational Analyzer facilitates photographic recording of the trace during one revolution cycle. The three waveform pictures, taken with a Tektronix Type C-12 camera, illustrate (1) a normal trace, showing 360° rotation of a wheel (2) a normal trace intensity modulated at 10° incre-

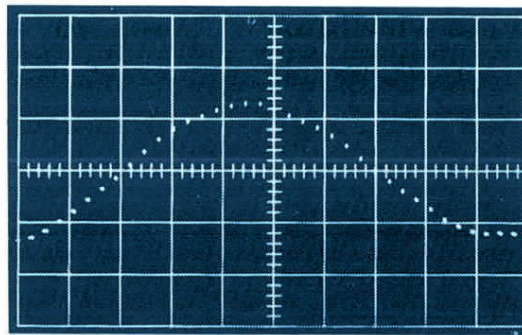
ments, and (3) a magnified trace (using oscilloscope magnifier), showing the incremental nature of the sweep. The vertical amplitude of the display designates the amount of wheel unbalance. The peak designates

the point of unbalance. With this information, it is comparatively easy to add or subtract the correct amount of weight at the precise point—to bring the wheel into balance.

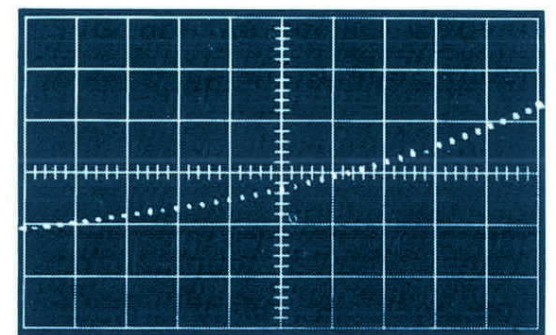
Bearing housing
displacement



360° Display without markers



360° Display with 10° markers



Magnified display showing 1° increments