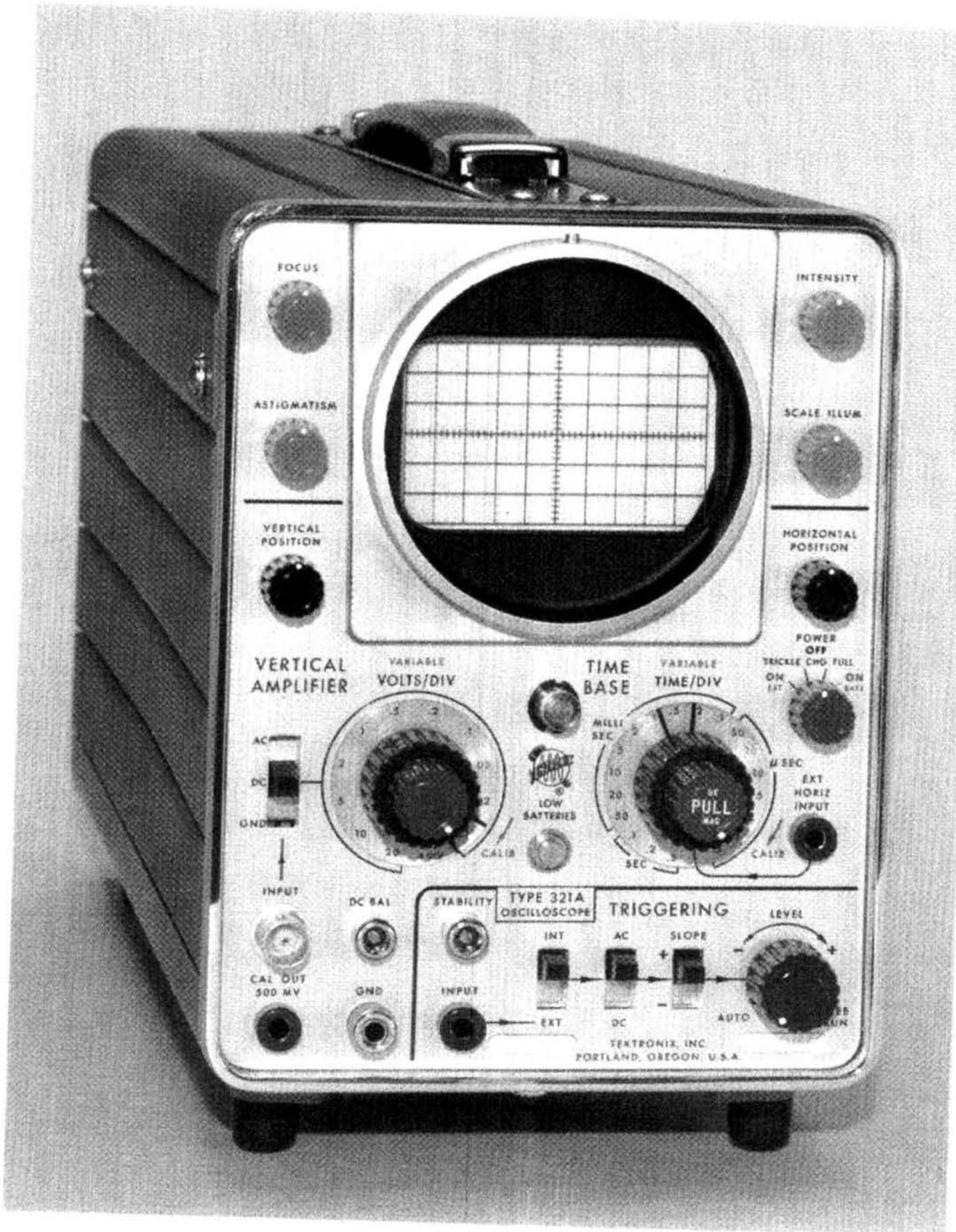

The Type 321A Oscilloscope

SECTION 1
CHARACTERISTICS

Introduction

The Tektronix Type 321A is a high-performance, dc-to-6 mc, transistorized oscilloscope. Its light weight, small size and ability to operate from a variety of power sources make it a versatile field and laboratory instrument. The oscilloscope can operate from its internally-contained rechargeable battery pack, an external dc source or from a 115/230-volt 50-800 cycle ac line. Regulated power supplies in the instrument, accurate calibration, and precise linearity assure exact time and amplitude measurements despite normal voltage-source and power-supply-load changes that occur under actual operating conditions.

Operating temperature range derived from tests indicates optimum performance and reliability on its self-contained batteries from 0° to +40° C at altitudes up to 15,000 feet. Temperature range without batteries when operating from an external source is —15° C to +55° C. Non-operating temperature range is —55° C to +75° C without batteries and —40° C to +60° C with batteries at altitudes to 50,000 feet.

For the operator's convenience, a front-panel battery light indicates when the internal batteries are low. If external dc or ac operation is being used instead of the batteries, the light turns on if the external voltage source drops too low for proper power supply regulation.

A 4-position power switch on the front panel permits convenient selection of charging rate and/or power source.

Vertical Deflection System

Bandpass—Dc to at least 6 mc (3-db down) using dc coupling; using ac coupling, low-frequency 3-db down point is 2 cps typical from a 1-kc reference.

Sensitivity—0.01 v/div to 20 v/div in 11 calibrated steps; accuracy is within 3% of front-panel markings. Continuously variable from 0.01 v/div to about 50 v/div uncalibrated.

Input Impedance—35 pf nominal paralleled by 1 megohm (±1%), 8.2 pf nominal paralleled by 10 megohms (±2%) when using the P6006 10× Probe.

Maximum Allowable Input Voltage Rating—600 volts combined dc and peak ac; 600 volts (not 1200 volts) peak-to-peak ac.

Triggering

Type—Automatic, or amplitude-level selection using preset stability.

Mode—Ac-coupled or Dc-coupled.

Slope—Plus, from rising slope of triggering waveform, or minus from negative slope of triggering waveform.

Source—Internal from vertical signal, or external from triggering signal.

Signal Requirements—Internal: 0.2 major division vertical deflection at 1 kc increasing to 1 major division at 6 mc.

External: 1 volt peak-to-peak at 1 kc increasing to 3 volts peak-to-peak at 6 mc. Nominal input impedance: 5 pf paralleled by 100 kilohms (±20%).

Sweep

Type—Miller Integrator.

Sweep Rates—0.5 μsec/div to 0.5 sec/div in 19 calibrated steps. Accurate 5× sweep magnifier extends calibrated range to 0.1 μsec/div. Calibrated sweep-rate accuracy is ±3%. Sweep time adjustable between steps and to ≥1.5 sec/div uncalibrated.

External Horizontal Input

Bandpass—Dc to at least 1 mc (3-db down).

Deflection Factor—1 v/dv ±10% with 5× magnifier on.

Input Impedance—30 pf typical paralleled by 100 kilohms (±5%).

Amplitude Calibrator

Square Wave—Frequency about 2 kc.

Amplitude—500 mv peak-to-peak. Also 40 mv peak-to-peak internally coupled in CAL 4 DIV position of VOLTS/DIV switch. Peak-to-peak amplitude accuracy is ±3%.

Cathode-Ray Tube

Type—Special Tektronix-manufactured T3211, 3" flat-face, post-deflection accelerator. Low heater power.

Accelerating Potential—4 kv.

Z-Axis Modulation—External terminal permits RC coupling to crt grid.

Unblanking—Deflection unblanking.

Phosphor—Type P31 normally furnished; P1, P2, P7, and P11 phosphors optional. Other phosphors furnished on special order.

Graticule

Illumination—Variable edge lighting when operating from ac line.

Display Area—Marked in 6-vertical and 10-horizontal 1/4" divisions.

Power Requirements

Source—Operates from 10 size D flashlight cells, or 10 size D rechargeable cells (approximately 3 hours using 2.5 ampere-hour cells; approximately 5 hours using 4

ampere-hour cells), or 11.5 to 35 volts dc (aircraft, auto, boat, etc.), or 103.5 to 126.5 volts or 207 to 253 volts, rms, 50 to 800 cycles, single-phase ac.

Power Consumption—Approximately 700 ma from internal batteries or external dc source; 20 watts nominal at 115-volt ac line.

Temperature Protection—Thermal cutout switch interrupts power if ambient temperature exceeds 131° F (55° C).

Built-in battery charger is standard equipment.

Environmental Capabilities

Vibration (operating)—0.025" peak-to-peak, 10 to 55 to 10 cps in 1 minute sweeps (4 G's) for 15 minutes on each axis. Three-minute vibration at resonance or 55 cps on each axis.

Shock (operating)—20 G's, ½ sine, 11-msec duration. Two shocks each direction along each of the three major axis: bottom, top, left side, right side, front and rear. Total of 12 shocks.

Shock (non-operating)—60 G's, ½ sine, 11-msec duration. One shock each direction along each of the three major axis; total of 6 shocks.

Humidity (non-operating)—Meets Mil-Std-202B, method 106A (except freezing and vibration) through 5 cycles (120 hours).

Transit (non-operating)—Meets National Safe Transit test when factory packaged. Vibration for one hour at slightly greater than one G. Eighteen-inch drop in any orientation.

Mechanical Specifications

Construction—Aluminum alloy chassis and cabinet.

Finish—Anodized panel, blue vinyl-finish cabinet.

Dimensions—8½" high, 5¾" wide, 16" deep overall.

ACCESSORIES

Information on accessories for use with this instrument is included at the rear of the mechanical parts list.