

1-1 INTRODUCTION

1-2 The 8012B is an extremely versatile, easy-to-operate pulse generator with a wide range of applications. It has a complete set of variable pulse parameters with a repetition rate of 0–50 MHz and transition times as low as 5ns. This makes it ideal for testing digital logic: RTL, DTL, TTL, some ECL and some MOS can be dynamically tested and noise patterns can be simulated. Any triangular or trapezoidal waveforms can be generated (up to a maximum ratio of 1:100 or 100:1 between leading and trailing edge transitions) over the entire frequency range. The pulse polarity can be set to positive or negative and the pulse output format to symmetrical, normal or complement using front panel switches, without affecting pulse amplitude or offset. The complement format can be used to obtain duty cycles of 100% and symmetrical format provides a means of checking device threshold, driving operational amplifiers and simulating amplifier outputs.

1-3 The 8012B has a selectable source impedance which makes impedance matching to the circuit under test very simple. It also has a square wave facility that is independent of width and delay settings and a double pulse facility that is useful for testing device recovery times and making noise immunity measurements.

1-4 The front panel of the 8012B has been carefully designed to provide a logical layout of the controls; horizontal controls for pulse timing parameters, vertical controls for pulse amplitude parameters. Also, compatible pulse settings are guaranteed as long as that the pulse delay and pulse width controls are either set to the left of the pulse period control or; if set vertically below the period control, that the

delay and width verniers are set counterclockwise of the period vernier. This simple, straightforward design enables pulses to be set up extremely quickly and easily.

1-5 The 8012B will operate in three different modes as follows:

Normal Mode: in this mode the internal rate generator determines the repetition rate of the output pulses. The generator can be triggered internally, externally or manually or can be gated. A trigger pulse is generated for each output pulse and the pulse output can be delayed with respect to the trigger output.

RZ Mode: in this mode external signals are applied to the input socket on the rear panel. These signals by-pass the internal rate generator and trigger the delay generator directly, thus determining the repetition rate of the output pulses. All other pulse parameters are determined by the front panel controls. Because the internal rate generator is not used in RZ mode, it is available to provide independent trigger pulses.

External Width Mode: in this mode external pulses applied to the input socket on the rear panel determine the width and repetition rate of the output pulses. In fact the output is a pulse-shaped version of the external input. The pulse available at the trigger output, being derived from the internal rate generator, is independent of the RZ output.

Table 1-1. Specifications

PULSE CHARACTERISTICS

Transition times: 5ns – 0.5s with INT. LOAD switched IN. 6ns – 0.5s with INT. LOAD switched OUT. In four ranges, common for leading and trailing edges. Verniers provide separate control of leading and trailing edges within each range up to a maximum ratio of 100:1 or 1:100.

Linearity: for transition times > 30 ns, maximum deviation from a straight line between the 10% and 90% points is less than 5% of pulse amplitude.

Overshoot and Ringing: $< \pm 5\%$ of pulse amplitude unless INT LOAD is switched OUT and amplitude reduced to 0.4V – 4V when it may increase to $\pm 10\%$.

Preshoot: $< \pm 5\%$ of pulse amplitude.

Pulse Width: < 10 ns to 1s in four ranges. Vernier provides continuous adjustment within ranges.

Width Jitter: $< 0.1\% + 50$ ps on any width setting.

Maximum Duty Cycle: $> 75\%$ from 1 Hz to 10 MHz, decreasing to $\geq 40\%$ at 50 MHz. Up to 100% in COMPL mode.

Maximum Output: With INT LOAD switched IN, output is 5V across 50 ohms, 10V across open circuit. With INT LOAD switched OUT, output is 10V across 50 ohms, Output circuit cannot be damaged by short circuits.

Attenuator: 4-step attenuator reduces output to 0.2V with INT LOAD switched IN, or to 0.4V with INT LOAD switched OUT. Vernier provides continuous adjustment within ranges.

Polarity: positive or negative selectable.

Output Format: symmetrical, normal or complement selectable.

Source Impedance: 50 ohms $\pm 10\%$ shunted by typically 20pF with INT LOAD switched IN. > 50 ohms shunted by typically 20pF with INT LOAD switched OUT.

DC Offset: With INT LOAD switched IN, offset is ± 2.5 V across 50 ohms and is independent of amplitude settings. With INT LOAD switched OUT, offset is automatically switched off.

Pulse Delay: < 35 ns to 1s (with respect to trigger output) in four ranges; vernier provides continuous adjustment within ranges.

Delay Jitter: $< 0.1\% + 50$ ps on any delay setting.

REPETITION RATE AND TRIGGER

Repetition Rate: 1 Hz to 50 MHz in four ranges, continuous adjustment within ranges.

Period Jitter: $< 0.1\% + 50$ ps on any rate setting.

Square Wave: 0.5 Hz to 25 MHz in four ranges. Duty cycle 50% $\pm 5\%$ up to 1 MHz, tolerance increases to $\pm 15\%$ at 25 MHz.

Double Pulse: up to 25 MHz simulating 50 MHz.

Trigger Output: $> +1$ V across 50 Ω , 16ns ± 10 ns wide. Suitable for triggering another 8012B/13B.

EXTERNALLY CONTROLLED OPERATION**External Triggering**

Repetition Rate: 0 to 50 MHz. For square wave output, frequency is divided by 2.

Trigger input: sinewaves > 1.7 V p-p (about zero) or pulses > 0.8 V either polarity with a width of > 7 ns.

Maximum input amplitude: ± 7 V.

Delay: 25ns ± 8 ns between leading edge of trigger input and trigger output signals.

Input impedance: 50 ohms $\pm 10\%$, dc-coupled.

Manual: front panel pushbutton for single pulse.

Table 1-1. Specifications (cont'd)

Gating

Synchronous gating: gating signal turns generator on. First trigger output pulse is coincident with leading edge of gate pulse. Last output pulse is always generated with normal width even if the gate pulse ends during the generation of the pulse.

Gate input: dc-coupled; voltage at open connector approx. +1.8V. Shorting current $\leq 12\text{mA}$. Input impedance approx. 160Ω . Gate input signal: voltage $> +1.5\text{V}$ or resistor $> 1\text{K}\Omega$ to ground enables rep. rate generator. Voltage $< +0.8\text{V}$ or resistor $< 160\Omega$ disables rep. rate generator. Gate input TTL compatible. Maximum input $\pm 5\text{V}$.

External Width and RZ Modes

External width: output pulse width determined by the width of the drive input signal. Transition times and amplitude are selectable. Trigger pulses, produced by internal rate generator, are independent of the output pulses.

RZ Mode: external input signal switched directly to delay generator. Output pulse period determined by period of RZ input signal. Transition times, delay, width, amplitude and output formats are selectable. Trigger pulses, produced by internal rate generator, are independent of the output pulses.

Input signal: input impedance 50 ohms, dc-coupled. Signal amplitude $> +1\text{V}$, maximum input $\pm 5\text{V}$. Width $> 7\text{ns}$.

GENERAL

Operating temperature range: 0°C to 55°C .

Power: 100/120/220/240V, +5%, -10%, 48 to 400 Hz, 100VA max.

Weight: net 4 kg (8.8 lbs); shipping 6.5 kg (14.6 lbs).

Dimensions: 200mm wide, 142mm high, 330mm deep, (7.9" x 5.6" x 13").

Accessories: 15179A Adapter Frame; rackmount for two units.

1-6 SPECIFICATIONS

1-7 Table 1-1 is a complete list of the Model 8012B critical specifications that are controlled by tolerances. Any changes in specifications due to manufacturing, design, or traceability to the U.S. National Bureau of Standards are included in table 1-1 or on a manual change sheet included with this manual. The manual and manual change sheet (if any) supersede all previous information concerning specifications of the Model 8012B.

1-8 INSTRUMENT AND MANUAL IDENTIFICATION

1-9 Instrument identification by serial number is located on the rear panel. Hewlett-Packard uses a

two-section serial number consisting of a four-digit prefix and a five-digit suffix, separated by a letter designating the country in which the instrument was manufactured. (A=U.S.A.; G=West Germany; J=Japan; U=United Kingdom.)

1-10 This manual applies to instruments with a serial prefix number as shown on the title page. If changes have been made in the instrument since this manual was printed, a "Manual Changes" supplement supplied with the manual will define these changes. Be sure to record these changes in your manual. Backdating information in Section VII adapts the manual to instruments with serial numbers lower than that shown on the title page. Part numbers for the manual and the microfiche copy of the manual are also shown on the title page.