Table 1–2. Specifications

SPECIFICATIONS

The following specifications apply to the 8161A standard and the 8161A Opt. 020 (two channels).
Specifications apply with 50 Ohm load resistance.
Incompatible values prevented by microprocessor which monitors all pulse parameters.
Programming allows all specified range limits to be achieved, irrespective of the accuracy specification.

PULSE PARAMETERS

PERIOD (PER)
Range: 10.0 ns to 980 ms
Resolution: 3 digits (best case 100 ps)
Accuracy: ± 3 % of progr. value ± 0.5 ns (PER < 100 ns)
± 2 % of progr. value (PER ≥ 100 ns)
Max. Jitter: 0.1 % of progr. value + 50 ps

DELAY, DOUBLE PULSE, WIDTH (Specifications apply for minimum transition times, measured at 50 % of amplitude. Delay is measured from trigger to main output).
Delay (DEL) Range: 0.0 ns to 990 ms
Double Pulse (DBL) Range: 8.0 ns to 990 ms
Width (WID) Range: 4.0 ns to 990 ms
Resolution: 3 digits (best case 100 ps)
Accuracy: ± 1 % of progr. value ± 1 ns
Max. Jitter: 0.1 % ± 50 ps (≤ 999 ns)
0.05 % (999 ns < – ≤ 9.99 µs)
0.005 % (> 9.99 µs)

DUTY CYCLE LIMITS
Delay: for DEL ≥ 50 ns, DEL_{max} < 0.94 PER – 30 ns
for DEL < 50 ns, DEL_{max} independent of period
Width: for WID ≥ 50 ns, WID_{max} < 0.94 PER – 30 ns
for WID < 50 ns, WID_{max} < 0.94 PER – 3 ns

OUTPUT LEVELS
High Level (HIL) Range: 4.95 V to 5.00 V
Low Level (LOL) Range: –5.00 V to 4.95 V
Resolution: 3 digits (10 mV)
Amplitude: 0.06 V min, 5.00 V max
Level Accuracy: ± 1 % of programmed value ± 3 % of amplitude ± 25 mV
Settling Time: 20 ns plus transition time to achieve specified accuracy.

NOTE
In A add B Mode (Opt. 020 only):
High Level (HIL) Range: –1.75 V to 1.80 V
Low Level (LOL) Range: –1.80 V to 1.75 V
Amplitude (per channel): 0.06 V min, 2.50 V max

TRANSITION TIMES (10 – 90 % ampl)
Leading Edge (LEE): 1.3 ns* to 900 µs
Trailing Edge (TRE): 1.3 ns* to 900 µs
* < 1 ns (20 – 80 % ampl)
* 1.5 ns in A add B mode (Opt. 020 only).
Resolution: 3 digits (best case 100 ps)
Accuracy: ± 10 % of programmed value ± 1 ns
Linearity: ± 5 % for transition times > 30 ns

PRESHOOT, OVERSHOOT, RINGING: ± 5 % of ampl. ± 10 mV for transition times ≥ 2.5 ns, may increase to ± 10 % of ampl + 10 mV < 2.5 ns.

A ADD B: Adds Channel A and B outputs (opt. 020).

OUTPUT FORMAT:
8161A: simultaneous normal and complement output
8161A Opt. 020: channel A and B, normal/complement independently selectable.

OPERATING MODES

NORM: Continuous pulse stream.
GATE: External signal enables rate generator. First output pulse sync with leading edge. Last pulse always complete.
TRIG: Each input cycle generates a single output pulse.
BURST: Each input cycle generates a programmable number (0 to 9999) of pulses. Min time between bursts is 1 period. Min period setting in burst mode is 15.0 ns.
MAN: Simulates ext signal when EXT INPUT switched OFF.
SINGLE PULSE: Provides a single pulse independent of input and period settings.

SUPPLEMENTARY PERFORMANCE CHARACTERISTICS

SOURCE IMPEDANCE
Typical source resistance: 50 Ohm
Typical reflection: 10 %

EXTERNAL INPUT
Trigger Level: +10 V to – 10 V.
Max. Input: ± 12 V in 50 Ohm, ± 20 V in 10 kOhm
Minimum Amplitude: 500 mVpp
Slope: Positive or negative
Min. Pulse Width: 3 ns
Typical Input Resistance: 50 Ohm or (also in OFF) 10 kOhm
Delay from Trigger Input to Trigger Output: 80 ns

TRIGGER OUTPUT
Switch selectable TTL and ECL output.
Typical output levels into 50 Ohm: TTL 0 / +2.5 V
ECL –0.9 / –1.6 V
Typical Source Resistance: 50 Ohm
Typical Pulse Width: 4 ns (PER < 100 ns),
40 ns (100 ns ≤ PER < 1 µs),
400 ns (PER ≥ 1 µs).
4 ns fixed in external trigger mode.

PROGRAMMING RANGES

Period: 9.0 ns to 999 ms
Delay: 0.0 ns to 999 ms
Double Pulse: 7.0 ns to 999 ms
Width: 3.0 ns to 999 ms
High Level: 5.05 V to 5.10 V
Low Level: −5.10 V to 5.05 V
Transition Time: Leading and trailing edge transition times are independently programmable for transition times ≥ 5 ns within a common range. For transition times < 5 ns, both transition times are set simultaneously.
Ranges are as shown below:

1.0 ns – 4.9 ns	0.50 µs – 9.99 µs
5.0 ns – 99.9 ns	05.0 µs – 99.9 µs
050 ns 999 ns	050 µs 999 µs

HP-IB CAPABILITY

All modes and parameters can be programmed.
EXT SLOPE POS/NEG programming can simulate Gate mode.
TRIG LEVEL adjustment, 50 Ohm/10 kOhm/OFF switch are not programmable.

PROGRAMMING TIMES

LISTEN (time for 8161A to receive and verify message), typical.

Period, Delay, Double Pulse, Width: 100 ms
Transition Times: 60 ms
Output Levels: 110 ms
Burst: 70 ms (existing burst will be interrupted when programming new burst)
Input Modes: 70 ms
Output Modes: 200 ms
Device Trigger: 40 ms (EXT TRIG),
80 ms (BURST)

TALK (time for 8161A to transmit a message), typical.

Status: 1 byte (indicates nature of programming error), < 6 ms typical.
Learn: 11 lines (18 in option 020) up to 14 characters plus CRLF 10 ms/line av.

SETTLING TIMES (time to execute message), typical.

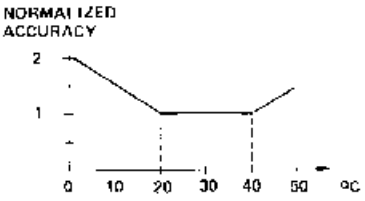
Period, Delay, Double Pulse, Width, Transition Times: 1 ms
Output Levels: 50 ms

MEMORY: 9 programmable locations.
1 location for active operating state.
1 location with fixed parameter set.

Capacity: 1 complete operating state per location.
Access Time: < 20 ms (store),
< 160 ms (recall)

GENERAL

RECALIBRATION PERIOD: 1 year
WARM-UP TIME: 30 min to meet all specifications
REPEATABILITY: Factor 2 better than specified accuracy.
ENVIRONMENTAL:
Storage temperature: −40°C to 75°C
Operating temperature: 0°C to 50°C.
Specifications apply from 20°C to 40°C.
Accuracy derating for temperatures from 20°C to 0°C and from 40°C to 50°C with factor (1 + 0.05 x Δ°C) – where Δ°C is the temperature deviation outside the 20°C – 40°C range.



Humidity range: 95 % R.H., 0°C to 40°C.
POWER-OFF-STORAGE: After eight hours of operation, batteries maintain all stored data up to 2 weeks with instrument switched off. Hardwired addressable location contains a fixed operating state for confidence check (standard parameter set).
POWER: 115/230 V rms + 10 %, −22 %; 48 66 Hz; 675 VA max.
WEIGHT: Net 20,8 kg (46 lbs), Shipping 25 kg (55 lbs).
DIMENSIONS: 178 mm high, 426 mm wide, 500 mm deep (7 x 16,8 x 19.7 in).

OPTIONS

020 Second Channel. Includes delay, width, double pulse, transition times, and output amplifier
Rear Panel Input and Outputs (instead of front panel) . . . . . no extra charge
907 Front Handle Kit (Part No. 5061 0090)
908 Rack Flange Kit (Part No. 5061–0078)
909 Rack Flange and Front Handle Combination Kit (Part No. 5061–0084)
910 Additional Operating and Service Manual (Includes Opt. 911) (Part No. 08161–90001)
911 Additional Operating and Programming Manual (Part No. 08161–90005)

Specifications describe the instrument's warranted performance. Supplemental characteristics are intended to provide information useful in applying the instrument by giving fixed or non warranted typical performance parameters.

Data subject to change.