

5314A UNIVERSAL COUNTER

OPERATING AND SERVICE MANUAL

SERIAL NUMBER PREFIX: 1828A

This manual applies directly to HP Model 5314A having serial number prefix 1828A and **below**.

NEWER INSTRUMENTS

This manual, with enclosed "Manual Changes" sheet, applies to HP Model 5314A having serial number prefixes as listed on the "Manual Changes" sheets.

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MANUAL PART NUMBER 05314-90001
Microfiche Part Number 05314-90002

Printed: SEPT 1978



SAFETY CONSIDERATIONS

GENERAL

This is a Safety Class I instrument. This instrument has been designed and tested according to IEC Publications 348, "Safety Requirements for Electronic Measuring Apparatus."

OPERATION

BEFORE APPLYING POWER verify that the power transformer primary is matched to the available line voltage and the correct fuse is installed (see Section II). Make sure that only fuses with required rated current and of the specified type (normal blow, time delay, etc.) are used for replacement. The use of repaired fuses and the short-circuiting of fuseholders must be avoided.

SERVICE

Although this instrument has been designed in accordance with international safety standards, this manual contains information, cautions, and warnings which must be followed to ensure safe operation and to retain the instrument **in safe condition**. Service and adjustments should be performed only by qualified service personnel.

Any adjustment, maintenance, and repair of the opened instrument under voltage should be avoided as much as possible and, when inevitable, should be carried out only by a skilled person who is aware of the hazard involved.

Capacitors inside the instrument may still be charged even **if the instrument has** been disconnected **from** its source of supply.

Whenever it is likely that the protection has been impaired, the instrument must be made inoperative and be secured against any unintended operation.

SECTION I

GENERAL INFORMATION

1-1. INTRODUCTION

I-2. This manual provides information pertaining to the installation, operation, testing, adjustment, and maintenance of the HP Model 5314A Universal Counter. Figure 1-1 shows the HP 5314A with the supplied equipment.

I-3. This operating and service manual is divided into eight sections, each covering a particular topic for the operation and service of the HP 5314A. The eight sections are listed here:

Section	Topic
I	General Information
II	Installation
III	Operation
IV	Performance Tests
V	Adjustments
VI	Replaceable Parts
VII	Manual Changes
VIII	Service

1-4. SPECIFICATIONS

I-5. Instrument specifications are listed in Table 7-7. These specifications are the performance standards or limits against which the instrument may be tested.

1-6. SAFETY CONSIDERATIONS

I-7. The HP 5314A Universal Counter is a Safety Class I instrument, designed according to international safety standards. This operating and service manual contains information, cautions, and warnings which must be followed by the user to ensure safe operation and keep the HP 5314A in safe operating condition.

1-8. INSTRUMENTS COVERED BY MANUAL

I-9. If the serial number prefix of your HP 5314A is lower than the serial number prefix on the title page of this manual, the manual must be modified for agreement with the HP 5314A. Refer to Section VII, Manual Changes, for the information which will adapt this manual to your HP 5314A. If the serial number prefix is higher, refer to the yellow "manual changes" sheet located inside the front cover.

I-10. The HP 5314A standard instrument, Option 001, and Option 002 are documented in this manual. The differences are noted in the appropriate locations such as Options in Section I, Replaceable Parts in Section VI, and Service in Section VIII.

I-11. INSTRUMENT IDENTIFICATION

1-12. The instrument 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. A letter between the prefix and suffix identifies the country in which the instrument was manufactured (A=USA, G=West Germany, J=Japan, U=United Kingdom). All correspondence with Hewlett-Packard concerning this instrument should include the complete serial number.

Table 1-1. Specifications

INPUT CHARACTERISTICS

Range:

Channel A	10 Hz to 100 MHz
Channel B	10 Hz to 2.5 MHz

Sensitivity:

Channel A:	25 mV rms to 100 MHz
	75 mV peak-to-peak minimum pulse with 5 ns
Channel B:	25 mV rms to 2.5 MHz
	75 mV peak-to-peak minimum pulse width of 50 ns

Coupling: AC

Impedance: 1MΩ NOMINAL shunted by less than 30 pF

Attenuator: X1 or X20 NOMINAL (A Channel only)

Trigger Level:

Continuously variable ± 350 mV times attenuator setting around average value of signal.

Slope: Independent selection of + or - slope

Channel Input: Selectable SEPARATE or COMMON A

Damage Level:

X1:	DC to 100 kHz	350V (DC + peak AC)
	100 kHz to 5 MHz	$2.5 \times 10^7 \text{ C} \times \text{Hz Product}$
	Above 5 MHz	5V rms
x20:	DC to 1 MHz	350V (DC + Peak AC)
	1 MHz to 50 MHz	$2.5 \times 10^8 \text{ V} \times \text{Hz Product}$
	Above 50 MHz	5V rms

FREQUENCY (A)

Range:

10 Hz to 10 MHz direct count
10 Hz to 100 MHz prescaled by 10

LSD Displayed: Direct count 0.1 Hz, 1 Hz, 10 Hz switch selectable. Prescaled 10 Hz, 100 Hz, 1 kHz switch selectable.

Resolution: $\pm \text{LSD}$

Accuracy: $\pm \text{LSD} \pm (\text{time base error}) \times \text{FREQ}$

PERIOD (A)

Range: 10 Hz to 2.5 MHz

LSD Displayed:

$$\frac{100 \text{ ns}}{N} \text{ for } N=1 \text{ to } 1000 \text{ in decade steps of } N$$

Resolution:

$$\pm \text{LSD} \pm 1.4 \times \frac{\text{Trigger Error}}{N}$$

Accuracy

$$\pm \text{LSD} \pm 1.4 \times \frac{\text{Trigger Error}}{N} \pm (\text{time base error}) \times \text{PER}$$

TIME INTERVAL (A TO B)

Range: 250 ns to 1 s

LSD Displayed: 100 ns

Resolution: $\pm \text{LSD} \pm \text{START Trigger Error} \pm \text{STOP Trigger Error}$

Accuracy: $\pm \text{LSD} \pm \text{START Trigger Error} \pm \text{STOP Trigger Error} \pm (\text{time base error}) \times \text{Tl}$

Time Interval measurements require an arming signal for both the START and STOP Channels.
(See Paragraph 3-11.)

RATIO

Range:

10 Hz to 10 MHz Channel A
10 Hz to 2.5 MHz Channel B

LSD Displayed:

1 part in $\frac{A}{B} \times N$ in decade steps of N for N=1 to 1000

Resolution:

$\pm \text{LSD} \pm (\text{B Trigger Error} \times \text{FREQUENCY A})/N$

Accuracy:

$\pm 1 \text{ count of } A \pm \text{B Trigger Error} \times \text{FREQUENCY A}$

TOTALIZE (A)

Range: 10 Hz to 10 MHz

Resolution: ± 1 count of input

GENERAL

Check: Counts internal 10 MHz Oscillator

Display: 7-digit amber LED display with gate and overflow indication.

Maximum Sample Rate: 5 readings per second.

Operating Temperature: 0° to 50°C

Power Requirement:

100/120/230/240V rms +5%, -10%, 48-66 Hz; 10 VA maximum.

Weight: 2.0 kg (4.4 lbs.)

Dimension: 238 mm wide X 98 mm high X 276 mm long
(9 3/8 X 3 3/8 X 10 7/8 in.)

TIME BASE

Frequency: 10 MHz

Aging Rate: <3 parts in 10⁷ per month

Temperature: $< \pm 1$ part in 10⁵, 0° to 50°C

line Voltage: $< \pm 1$ part in 10⁷ for $\pm 10\%$ variation.

OPTIONS

Option 001: High Stability Time Base (TCXO)

Frequency: 10 MHz

Aging Rate: <1 part in 10⁷ per month

Temperature: $< \pm 1$ part in 10⁶, 0° to 40°C

line Voltage: $< \pm 1$ part in 10⁸ for $\pm 10\%$ variation

Option 002: Battery

Type: Rechargeable lead-acid (sealed)

Capacity: TYPICALLY 8 hour of continuous operation at 25°C.

Recharging Time: TYPICALLY 16 hours to 98% of full charge, instrument nonoperating. Charging circuitry included with option. Batteries not charged during instrument operation.

Battery Voltage Sensor: Automatically shuts instrument off when low battery condition exists.

line Failure Protection: Instrument automatically switches to batteries in case of line failure.

Weight: Option 002 adds 1.5 kg (3.3 lbs.) to weight of instrument.

DEFINITIONS

Resolution: Smallest discernible change of measurement result due to a minimum change in the input.

Accuracy: Deviation from the actual value as fixed by universally accepted standard of frequency and time.

Trigger Error:

$$\frac{\sqrt{(80 \mu\text{V})^2 + e_n^2}}{\text{Input Slew Rate at Trigger Point } (\mu\text{V/s})} \quad (\text{rms})$$

Where e_n is the rms noise of the input for a 100 MHz bandwidth on Channel A and a 10 MHz bandwidth on Channel B

LSD: Least Significant Digit.

I-13. This instrument has a two-part serial number. The first four digits and the letter comprise the serial number prefix. The last five digits form the sequential suffix that is unique to each instrument. The contents of this manual apply directly to instruments having the same serial number prefix(es) as listed under SERIAL PREFIX on the title page.

I-14. An instrument manufactured after the printing of this manual may have a serial prefix that is not listed on the title page. This unlisted serial prefix indicates that the instrument is different from those documented in this manual. The manual for this instrument is supplied with a yellow Manual Changes supplement which contains change information that documents the differences.

I-15. DESCRIPTION

I-16. The HP 5314A is a 100 MHz/100 ns Universal Counter. It features a seven-digit, seven-segment LED display with overflow indication, seven function performance, and full input signal conditioning. There are two options available for the HP 5314A. They are a Temperature Compensated Crystal. Oscillator (TCXO, Option 001) and a battery pack for portable operation (Option 002).

I-17. The seven functions are: Frequency, Single-Shot Period, Period Average, Time Interval, Totalize, Ratio, and Self Check. This is accomplished by a single LSI integrated circuit. The input signal is AC coupled and can be conditioned as follows: slope selection, trigger level, and attenuation.

I-18. OPTIONS

I-19. The following is a list of options available for the HP 5314A Universal Counter:

NOTE

A full description of the options is given in Table 7-7, Specifications. For more information concerning the options for the HP 5314A, contact your local HP Sales and Service Office. A list of HP Sales and Service offices is provided at the end of this manual.

Option	Description
001	High Stability Time Base (TCXO)
002	Battery with built-in charger

NOTE

One of the following options must be included with each order.

Option	Description
115	Line operating voltage factory set at 115V nominal (86V to 127V) ac
230	Line operating voltage factory set at 230V nominal (190V to 250V) ac

For field installation of Options 001 and 002, refer to paragraph 2-14, Installation of Options 001 and 002.

I-20. EQUIPMENT SUPPLIED

I-21. Table 1-2 lists the only equipment supplied with the **HP 5314A**.

Table 7-2. Equipment Supplied

DESCRIPTION	HP PART NO.
Detachable Power Cord 229 cm (7½ feet long)	8120-I 378

I-22. RECOMMENDED TEST EQUIPMENT

I-23. The test equipment listed in Table 7-3 is recommended for use during performance tests, adjustments, and troubleshooting. Substitute test equipment may be used if it meets the required characteristics listed in the table,

Table 7-3. Recommended Test Equipment

Instrument Type	Required Characteristics	HP Model No. Recommended
Test Oscil lator	10 MHz, 25 mV rms	651A
Signal Generator	100 MHz, 25 mV rms	8654A
50-ohm Termination	100 MHz bandwidth	11048A
Digital Voltmeter	10 volts	3465A
Oscilloscope (100 MHz)	V: 5 mV	1801A
	H: 50 ns	1825A
Function Generator	2.5 MHz, 25 mV rms	3312A

SECTION III OPERATION

3-1. INTRODUCTION

3-2. This section provides complete operating information needed for the HP 5314A Universal Counter. This section includes a description of all front panel controls, connectors and indicators, operating instructions, operator's checks, and operator's maintenance.

3-3. OPERATING CHARACTERISTICS

3-4. The following paragraphs describe the operating ranges and resolution for frequency, period, time interval, ratio A/B, totalize A, and self-check functions.

3-5. Frequency Measurements

3-6. All frequency measurements are made through the A channel input. The frequency range is 10 Hz to 10 MHz direct count and 10 Hz to 100 MHz prescaled by 10, with a minimum input level of 25 mV rms or 75 mV p-p (with a minimum pulse width of 5 ns) times the attenuator setting. The resolution is 0.1 Hz for frequencies up to 10 MHz. With frequencies above 10 MHz (prescale mode), the resolution is 10 Hz. See Figure 3-3 for a typical frequency measurement setup.

3-7. Period Measurements

3-8. All period measurements are made through the A channel input. The signal can be a sine wave, square wave, or a wave form with components faster than 10 Hz. The period range is 100 ms to 400 ns (10 Hz to 2.5 MHz). The sensitivity is 25 mV rms or 75 mV p-p. The resolution is 100 ns. See Figure 3-4 for a typical period measurement setup.

3-9. Time Interval Measurements

3-10. The counter measures time intervals from Channel A to Channel B; that is, Channel A starts the measurement and Channel B stops the measurement. Time between points on a single waveform can be measured by connecting the input signal to CHANNEL A jack and placing the Input Amplifier Control switch to COM A. Under these conditions, the slope and level controls of Channel A and Channel B allow variable triggering on either the + or - slope. With the Input Amplifier Control switch set to SEP, measurements can be made between points on separate waveforms. The time interval range is 250 ns to 1 s. The sensitivity is 25 mV rms (75 mV p-p). The resolution is 100 ns. See Figures 3-5 and 3-6 for typical time interval measurement setups.

3-11. INITIATING A MEASUREMENT. The HP 5314A does not internally arm itself in time interval. Both Channels A and B must be externally armed before a time interval measurement can be initiated, see Figure 3-1. Each channel is armed by the first positive or negative edge (corresponding to the slope selection setting) of the input signal. Channel A is armed first. Channel B ignores all input edges until Channel A is armed. Once Channel A is armed, the first positive or negative edge (corresponding to the slope selection setting) arms Channel B. Until Channel B is armed, Channel A ignores any further input edges. Once Channel B is armed, the next slope selected edge in Channel A starts the time interval measurement, and the next slope selected edge in Channel B stops the time interval measurement.

3-20. OPERATING INSTRUCTIONS

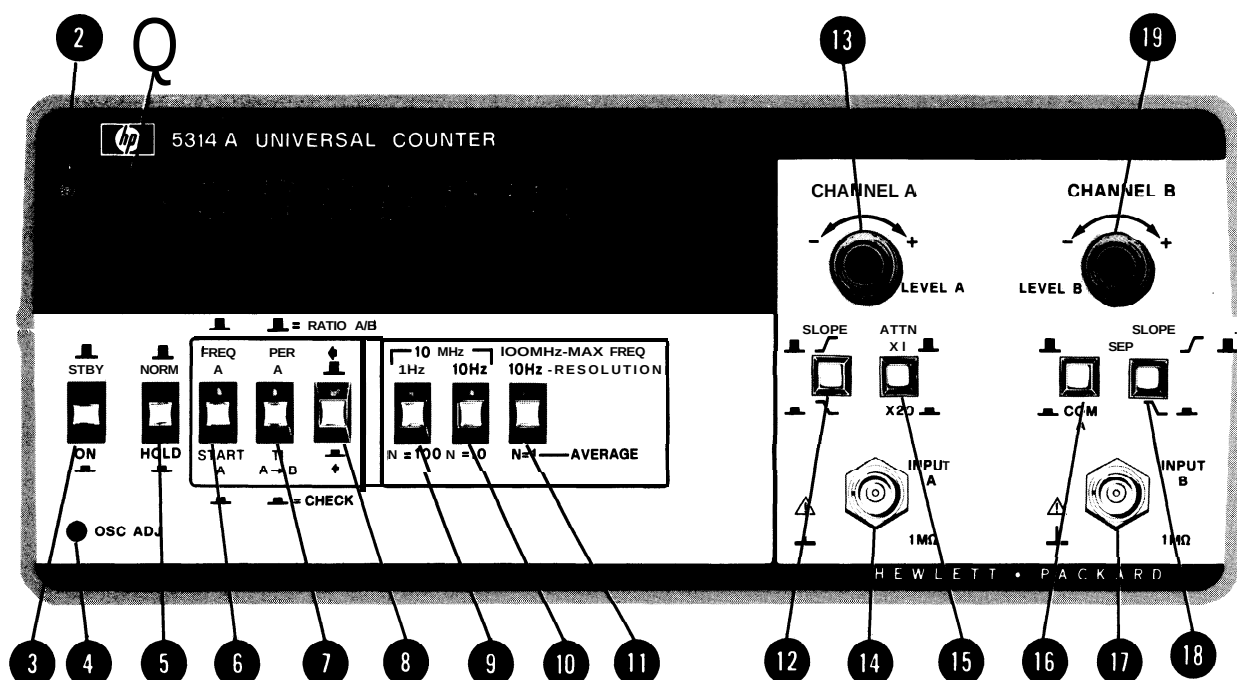
3-21. General operating procedures with the HP Model 5314A Universal Counter connected in typical measurement setups are shown in Figures 3-3, 3-4, 3-5, 3-6, 3-7, and 3-8. Many other applications are possible but not shown because the general operating procedure is the same. Description numbers match the numbers on the illustration.

3-22. OPERATOR'S MAINTENANCE

3-23. There is no operator's maintenance for the HP 5314A. All maintenance should be performed by qualified service personnel only.

3-24. Power/Warm-Up

3-25. The HP 5314A has a two position power switch, STBY and ON. For HP 5314A models with Option 002, it is important that the instrument be connected to the power source in the STBY mode when not in use. This supplies power to the battery charging circuitry.



- | | | |
|---|-------------------|---|
| 0 | GATE | The gate light, when lit, indicates the main gate is open and a measurement is in progress. |
| 2 | OVERFLOW | LED annunciator which lights when one or more of the most significant digits (digits left-most from the decimal point) are not displayed. However, the counter continues to count correctly although the digits are only correct to the extent of the time base. |
| 3 | STBY/ON | Supplies power to the entire instrument in the ON position. Supplies power only to the Option 002 battery charging circuit in the STBY position. |
| 0 | OSC ADJ | Front panel window allowing access to the oscillator frequency - adjustment capacitor (AIC2). |
| 5 | NORM/HOLD | In HOLD, switch IN, the measurement (except for totalize) in progress is stopped, the main counter is reset, and the HP 5314A is held ready to make a new measurement. The latches are not updated so the last complete measurement is displayed. When switched back to NORM, a new measurement is initiated. In totalize, when placed in HOLD, the display is held but the counters continue to increment. When the HOLD is released, the display is updated and resumes counting. |
| 6 | FREQ A
START A | With this switch IN, the HP 5314A is placed in either frequency or totalize (START) mode as determined by the position of the blue shift key@. |
| 7 | PER A
T.I. A→B | With this switch IN, the HP 5314A is placed in either period or time interval mode as determined by the position of the blue shift key@. |

Figure 3-2. front Panel Controls and Connectors

NOTE

There are two additional functions which are selected using combinations of switches @ and @. These two functions are Self-Check and Ratio A to B. For self-check mode, place both function switches 6 and @ in the IN position. The instrument is now making a frequency measurement on the internal 10 MHz time base. Activating switches 9 and 10 causes 10 MHz to be displayed. Activating switch 11 causes 100 MHz to be displayed. Resolution selection switches can now be checked for proper operation. For Ratio A to B, place both function switches 6 and 7 in the OUT position. For more details on Ratio A to B, refer to paragraph 3-12 and Figure 3-7.

SHIFT KEY

IN/OUT position determines the function selected by keys 6 and 7. IN position selects the bottom row functions. OUT position selects the upper row functions.

NOTE

The following three switches 9, 10, and 11 are dual purpose. Depending on the function selected (Frequency, Period, Ratio, etc.) the switches either represent the resolution and bandwidth (gate time) or the sample size (N samples).

9 1 Hz/N=100

In frequency (10 Hz to 10 MHz), this switch, when IN, gives a display with a 1 Hz resolution (1 second gate time). For frequencies between 10 MHz and 100 MHz, see the explanation for switch @. In period, this switch, when IN, causes the HP 5314A to measure 100 periods and display the average value in microseconds. In ratio, this switch when IN, causes the HP 5314A to make 100 measurements and display the average ratio. This switch does not improve accuracy beyond 100 nanoseconds for time interval measurements!

10 10 Hz/N=10

In frequency (10 Hz to 10 MHz), this switch, when IN, gives a display with a 10 Hz resolution (100 millisecond gate time). For frequencies between 10 MHz and 100 MHz, see the explanation for switch @. In period, this switch, when IN, causes the HP 5314A to measure 10 periods and display the average value in microseconds.

In ratio, this switch, when IN, causes the HP 5314A to make 10 measurements and display the average ratio. This switch does not improve accuracy beyond 100 nanoseconds for time interval measurements!

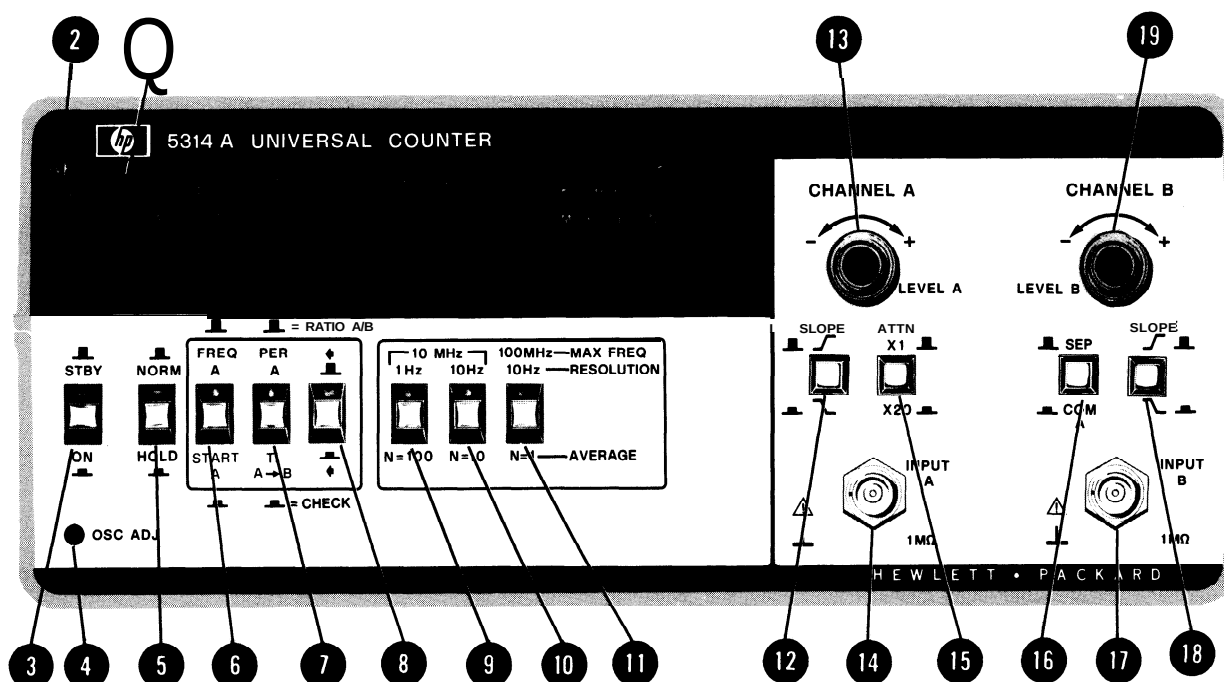
NOTE

There is another resolution available using switches 9 and 10 in addition to the two resolutions called out on the front panel. It is 0.1 Hz/N=1000. This is generated when switches 9, 10, and 11 are in the OUT position. In frequency (10 Hz to 100 MHz), with these three switches out, the HP 5314A gives a display with 0.1 Hz resolution (10 second gate time). For frequencies between 10 MHz and 100 MHz, see the explanation for switch 11. In period, with these three switches out, the HP 5314A measures 1000 periods and displays the average value in microseconds. In ratio, with these three switches out, the HP 5314A makes 1000 measurements and displays the average ratio. This switch combination does not improve accuracy beyond 100 nanoseconds for time interval measurements.

Figure 3-2. Front Panel Controls and Connectors (Continued)

- | | |
|---------------------|--|
| <p>11 10 Hz/N=1</p> | <p>This switch, when IN, reroutes the Channel A input signal through a divide-by-10 prescaler circuit (when FREQ A/START A switch 6 is in). This switch MUST be used for frequencies between 10 MHz and 100 MHz. In frequency, this switch, when IN, prescales the input signal by 10 and gives a display with a 10 Hz resolution (prescale by 10 with a 1-second gate time). This switch and switch@ (1 Hz/N=100) IN prescales the input and gives a display with a 100 Hz resolution (prescale by 10 with a 100-millisecond gate time). This switch and switch 10 (10 Hz/N=10) IN prescales the input and gives a display with a 1 kHz resolution (prescale by 10 with a 10-millisecond gate time).</p> <p>In Period, this switch IN causes the HP 5314A to measure 1 period and display the value in microseconds (this switch is used for single-shot period measurements).</p> <p>In Ratio, this switch IN causes the HP 5314A to make 1 measurement and display the ratio (this switch is used for single-shot ratio measurements).</p> <p>In Time Interval, this switch should be pressed. This programs the HP5314A to make single-shot time interval measurements.</p> <p>In Start, the HP 5314A counts the input directly (10 Hz to 10 MHz) and displays in units. With this switch IN, the input is prescaled by 10 and the display is in kilo units. This switch MUST be used in START A for signals above 10 MHz.</p> |
| <p>12 SLOPE</p> | <p>This switch setting determines which slope of the Channel A input signal will be used as the triggering slope.</p> |
| <p>13 LEVEL A</p> | <p>LEVEL control used in conjunction with the attenuator switch 15, to select the relative voltage at which triggering occurs. Approximately 350 millivolts is the amount varied. The input amplifiers are ac coupled. The actual dc level of the trigger point is unknown.</p> |
| <p>14 INPUT A</p> | <p>BNC connector for the A channel signal input. The input impedance is 1 Meg. For more information on the input signal, refer to Table 7-7, Specifications.</p> |
| <p>15 ATTN</p> | <p>Channel A input signal attenuator switch. Used in conjunction with the LEVEL control to set the trigger point. The input signal is not affected in X1 position. Input signal amplitude is reduced by a factor of 20 in the X20 position.</p> |
| <p>16 SEP/COM A</p> | <p>Input amplifier control switch.</p> <ul style="list-style-type: none"> a. SEP - Allows independent operation of A and B channels. b. COM A - Operationally connects Channels A and B in parallel. Used for single source time interval measurements. Channel B input jack is not active. The input impedance remains the same as in SEP. |
| <p>17 INPUT B</p> | <p>BNC connector for the B channel signal input. The input impedance is 1 Meg. For more information on the input signal, refer to Table 7-7, Specifications.</p> |
| <p>18 SLOPE</p> | <p>This switch setting determines which slope of the Channel B input signal will be used as the triggering slope.</p> |
| <p>19 LEVEL B</p> | <p>LEVEL control used to select the relative voltage at which triggering occurs. When switch 16 is in SEP, the trigger voltage varies approximately ± 350 mV. When switch 16 is in COM A, the trigger voltage varies approximately ± 350 mV times the attenuator (switch-a) setting. The input amplifiers are ac coupled. The actual dc level of the triggering point is unknown.</p> |

Figure 3-2. Front Panel Controls and Connectors (Continued)



NOTE

See Table 7-7 for the specifications on all input signals concerning bandwidth, accuracy, and amplitude.

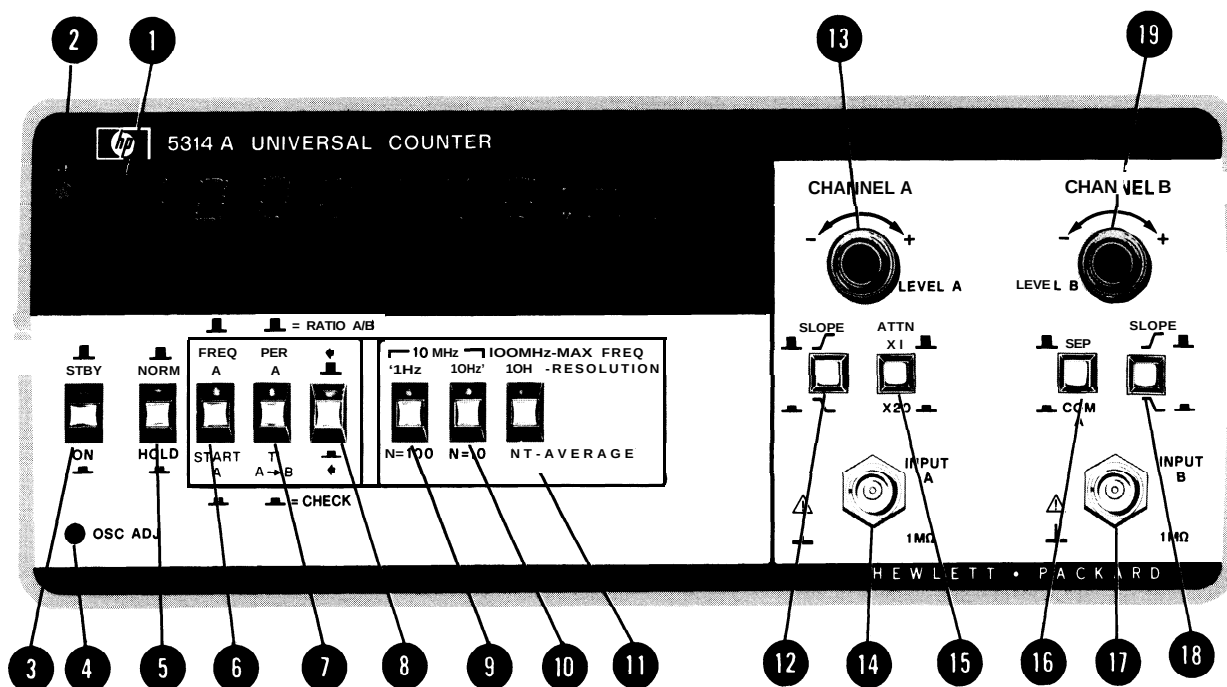
1. Set line switch **3** to the ON position.
2. Set COM A/SEP switch **16** to SEP position.
3. Connect the input signal to INPUT A jack **14**.
4. Press FREQ A/START A switch **6** IN. Be sure the blue shift key **8** is in the OUT position. This selects the top function of switch@.
5. Set SLOPE **12**, ATTN **15**, and LEVEL A **13** to desired positions; see Table 7-7, Specifications, for details.
6. Select either 1 Hz **9** or 10 Hz **10** resolution for frequencies between 10 Hz and 10 MHz. NOTE; 10 Hz **11** may also be used. For frequencies higher than 10 MHz, the 100MHz/10 Hz switch **11** must be pressed IN.

NOTE

The following three resolutions are available with the HP 5314A but are not printed on the front panel.

- A. For 0.1 Hz resolution (10 second gate time) on frequencies from 10 Hz to 10 MHz, place all three resolution switches **9** **10** **11** in the OUT position.
- B. For 100 Hz resolution (0.1 second gate time) on frequencies to 100 MHz, place switches **9** and **11** in the IN position.
- C. For 1kHz resolution (0.01 second gate time) on frequencies to 100 MHz, place switches **10** and **11** in the IN position.

Figure 3-3. Frequency Measurement Setup

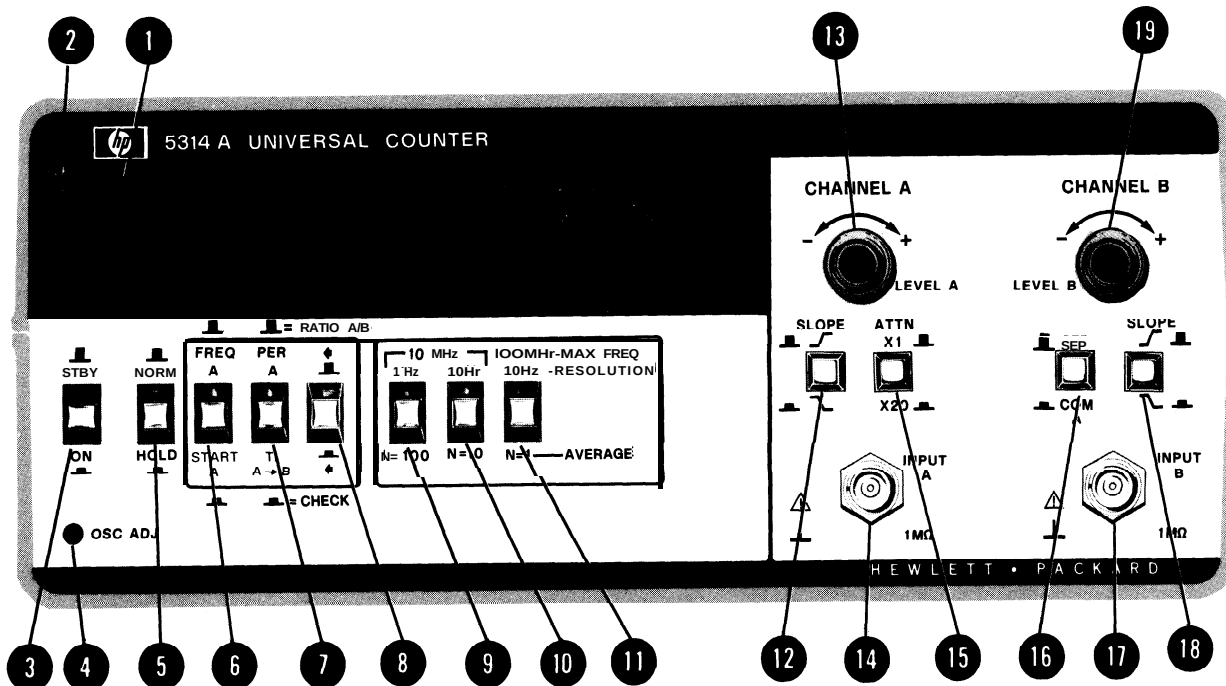


NOTE

See **Table 1-1** for the specifications on all input signals concerning bandwidth, accuracy, and amplitude.

1. Set line switch @to the ON position.
2. Set **COM A/SEP** switch 16 to SEP position.
3. Connect the input signal to INPUT A jack 14.
4. Press PER A/T.I. A-B switch 7 IN. Make sure the blue shift key 8 is in the OUT position. This selects the top function of switch 7.
5. Set SLOPE 12, ATTN 15 and LEVEL A 13 to desired positions; see Table 1-1, Specifications, for details.
6. Press desired sample size switch (9, 10, 11). For an explanation of the sample size switches 9, 10 and 11, see Figure 3-2.

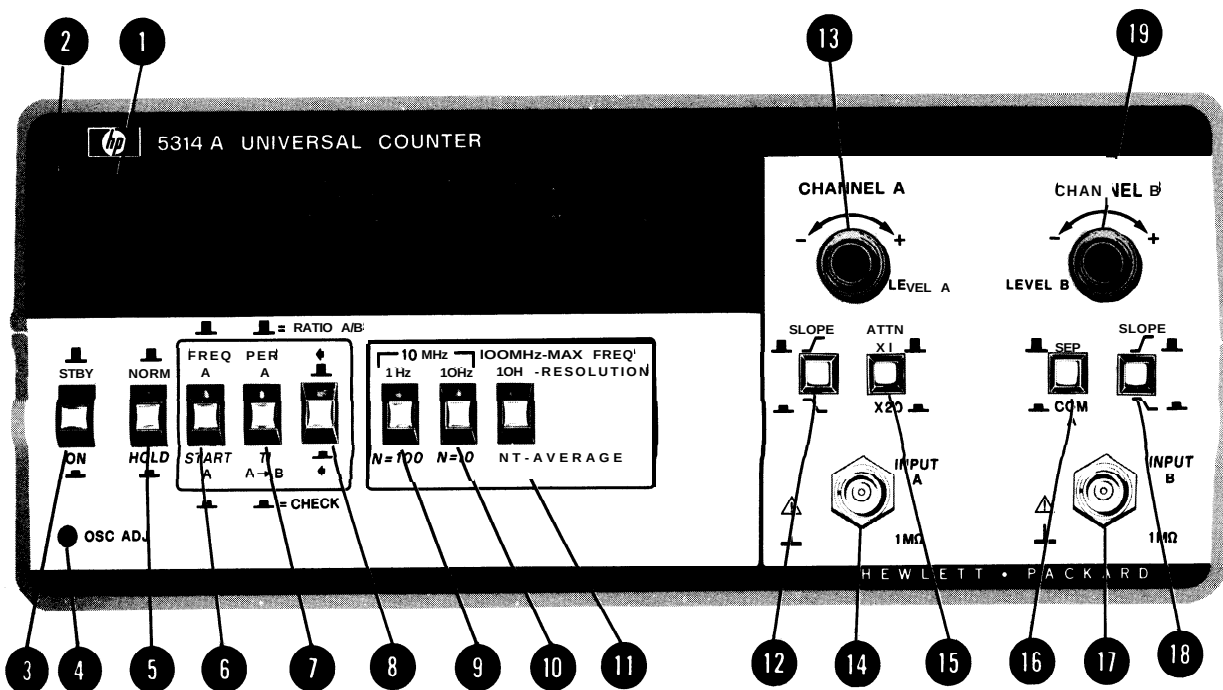
Figure 3-4. Period Measurement Setup



NOTE

See Table 7-7 for specifications on all input signals concerning bandwidth, accuracy, and amplitude. See paragraph 3-11 for time interval arming characteristics.

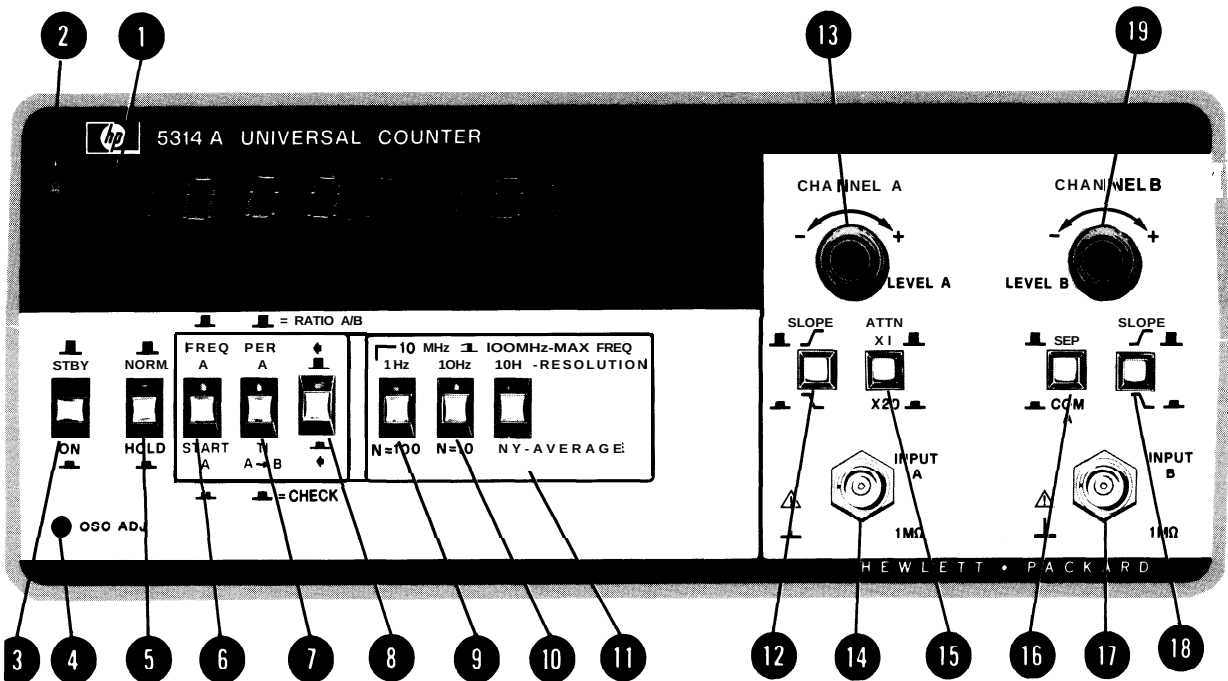
1. Set line switch **3** to the ON position.
2. Set COM A/SEP switch **16** to SEP position.
3. Press PER A/T.I. A→B switch **7** IN. Press the blue shift key @ (IN position). This selects the bottom function of switch **7**.
4. Connect the start time-interval signal to the INPUT A jack **14**. Connect the stop time-interval signal to the INPUT B jack **17**.
5. Set SLOPE switches **12** and **18**, ATTN switch **15**, and LEVEL A and B controls **13** and **19** to desired positions; see Table 7-7, Specifications, for details.
6. Press resolution switch **11** (N=1) IN. This places the **HP 5314A** into **single-shot mode**. All **time interval measurements made with the HP 5314A** should be single-shot.



NOTE

See Table 7-7 for specifications on all input signals concerning bandwidth, accuracy, and amplitude.

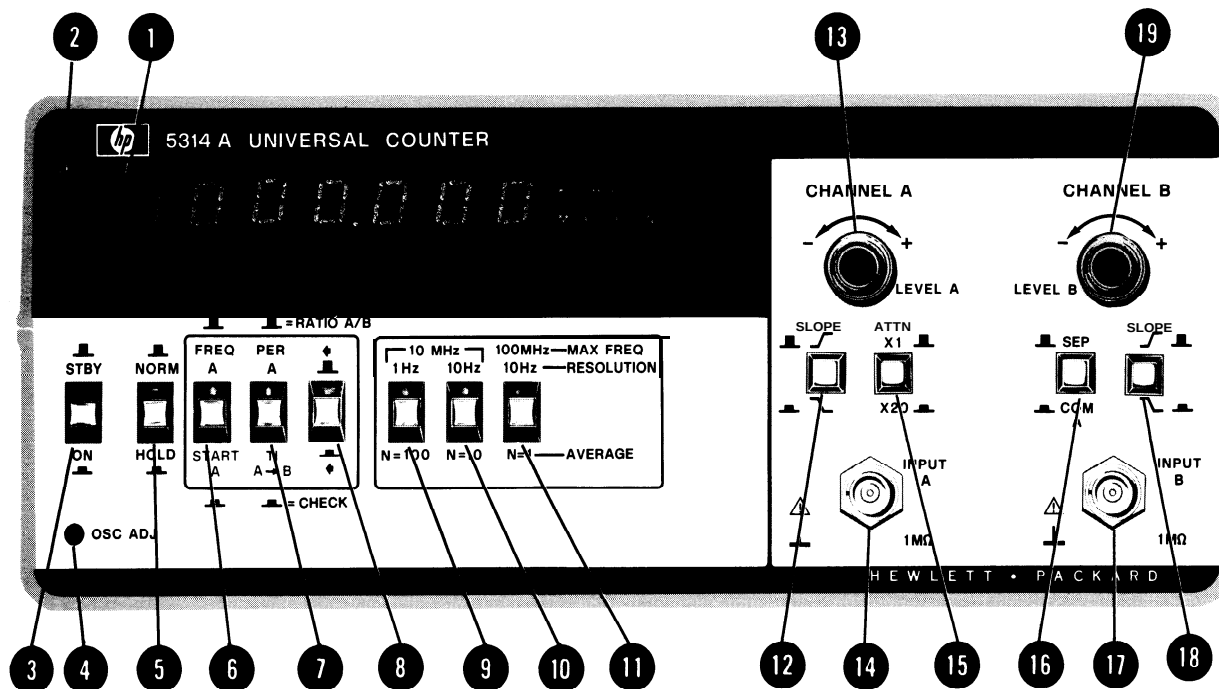
1. Set line switch **3** to the ON position.
2. Set COM A/SEP switch **16** to SEP position.
3. Place the two function switches **6** and **7** in the OUT position. This places the HP 5314A in the Ratio A to B function.
4. Connect the higher frequency signal to the **INPUT A** jack **14**. Connect the lower frequency signal to the **INPUT B** jack **17** (the higher frequency can be input to **INPUT B** if it is below 2.5 MHz).
5. Set SLOPE switches **12** and **18**, ATTN switch **15**, and LEVEL A and B controls **13** and **19** to desired positions; see Table 1-1, Specifications, for details.
6. Press the desired sample size switch (**9**, **10**, **11**) For an explanation of the sample size switches, see Figure 3-2, **9**, **10**, and **11**.



NOTE

See Table 1-1 for specifications on all input signals concerning bandwidth, accuracy, and amplitude.

1. Set line switch **3** to the ON position.
2. Set COM A/SEP switch **16** to SEP position.
3. Press the FREQ A/START A switch **6** IN.
4. Press the blue shift key **8** (IN position). This selects the bottom function of switch **6**.
5. Set SLOPE **12**, ATTN **15**, and LEVEL A **13** to desired positions; see Table 1-1, Specifications, for details.
6. Connect the input signal to INPUT A jack **14**. For input frequencies higher than 10 MHz, the 100 MHz/10 Hz resolution switch **11** (prescale by 10) MUST be pressed (IN position).



NOTE

This operator's check checks for proper operation of the counter chip AIU2, the function and resolution switches, and the display. This procedure does not check the operation of the two input amplifiers. See Figure 4-1, Operation Verification, for a more complete operational check.

1. Set the line switch **3** to the ON position.
2. Depress both function switches **6** and **7** (IN position). This places the HP 5314A in the self-check mode.
3. Place resolution switch **9** (1 Hz/N=100) in the IN position. The HP 5314A should display

0000.000

with the overflow LED **2** ON and the instrument gating once every second.

4. Place resolution switch **10** (10 Hz/N=10) in the IN position. The HP 5314A should display

10000.00

with the overflow LED OFF and a 100-millisecond gate time.

5. Place resolution switch **11** (10 Hz/N=1) in the IN position. The HP 5314A should display

00000.00

with the overflow LED **2** ON and a 1-second gate time.

6. Place both resolution switches **9** and **11** in the IN position. The HP 5314A should display

100000.0

with the overflow LED **2** OFF and a 100-millisecond gate time.

7. Place both resolution switches **10** and **11** in the IN position. The HP 5314A should display

100000.

with a 10-millisecond gate time.