B&K Precision 4017A

B&K Precision 4017A Sweep Function Generator User Manual

Model: 4017A

1. Introduction

The B&K Precision Model 4017A Sweep/Function Generator is a versatile signal source designed for a wide range of electronic testing and development applications. This instrument integrates waveform generation, pulse generation through variable symmetry, and frequency sweep capabilities into a single unit. It also features a built-in frequency counter, providing accurate determination of the output frequency. The 4017A is capable of generating Sine, Square, Triangle, Pulse, and Ramp waveforms across a frequency range of 0.1 Hz to 10 MHz.

2. Safety Information

To ensure safe operation and to prevent damage to the instrument, please observe the following safety precautions:

- Always connect the instrument to a properly grounded power outlet.
- Do not operate the instrument in wet or damp conditions.
- Avoid operating the instrument in explosive atmospheres or in the presence of flammable gases or fumes.
- Ensure adequate ventilation around the instrument to prevent overheating.
- Do not attempt to service the instrument unless you are qualified to do so. Refer all servicing to qualified service personnel.
- Before replacing fuses, disconnect the power cord from the mains supply.
- Use only the specified power cord and accessories provided with the unit.

3. Product Overview

3.1. Front Panel Controls and Indicators

The front panel of the 4017A provides all necessary controls for operation and displays for monitoring. Refer to the image below for a visual guide.

Figure 1: Front view of the B&K Precision 4017A Sweep Function Generator, showing the control panel, LED display, and various input/output ports. The image also displays the included power cord, BNC to alligator clip cable, and spare fuses.

1. Power Button: Toggles the instrument's power on and off.

2. Frequency Display (LED): A 5-digit LED display showing the current output frequency in Hz, kHz, or MHz.

3. Frequency Range Buttons: Selects the frequency range (1, 10, 100, 1K, 10K, 100K, 1M, 10M Hz).

4. Coarse/Fine Frequency Knobs: Adjusts the output frequency within the selected range. The Coarse knob provides large adjustments, while the Fine knob allows for precise tuning.

5. Waveform Selection Buttons: Selects the desired output waveform (Sine, Square, Triangle, Pulse, Ramp). *(Note: Specific buttons for each waveform are not explicitly visible in the provided image but are implied by product description.)*

6. Duty Cycle Controls: Adjusts the duty cycle of the square wave and pulse waveforms. Includes a switch for ON/OFF and a knob for adjustment.

7. CMOS Level Control: Adjusts the output level for CMOS compatibility.

8. DC Offset Control: Adds a DC voltage offset to the output waveform.

9. Output Level Control: Adjusts the amplitude of the output waveform.

10. Sweep Controls (Time, Width, Log/Int):

- **Time:** Sets the sweep time.
- **Width:** Sets the sweep width.
- **Log/Int:** Selects between linear or logarithmic sweep, or internal sweep.

11. VCG/Sweep Input: Input for external voltage control of frequency or external sweep.

12. TTL/CMOS Output: Provides a TTL/CMOS compatible output signal.

13. Main Output: The primary output for the generated waveform.

3.2. Rear Panel

The rear panel typically includes the AC power input, fuse holder, and possibly additional I/O ports depending on the model

revision.

3.3. Included Components

Upon unpacking, verify that the following items are included:

- B&K Precision 4017A Sweep Function Generator Unit
- AC Power Cord
- BNC to Alligator Clip Cable
- Spare Fuses
- User Manual (this document)

4. Setup

4.1. Unpacking and Inspection

Carefully remove the instrument from its packaging. Inspect the unit for any signs of physical damage that may have occurred during transit. If any damage is found, contact your supplier immediately.

4.2. Power Connection

Connect the supplied AC power cord to the power input receptacle on the rear panel of the instrument and then to a suitable grounded AC power outlet. Ensure the voltage rating of the instrument matches your local mains supply.

4.3. Initial Power-On

Press the Power button on the front panel. The LED frequency display should illuminate, indicating the unit is powered on. Allow a few minutes for the instrument to warm up and stabilize before taking precise measurements.

5. Operating Instructions

5.1. Basic Waveform Generation

1. **Power On:** Ensure the instrument is powered on as described in Section 4.3.
2. **Select Waveform:** Press the desired waveform button (e.g., Sine, Square, Triangle) to select the output waveform.
3. **Select Frequency Range:** Press one of the Frequency Range buttons (e.g., 1K for 1 kHz to 10 kHz range) to set the approximate frequency range.
4. **Adjust Frequency:** Use the **Coarse** and **Fine** frequency knobs to set the exact desired frequency. The LED display will show the current frequency.
5. **Adjust Output Level:** Rotate the **Output Level** knob to set the amplitude of the output signal.
6. **Connect Output:** Connect your test equipment (e.g., oscilloscope) to the **Output** BNC connector.

5.2. Using the Sweep Function

The sweep function allows the output frequency to vary automatically over a defined range and time.

1. Set up a basic waveform as described in Section 5.1.
2. **Select Sweep Mode:** Use the **Log/Int** switch to select between linear or logarithmic sweep.
3. **Adjust Sweep Time:** Use the **Time** knob in the SWEEP section to set the duration of the sweep cycle.
4. **Adjust Sweep Width:** Use the **Width** knob to define the frequency span of the sweep.
5. Observe the sweeping frequency on the LED display and your connected oscilloscope.

5.3. Adjusting Duty Cycle and DC Offset

- **Duty Cycle:** For square and pulse waveforms, use the **Duty Cycle** switch (ON/OFF) and knob to vary the ratio of the pulse width to the period.
- **DC Offset:** Rotate the **DC Offset** knob to add a positive or negative DC voltage component to the output waveform. This shifts the entire waveform up or down relative to ground.

6. Maintenance

6.1. Cleaning

To maintain the appearance and prolong the life of the instrument, clean the exterior surfaces with a soft, damp cloth. Do not use abrasive cleaners or solvents. Ensure the instrument is powered off and disconnected from the mains before cleaning.

6.2. Fuse Replacement

If the instrument fails to power on, the fuse may need replacement. The fuse holder is located on the rear panel. Always replace the fuse with one of the same type and rating as specified on the instrument's rear panel or in the specifications section of this manual. Two spare fuses are included with the product.

1. Disconnect the power cord from the mains supply.
2. Locate the fuse holder on the rear panel.
3. Twist or pry open the fuse holder cap.
4. Remove the old fuse and insert a new fuse of the correct rating.
5. Replace the fuse holder cap and reconnect the power cord.

7. Troubleshooting

This section provides solutions to common operational issues. If the problem persists, contact B&K Precision customer support.

Problem	Possible Cause	Solution
Instrument does not power on.	No AC power; Blown fuse; Power cord not connected.	Check power outlet; Replace fuse (see Section 6.2); Ensure power cord is securely connected.
No output signal.	Output Level set to minimum; Incorrect waveform selected; Output cable faulty.	Increase Output Level; Verify waveform selection; Check output cable connection and integrity.
Frequency display is unstable or difficult to set precisely.	Instrument not warmed up; Fine tuning knob sensitivity.	Allow instrument to warm up for at least 15-30 minutes; Use the Coarse and Fine knobs carefully, especially at higher frequencies where fine adjustments can cause significant changes.
Sweep function not working.	Sweep controls (Time, Width) not adjusted; Incorrect sweep mode selected.	Adjust Sweep Time and Width knobs; Ensure Log/Int switch is set correctly.

8. Specifications

The following are the key specifications for the B&K Precision 4017A Sweep Function Generator:

- **Frequency Range:** 0.1 Hz to 10 MHz
- **Waveforms:** Sine, Square, Triangle, Pulse, Ramp
- **Frequency Display:** 5-digit LED

- **Duty Cycle:** Variable
- **DC Offset:** Variable
- **Sweep Function:** Linear and Logarithmic
- **Dimensions (Product):** 18 x 14 x 12 inches (45.7 x 35.6 x 30.5 cm)
- **Weight (Product):** 7.8 Pounds (3.54 kg)
- **Model Number:** 4017A
- **Manufacturer:** B&K Precision Corporation

9. Warranty and Support

B&K Precision products are designed for reliability and performance. For information regarding warranty coverage, technical support, or service, please contact B&K Precision directly or visit their official website. Please have your model number (4017A) and serial number ready when contacting support.

For the most up-to-date contact information and support resources, please refer to the official B&K Precision website: www.bkprecision.com