



Model 4030

10 MHz Pulse Generator

INSTRUCTION MANUAL



1 Safety Summary

The following safety precautions apply to both operating and maintenance personnel and must be observed during all phases of operation, service, and repair of this instrument. Before applying power, follow the installation instructions and become familiar with the operating instructions for this instrument.

GROUND THE INSTRUMENT

To minimize shock hazard, the instrument chassis and cabinet must be connected to an electrical ground. This instrument is grounded through the ground conductor of the supplied, three-conductor ac power cable. The power cable must be plugged into an approved three-conductor electrical outlet. Do not alter the ground connection. Without the protective ground connection, all accessible conductive parts (including control knobs) can render an electric shock. The power jack and mating plug of the power cable meet IEC safety standards.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

KEEP AWAY FROM LIVE CIRCUITS

Instrument covers must not be removed by operating personnel. Component replacement and internal adjustments must be made by qualified maintenance personnel. Disconnect the power cord before removing the instrument covers and replacing components. Under certain conditions, even with the power cable removed, dangerous voltages may exist. To avoid injuries, always disconnect power and discharge circuits before touching them.

DO NOT SERVICE OR ADJUST ALONE

Do not attempt any internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

DO NOT SUBSTITUTE PARTS OR MODIFY THE INSTRUMENT

Do not install substitute parts or perform any unauthorized modifications to this instrument. Return the instrument to B&K Precision for service and repair to ensure that safety features are maintained.

WARNINGS AND CAUTIONS

WARNING and **CAUTION** statements, such as the following examples, denote a hazard and appear throughout this manual. Follow all instructions contained in these statements.

A **WARNING** statement calls attention to an operating procedure, practice, or condition, which, if not followed correctly, could result in injury or death to personnel.

A **CAUTION** statement calls attention to an operating procedure, practice, or condition, which, if not followed correctly, could result in damage to or destruction of parts or the entire product.

WARNING: *Do not alter the ground connection. Without the protective ground connection, all accessible conductive parts (including control knobs) can render an electric shock. The power jack and mating plug of the power cable meet IEC safety standards.*

WARNING: *To avoid electrical shock hazard, disconnect power cord before removing covers. Refer servicing to qualified personnel.*

CAUTION: *Before connecting the line cord to the AC mains, check the rear panel AC line voltage indicator. Applying a line voltage other than the indicated voltage can destroy the AC line fuses. For continued fire protection, replace fuses only with those of the specified voltage and current ratings.*

CAUTION: *This product uses components which can be damaged by electro-static discharge (ESD). To avoid damage, be sure to follow proper procedures for handling, storing and transporting parts and subassemblies which contain ESD-sensitive components.*

Compliance Statements

Disposal of Old Electrical & Electronic Equipment (Applicable in the European Union and other European countries with separate collection systems)



This product is subject to Directive 2002/96/EC of the European Parliament and the Council of the European Union on waste electrical and electronic equipment (WEEE), and in jurisdictions adopting that Directive, is marked as being put on the market after August 13, 2005, and should not be disposed of as unsorted municipal waste. Please utilize your local WEEE collection facilities in the disposition of this product and otherwise observe all applicable requirements.

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2 Introduction

Description

The B&K Precision model 4030 is specifically designed to include the basic facilities of a Pulse Generator in order to make it an easy to operate unit. It offers pulse repetition rates from 0.1 Hz to 10 MHz with rise and fall times of <12 nsec, pulse width from 50 nsec to 50 msec and pulse amplitude from 0.5 V to 5 V across 50 ohms. A provision for external triggering and monopulse generation is also available.

The x'tal mode gives accurate eight spot frequencies derived from a 10 MHz crystal source.

This manual contains information pertaining to the specifications, installation and operation of the model 4030 Pulse Generator,

Features

- Adjustable frequency range from 0.1 Hz to 10 MHz
- Four digit LED frequency display
- Invertible polarity
- Single pulsed output via manual trigger

3 Installation

3.1 Initial Inspection

This unit is tested prior to shipment. It is therefore ready for immediate use upon receipt. The initial physical inspections should be made to ensure that no damage has been sustained during shipment.

Inspect the packing box on receipt for any external damage. If any external damage is evident, remove the instrument and visually inspect its case and parts for any damage. If damage to the instrument is evident, a description of the damage should be noted on the carrier's receipt and signed by the driver or carrier agent. Save all

shipping packaging for inspection and contact the distributor from where the instrument was purchased.

Retain the original packing in case subsequent repackaging for return is required. Use of the original packing is essential.

After the mechanical inspection, verify the contents of the shipment. The items included with the instrument are:

- Power cord
- User manual
- BNC to alligator clips

If the contents are incomplete, or if the instrument does not pass the specification acceptance tests, notify B&K Precision.

3.2 Input Power Requirements

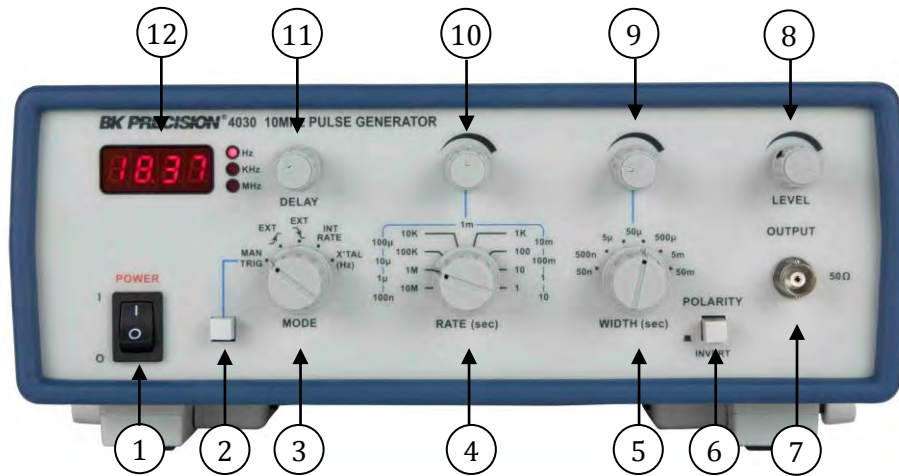
The instrument can operate on 115 or 230 VAC source at 50 or 60 Hz. The line selector plug on the rear panel allows you to select the line voltage. Before connecting the power plug to an AC line outlet, be sure to check that voltage selector plug is set in the correct position corresponding to the line voltage in your location and the fuse rating is as shown in the table.

Selector	Line Voltage	Fuse
115V	110 – 120 V, 50/60 Hz	0.5A
230V	220 – 240 V, 50/60 Hz	0.250A

Table 1 - Fuse Table

4 Controls and Indicators

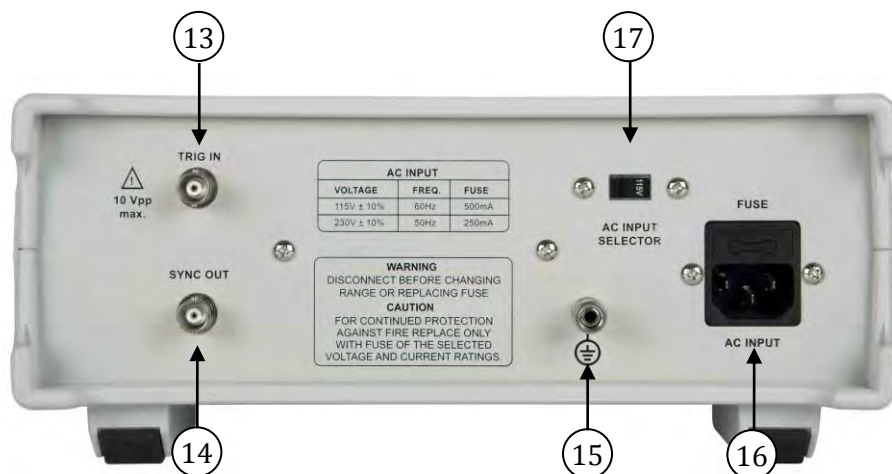
4.1 Front Panel Description



- 1) POWER SWITCH
Turns power on and off.
- 2) MANUAL TRIGGER BUTTON
Outputs one pulse per button press.
- 3) MODE SWITCH
- 4) RATE KNOB
- 5) WIDTH KNOB
- 6) POLARITY BUTTON
Inverts output signal
- 7) MAIN OUTPUT
- 8) OUTPUT LEVEL KNOB

- 9) VARIABLE WIDTH KNOB
- 10) VARIABLE RATE KNOB
- 11) DELAY KNOB
- 12) LED DISPLAY
Displays the output frequency

4.2 Rear Panel Description



-
- 13) TRIGGER INPUT
 - 14) SYNC OUTPUT
 - 15) EARTH GROUND SCREW
 - 16) INPUT AC POWER SELECTOR AND FUSE
Power input socket and fuse compartment. Refer to arrow mark on fuse plug and mark on panel for selected input line voltage.
 - 17) AC INPUT VOLTAGE SELECTOR

5 Operating Instructions

5.1 Pulse Generator Output

Before applying power to the unit, make sure that input voltage is correct and the ventilation holes are not blocked. Ensure the ventilation fan is working well. It is necessary to inspect the generated signal with an oscilloscope before connecting it to any electronic circuit. Hence, use of oscilloscope is mentioned in the procedure. Turn on the instrument with power on switch provided on the front panel. The display LED will light up.

1. Select the type of waveform required by adjusting the corresponding knobs by following the steps below.
2. Select the type of triggering you require. If you want to use standard triggering, set the MODE KNOB to INT RATE.
3. Connect the main output signal to CH1 of oscilloscope and the SYNC output signal to CH2 of oscilloscope. Set the trigger source of oscilloscope to CH2.
3. Set the output frequency of the signal with the RATE KNOBS. The display shows the output frequency at all times.
4. Adjust the output waveform shape by adjusting the WIDTH KNOBS. The output of the generator should be reflected on the display of the oscilloscope on CH1.
5. Adjust the amplitude of the signal with the LEVEL KNOB.
6. Observe the output level changing on the display of the oscilloscopes on CH1.

Note: Check the impedance of the load before connecting. To get an accurate representation of the signal and prevent reflection, it is important to match this impedance to the output impedance of the function generator.

5.2 Using Manual Trigger

In order to use the manual trigger, you must have the "Rate" switch in the 10M/100nS position. This is the only way to access the manual trigger function. If you set the Rate switch to the 10M position and the "Width" switch to the 50mS and the "Mode" switch to manual trigger, then set the volt/division switch on your O-Scope to 2V or 5V and your time/division respectively at 50mS. When you push the manual

trigger you will see a 50mS pulse (one division horizontally). You may have to push it a couple of times because sometimes the trigger pulses off the screen. To verify that the pulse is actually triggering you can hook the unit up to a counter that has a "Total" feature. Every time you push the trigger the counter will count 1 pulse. If you change your volts/division switch to 500mS and leave all the other settings the same as above, you will see the pulses very clearly.

To continue viewing the trigger, make sure that the "Width" switch and the time/division switch on your O-Scope match. There will come a point where the trigger is too fast for your eye to view it using an analog scope. If you leave the time/division at 500mS or 50mS you will be able to view faster pulses but it will be a very dim and quick dot and you will have to look closely to see it; but once again, verify the pulse by the counter. It should go up 1 every time you push the button.

5.3 Using External Trigger

First select either portative or negative edge external triggering. Then connect your external signal to the TRIG IN BNC on the rear of the generator.

With the RATE KNOB set to 10M (100n), the output signal will equal the frequency of the external signal. By then selecting the subsequent rates, the output frequency will be divide by 10 as you select the decade rates (e.g. if you input a 5 MHz external signal and set the RATE KNOB to 1 M (1 μ), the output will equal 500 kHz.

6 Specifications

	4030
Frequency Range	
Internal	0.1 Hz to 10 MHz in 8 decade ranges & variable adjust
Internal Mode Stability	0.5%
X'tal Spot Frequencies	10 MHz, 1 MHz, 100 kHz, 10 kHz, 1 kHz, 100 Hz, 10 Hz, 1 Hz
X'tal Mode Stability	200 ppm
Warm up Time	30 Minutes
Triggering	
Internal	0.1 Hz to 10 MHz
External	10 Hz to 10 MHz
Manual	One pulse out for each button press (available only for 10 MHz (100 ns) rate)
Ext. Trig-Input	± 1 V to ± 10 Vp-p sine & square
Trig. Output	TTL Pulse ($Z_o = 50$ ohms)
Frequency Counter	
Range	0.1 Hz to 10 MHz
Display	4 Digit counter with Internal, External and Auxiliary mode
Display Accuracy	$\pm 0.5\% \pm 1$ count
Waveform	
Rate	100 nsec to 0.1 sec (8 decade ranges & variable adjust)
Width	50 nsec to 50 msec (6 decade ranges & variable adjust)
Delay	0 to 2 μ sec variable w.r.t. trigger output

Output	
Pulse Out	0.5 V to 5 V into 50 ohms
Impedance	50 ohms
Rise & Fall Time	12 nsec
Terminal	BNC
Polarity	Normal or Inverted
General	
AC Input	115/230 VAC, 50/60 Hz, $\pm 10\%$
Consumption	10 VA
Operating Temperature	32 °F to 104 °F (0 °C to 40 °C)
Humidity	10% - 80% R.H.
Storage Temperature	-4 °F to 158 °F (-20 °C to 70 °C)
Storage Humidity	0% - 90% R.H.
Dimensions (W x H x D)	10.3" x 4.4" x 12.4" (26.2 x 11.2 x 31.5 cm)
Weight	5.5 lbs (2.5 kg)
Supplied Accessories	Instruction manual, power cord, BNC to alligator clips

NOTE: All specifications apply to the unit after a temperature stabilization time of 30 minutes. Specifications and information are subject to change without notice.

To ensure the most current version of this manual, please download the current version

7 Certification

CE Compliant

CE Declaration of Conformity

The pulse generator meets the requirements of 2006/95/EC Low Voltage Directive and 2004/108/EC Electromagnetic Compatibility Directive.

Low Voltage Directive

- EN61010-1:2001
 - o Safety requirements for electrical equipment for measurement, control, and laboratory use.

EMC Directive

- EN 61000-6-2:2005
- EN 61000-6-4:2007
- EN 61326-1:2006
 - o Electrical equipment for measurement, control, and laboratory use.

8 Maintenance

8.1 Preventive Steps

Please follow these preventive steps to ensure the proper operation of your instrument.

- Never place heavy objects on the instrument.
- Never place a hot soldering iron on or near the instrument.
- Never insert wires, pins, or other metal objects into ventilation fan.
- Never move or pull the instrument with power cord or output lead. More importantly, never move the instrument when the power cord or output lead is connected.
- Do not obstruct the ventilation holes in the rear panel as this will increase the internal temperature.
- Do not operate the instrument with the cover removed unless you are a qualified service technician.
- Clean and recalibrate the instrument on a regular basis to keep the instrument looking nice and working well.
- Remove any dirt, dust, and grime whenever they become noticeable on the outside cover using a soft cloth moistened with a mild cleaning solution.

8.2 When the Unit is Not Turning On

Check if the power ON/OFF switch is turned ON. If not, then check the power cord. Please make sure that the power cord is properly connected to the unit. Please also check the main switch and ensure that the AC supply at your site is the same as the one mentioned at the rear chassis of the unit. Check for a blown fuse.

8.3 Fuse Replacement

If the fuse blows, the LED will not light and the instrument will not operate. Replace only with the correct value fuse. Refer to Table 1 - Fuse Table for fuse values. The fuse is located on the rear panel adjacent to the power cord receptacle.

Remove the fuse holder assembly as follows:

1. Unplug the power cord from the rear of the instrument.
2. Insert a small screwdriver in the fuse holder slot (located between fuse holder and receptacle).

When reinstalling fuse holder, be sure that the fuse is installed so that the correct line voltage is selected. To verify this, check the inscription on the surface of the fuse box. At the top left and bottom right corner, the line voltage rating is labeled along with a small arrow. Pick the line voltage to use and match the arrow on the bottom right corner. On the rear panel, there is also a label that says "LINE VOLT." with an arrow. Match the line voltage inscription of the fuse box to this arrow to select that line voltage.

8.4 Instrument Repair Service

Because of the specialized skills and test equipment required for instrument repair and calibration, many customers prefer to rely upon B&K Precision for this service. We maintain a network of B&K Precision authorized service agencies for this purpose. To use this service, even if the instrument is no longer under warranty, follow the instructions given in the Warranty Service Instructions section of this manual. There is a nominal charge for instruments out of warranty.

9 Service Information

Warranty Service: Please go to the support and service section on our website at [www.itm.com](#) to obtain an RMA #. Return the product in the original packaging with proof of purchase to the address below. Clearly state on the RMA the performance problem and return any leads, probes, connectors, and accessories that you are using with the device.

Non-Warranty Service: Please go to the support and service section on our website at [www.itm.com](#) to obtain an RMA #. Return the product in the original packaging to the address below. Clearly state on the RMA the performance problem and return any leads, probes, connectors, and accessories that you are using with the device. Customers not on an open account must include payment in the form of a money order or credit card. For the most current repair charges, please refer to the service and support section on our website.

Return all merchandise to B&K Precision Corp. with pre-paid shipping. The flat-rate repair charge for Non-Warranty Service does not include return shipping. Return shipping to locations in North America is included for Warranty Service. For overnight shipments and non-North American shipping fees, please contact B&K Precision Corp.

Include with the returned instrument your complete return shipping address, contact name, phone number, and description of problem.

10 Limited One-Year Warranty

B&K Precision Corp. warrants to the original purchaser that its products and the component parts thereof will be free from defects in workmanship and materials, for a period of one year from date of purchase.

B&K Precision Corp. will, without charge, repair or replace, at its option, defective product or component parts. Returned product must be accompanied by proof of the purchase date in the form of a sales receipt.

To obtain warranty coverage in the U.S.A., this product must be registered by completing a warranty registration form on our website within fifteen (15) days of purchase.

Exclusions: This warranty does not apply in the event of misuse or abuse of the product or as a result of unauthorized alterations or repairs. The warranty is void if the serial number is altered, defaced, or removed.

B&K Precision Corp. shall not be liable for any consequential damages, including without limitation, damages resulting from loss of use. Some states do not allow limitations of incidental or consequential damages. So the above limitation or exclusion may not apply to you.

This warranty gives you specific rights and you may have other rights, which vary from state-to-state.



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