

BK PRECISION® DP-31A

**INSTRUCTION
SHEET**

LOGIC PULSER

DESCRIPTION

The B+K Precision Model DP-31A Logic Pulser is a very effective tool for testing and troubleshooting logic circuits. It can inject a signal into logic circuits without removing an IC or breaking the circuit. Using a logic probe such as the B+K Precision Model DP-21A or DP-52 as a monitor, you can not only check wiring errors but also check component malfunctions. An important characteristic is the ability to produce a very high current for a very short duration. The high current can usually backdrive (overcome) a stuck or shorted device that may also be across the signal injection point and attain a logic state transition. Since the average power under these conditions is very small, the injected signal will not damage any of the components in the circuit.

The DP-31A Logic Pulser can produce a 10 μ S pulse signal at up to 100 mA load. The signal frequency may be switched to either 0.5 Hz or 400 Hz, and as a result the DP-31A is a fairly powerful pulser. At the same time, the DP-31A can produce a coincident square wave at the SQ terminal, which is useful for synchronizing an oscilloscope to observe and trace circuit operation. The DP-31A also has an EXT SYNC input point, which enables the probe's output to be in sync with an external source. An LED gives visual indication of pulse activity, and a handy GND pin is provided for use with the SQ or EXT INPUT terminals.

CE

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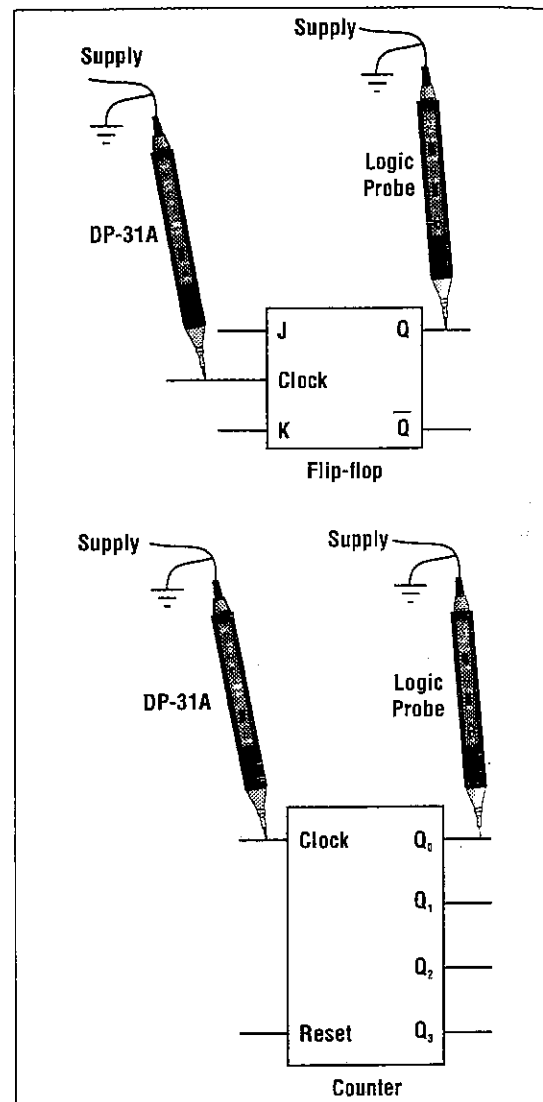


Figure 4.

NOTE

Devices in-circuit are usually affected by other circuits. For example, in Figure 3, if input A of the NAND gate is brought low by some other circuit, the output cannot toggle. Similarly, in Figure 4, inputs J and K must be high for the flip-flop to toggle, and an active Reset input on the counter will prevent it from counting. Other circuits may also be affecting the inputs dynamically while you are testing the device. The inputs should be checked with the logic probe to see if such conditions exist.

- The 0.5 PPS mode of the DP-31A may be used to investigate logic activity at a slower rate; for example, each successive stage of a counter should toggle at half the rate of the previous stage. Again, these conditions may vary due to the dynamic influence of other circuits. Schematic diagrams and a knowledge of the circuits under test are invaluable.

SPECIFICATIONS

Pulse repetition rate	0.5 pps/400 pps
Pulse width	10 μ S
Output current	
Pulser mode	100 mA sink/source
Square wave output	5 mA sink/source
Operating supply voltage range	5-15 V
Sync input impedance	1 M Ω
Power supply protection	\pm 20 V/30 sec.
Output protection	\pm 35 V/30 sec.
Sync input protection	\pm 120 V/30 sec.
Operating temperature	0-50°C, <80% R.H.
Storage temperature	-20° to +65°C, <75% R.H.
Size (H x W x D)	0.7" x 0.7" x 8.2" (18 x 18 x 210 mm)
Weight	1.4 oz (40 g)

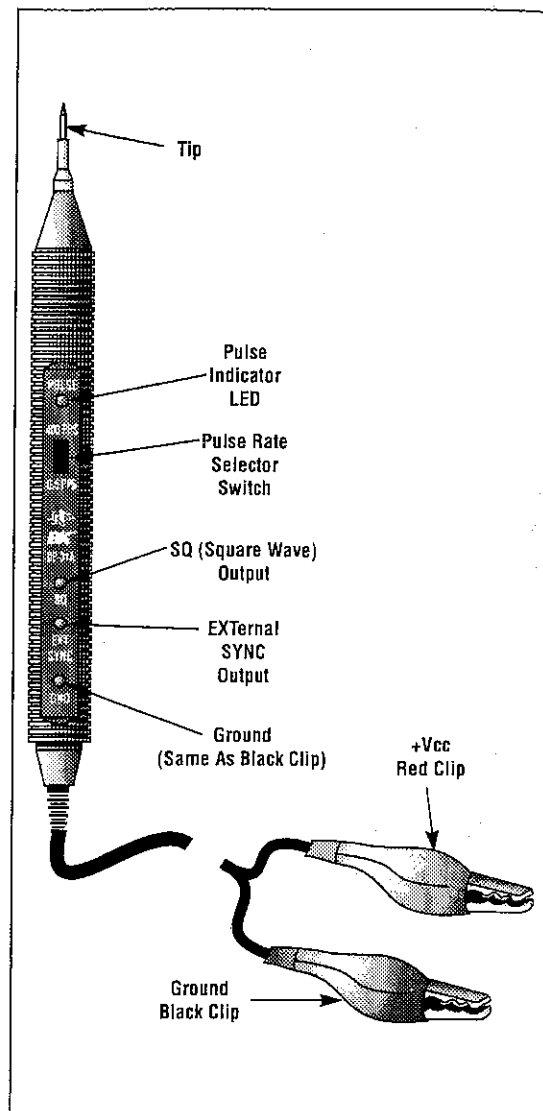


Figure 1.

OPERATION

Applying Power To the Pulser

1. Connect the black clip to the power supply ground.
2. Connect the red clip to V_{cc} (+5 volts for a TTL circuit, +5 to +15 volts for CMOS).

Setting Pulse Rate

Set the pulse rate switch:

1. 0.5 PPS position:

The instrument generates pulses at 0.5 pps. At this rate it is easy to control the number of pulses injected into a circuit, and to observe the circuit state with a logic probe such as the DP-21A.

2. 400 PPS position:

The instrument generates pulses at 400 pps. At this rate, the circuit waveform is easy to monitor on an oscilloscope, and can be used with the DP-21A.

Output Waveform

The Logic Pulser senses the circuit's logic level at the tip and generates a $10\ \mu\text{S}$ pulse of the opposite polarity. That is, if the point is at a high ("1") level, the pulser will pull the point low ("0") for $10\ \mu\text{S}$. The high current usually assures that the logic level will be changed, even if the point is stuck or shorted.

Figure 2 shows the nature and timing of the various waveforms.

SQ (Square Wave) Output

The SQ terminal produces a square wave output having approximate 50% duty cycle in the 400 PPS mode, and approximate 75% duty cycle in the 0.5 PPS mode. Refer to Figure 2. This waveform is coincident with the pulses at the probe tip.

EXTERNAL SYNC Input

This input enables the probe's output to be synchronized with an external source. The probe will sync from approximately one-half to twice the internal rate (200 pps to 800 pps with switch in the 400 PPS position). Refer to Figure 2. Note that the pulses at the probe tip remain constant in width at $10\ \mu\text{S}$, regardless of input frequency.

Pulse Indicator LED

The LED blinks synchronous with the square wave output.

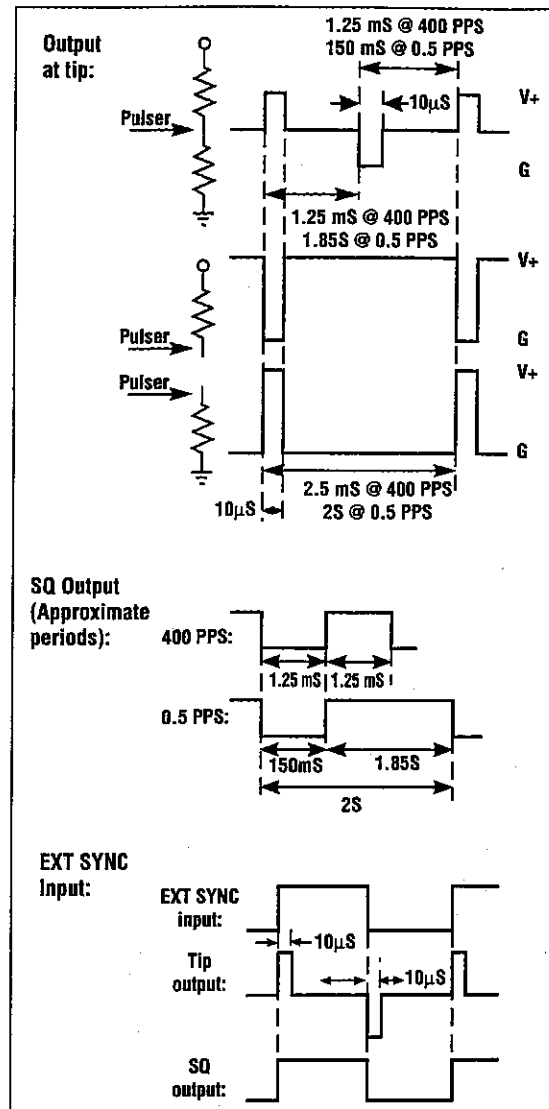


Figure 2.

APPLICATIONS

Use With a Logic Probe

The typical use of the pulser will be with a logic probe such as the B+K Precision Model DP-21A or DP-52. This method of troubleshooting is described below, although an oscilloscope or the circuit under test itself can be used if it gives an indication of logic activity.

1. Connect the logic probe and the DP-31A to the supply of the circuit to be tested.
2. Hold the tip of the logic probe on the output of a suspected bad gate, as in Figure 3, or the output of a flip-flop or counter, as in Figure 4.
3. With the DP-31A in the 400 PPS mode, touch the tip to a logic input of the suspected gate or the clock input of the flip-flop or counter.
4. The output(s) of a good device will generally show a pulse indication on the logic probe.

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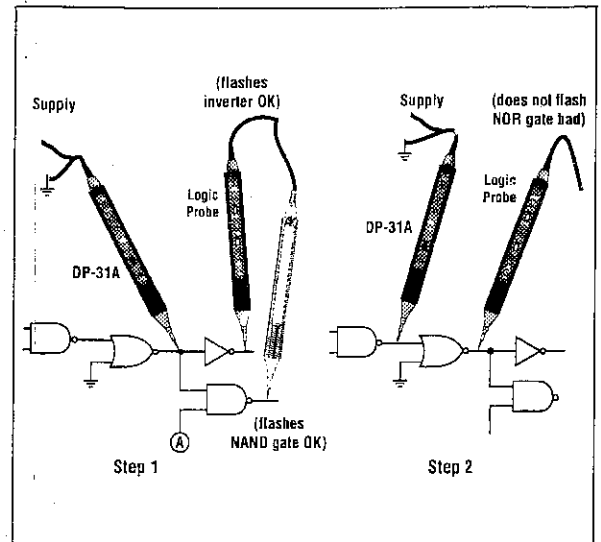


Figure 3.

LIMITED ONE-YEAR WARRANTY

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

MAXTEC will, without charge, repair or replace, at its option, defective product or component parts upon delivery to an authorized B+K Precision service contractor or the factory service department, accompanied by proof of the purchase date in the form of a sales receipt.

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.

MAXTEC shall not be liable for any consequential damages, including without limitation damages resulting from loss of use. Some states do not allow limitation 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 also have other rights which vary from state to state.

For your convenience we suggest you contact your B+K Precision distributor, who may be authorized to make repairs or can refer you to the nearest service contractor. If warranty service cannot be obtained locally, send the unit to B+K Precision Service Department, 22820 Savi Ranch Parkway Yorba Linda, CA 92887, properly packaged to avoid damage in shipment, in shipment.

B+K Precision Test Instruments warrants products sold in the U.S.A. and its overseas territories. In other countries, each distributor warrants the B+K Precision products which it sells.

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