B+K PRECISION®

Instruction Manual

Model 1856B 2.7GHz Frequency Counter

Limited One Year Warranty

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

B+K Precision 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 a sales receipt.

To obtain warranty coverage in the U.S.A., this product must be registered by completing and mailing the enclosed warranty card to B+K Precision, 1031 Segovia Circle, Placentia, CA 92870 within fifteen (15) days from proof of purchase.

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

B+K Precision 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 have other rights, which vary from state-to-state.

Model Number: _____ Date Purchased: _____

TABLE OF CONTENTS

1. FEATURES

* TCXO (temperature compensated crystal oscillator) time base, high stability & accuracy.
* High sensitivity for the VHF & UHF frequency measurement, useful for the CB amateur.
* Wide measuring range up to 2.7 GHz.
* Used the exclusive Microprocessor IC offered the intelligent function: Frequency, Period, Multi resolution, Data hold, Relative measurement, Data record (Max., Min., Average reading).
* 8 digits, 18.3 mm large LCD .
* 0.1 Hz resolution for 10 MHz.
* LCD display for low power consumption & clear read-out even in bright ambient light condition.
* Power supply from battery or AC to DC 9V adapter.
* RS 232 PC serial interface.

2. SPECIFICATIONS

2-1 General Specifications

Display	18.3 mm (0.72") LCD (Liquid Crystal Display), 8 digits.	
Measurement	Frequency, Data hold, Relative, Memory (max., min., average), Period.	
Range	2.7 GHz	100 MHz to 2700 MHz
	500 MHz	10 MHz to 500 MHz.
	10 MHz	10 Hz to 10 MHz
	Period	10 Hz to 10 MHz
Resolution, Sample Time	Ref. the following "Table for Resolution & Sample Time".	

Sensitivity *(Sensitivity Sw. set to high position)*	10 MHz & Period	≤ 30 mV rms.
		Typical : ≤ 15 mV rms. *(10 Hz to 9 MHz)*
	500 MHz	≤ 50 mV rms.
		Typical : ≤ 25 mV rms. *(30 MHz to 400 MHz)*
	2.7 GHz	≤ 50 mV rms. *(100 MHz to 2.5 GHz)*
		Typical : ≤ 35 mV rms. *(300 MHz to 2.4 GHz)*
Max. functional signal input *(Sensitivity Sw. set to normal position)*	10 MHz & Period	≤ 15 V rms.
	500 MHz	≤ 4 V rms.
	2.7 GHz	≤ 4 V rms. *(400 MHz to 2.7 GHz)*
Over−input (Max. signal will not hurt the circuit)	*10 MHz & Period range :* Max. 15 V rms.	
	2.7 GHz & 500 MHz range : Max. 4 V rms.	
Time Base Stability vs. Temp.	± 1.5 PPM (10 °C to 30 °C).	
Frequency Accuracy	± (2 PPM + 1 d) *23 ± 5 °C, after calibration.*	
Time Base circuit	16.777216 MHz, TCXO (temperature compensated crystal oscillator).	
Input Connector	*10 MHz & Period range :* BNC connector.	
	500 MHz range : N coaxial connector.	
	2700 MHz : N coaxial connector.	

Case	Durable & strong ABS–plastic housing with handle.	
Operating Temp.	0 °C to 50 °C (32 °F to 122 °F).	
Operating Humidity	Less than 80%.	
Power Supply	6 x 1.5 V AA (UM–3) battery or AC to DC 9V adapter.	
Power Consumption	*2700 MHz & 500 MHz range :* Approx. DC 105 mA.	
	10 MHz & Period range Approx. DC 45 mA.	
AC Adapter Power Input	Optional, 9V DC , 300 to 500 mA rating, central positive for socket.	
Dimension	280 x 210 x 90 mm (11.0 x 8.3 x 3.5 inch).	
Weight	1200 g/0.27 LB (including battery).	
Standard Accessories	Instruction Manual ..... 1 PC.	
Optional Accessories	PB–21	Direct probe with BNC connector & alligator clip pairs, available for 10 MHz range
	BB–22	Direct probe with double BNC connector, available for 500 MHz & 10 MHz range.
	NN–23	Direct probe with double N coaxial connector, available for 500, 2700 MHz range.
	NB–24	N coaxial connector to BNC connector adapter.
Remark	Spec. tested under the environment RF Field Strength less than 3 V/M & frequency less than the 30 MHz only.	

2–2 Table for Resolution & Sample Time

Range	Gate Time Selec	Resolution	Sampling Time
10 MHz	FAST	10 Hz	0.5 SEC
	SLOW	1 Hz	1.25 SEC
	SLOW (select 1)	0.2 Hz	6 SEC
	SLOW (select 2)	0.1 Hz	11 SEC
500 MHz	FAST	100 Hz	0.75 SEC
	SLOW	10 Hz	6 SEC
	SLOW (select 1)	20 Hz	5 SEC
	SLOW (select 2)	50 Hz	1.5 SEC
2700 MHz (2.7 GHz)	FAST	1000 Hz	0.5 SEC
	SLOW	100 Hz	2.75 SEC
	SLOW (select 1)	200 Hz	1.5 SEC
	SLOW (select 2)	500 Hz	0.75 SEC

3. FRONT PANEL DESCRIPTION

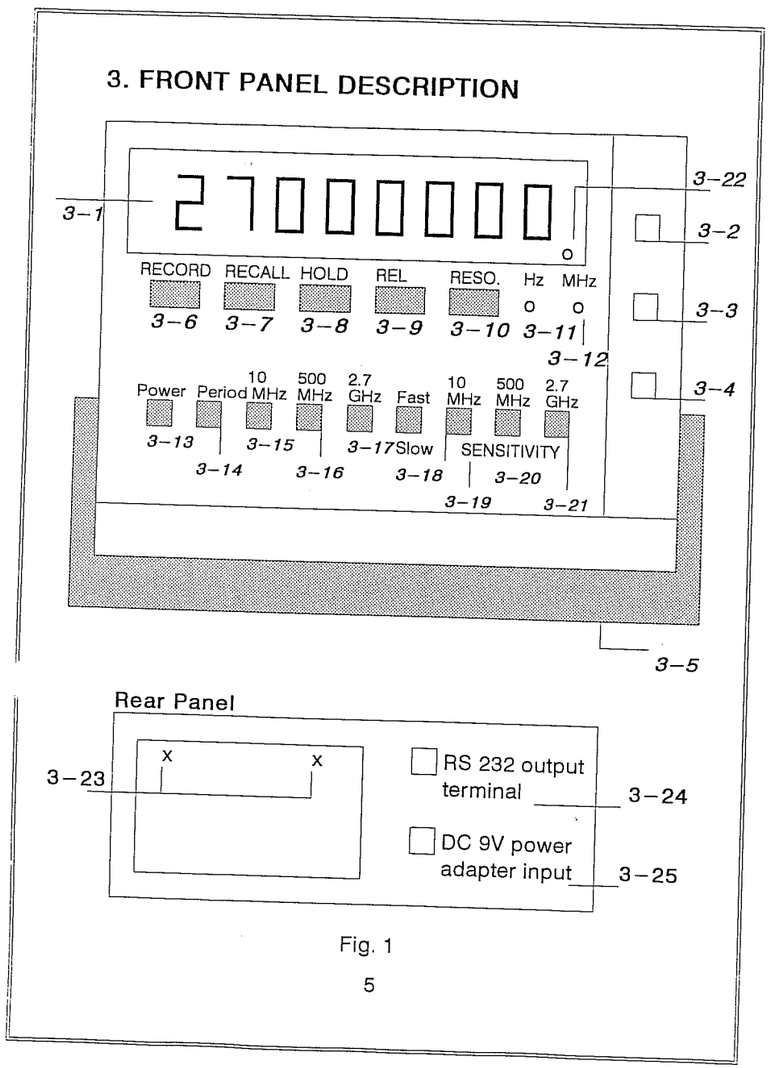

Fig. 1

3–1 Display
3–2 10 MHz (LF, Channel A) input, BNC Socket
3–3 500 MHz (RF, Channel B) input, N type Socket
3–4 2700 MHz (RF, Channel C) input, N type Socket
3–5 Handle
3–6 RECORD Button (Memory Record)
3–7 RECALL Button (Memory Data Call)
3–8 HOLD Button (Data Hold)
3–9 REL. Button (Relative Measurement)
3–10 RESO. Button (Resolution selecting)
3–11 Hz indicator
3–12 MHz indicator
3–13 Power Switch
3–14 Period Switch (Range Switch)
3–15 10 MHz Switch (Range Switch)
3–16 500 MHz Switch (Range Switch)
3–17 2.7 GHz Switch (Range Switch)
3–18 FAST/SLOW Switch (Gate Time Switch)
3–19 10 MHz range Sensitivity Switch
3–20 500 MHz range Sensitivity Switch
3–21 2.7 GHz range Sensitivity Switch
3–22 Gate Indicator
3–23 Battery Cover Screws/Battery Compartment
3–24 RS232 output Terminal
3–25 AC/DC 9V Adapter Socket

4. MEASURING PROCEDURE

4–1 Frequency Measurement

1) Push the " Power Switch " (3–13, Fig. 1), all the display segments will bright then show 0 or some random values. Now the instrument is ready for measurement.

Considering :

* *If no signal input (or short circuit), for " Period Range " the display will show " – – – oL – – – "*
* *If no signal input (or short circuit), for " 10 MHz Range " the display will show " 0 "*
* *If no signal input (or short circuit), for " 500 MHz and 2.7 GHz Range " the display will show certain random value due to the environment noise for input circuit, it is normal. However after the signal input, those noise will be suppressed.*

2) Push the " Range Switch " (3–15, 3–16, 3–17, Fig. 1) to the " 10 MHz ", " 500 MHz " or " 2.7 GHz " position according to the measurement required.

Considering :

Always to select the suitable range to get high sensitivity & good resolution.

3) a. Input the measured signal to Channel A/BNC socket (3–2, Fig. 1) via. BNC cable (optional, PB–21 or BB–22) if the measured frequency is within 10 MHz.
   b. Input the measured signal to Channel B/N type socket (3–3, Fig. 1) via N type cable (optional, NN–23) if the measured frequency is within 10 MHz to 500 MHz.
   c. Input the measured signal to Channel C/N type socket (3–4, Fig. 1) via N type cable (optional, NN–23) if the measured frequency is within 100 MHz to 2700 MHz.

4) According the different input range, select the Sensitivity Switch (3−19, 3−20, 3−21, Fig. 1) to the " HIGH " (high sensitivity) or " NORMAL " (normal sensitivity) position.
5) Slide the Gate Time Switch (3−18, Fig. 1) to the " FAST " or " SLOW " position to determine the convenient sampling time & display resolution.
6) The display unit is Hz for 10 MHz range. The display unit is MHz for 500 & 2.7 GHz range. The Gate Indicator (3−22, Fig. 1) will be flashed one for each sampling time passed.

Considering :

* *Select to " Gate Time Switch " to " Fast " position normally.*
* *If select to " SLOW " position, then push The RESO. button (3−10, Fig. 1) at once 3 times will result 3 kinds Sampling Time & Resolution combination. For more details please see the following table :*

Range	Gate Time Selec	Resolution	Sampling Time
10 MHz	FAST	10 Hz	0.5 SEC
	SLOW	1 Hz	1.25 SEC
	SLOW(select 1)	0.2 Hz	6 SEC
	SLOW(select 2)	0.1 Hz	11 SEC
500 MHz	FAST	100 Hz	0.75 SEC
	SLOW	10 Hz	6 SEC
	SLOW(select 1)	20 Hz	5 SEC
	SLOW(select 2)	50 Hz	1.5 SEC
2700 MHz (2.7 GHz)	FAST	1000 Hz	0.5 SEC
	SLOW	100 Hz	2.75 SEC
	SLOW(select 1)	200 Hz	1.5 SEC
	SLOW(select 2)	500 Hz	0.75 SEC

4–2 Data Hold Measurement

During the measurement, it will hold the display values, if push the " HOLD Button " (3–8, Fig. 1) at once.

Considering :

* *When push the HOLD button at once, then the display will show "– – HoLd – –" & holding values alternately.*
* *It will release the hold function if push the HOLD button at once again.*

4–3 Relative Measurement

1) During the measurement, the circuit will memorize the last measured values if push the " REL. Button " (3–9, Fig. 1) at once, then LCD will show "0" & a "REL" marker appear on the right down corner.
2) The new measured frequency values will deduct above memorized "last measured values" automatically.
3) It will release the Relative Measurement function if push the REL. button at once again, at same time the " REL " marker will disappear.

Considering :

When making the " Data Hold " & " Data Record " measurement, the Relative function is prohibited.

4–4 Data Record(Max., Min., Average reading)

1) The DATA RECORD function displays the maximum, minimum and average readings. To start the DATA RECORD function, press the RECORD button once. An " R.C. " marker should appear on the top right corner of the display.
   a) Push the RECALL button once and "– – – HI – – –" should appear on the display followed in about a second by the maximum reading. The " R.C. " marker will be flashing.
   b) Push the RECALL button again and "– – – Lo – – –" should appear on the display followed by the minimum reading.
   c) Push the RECALL button again and "– – – A – – – " should appear on the display followed by the average reading.
   The average reading will be continually updated every ten samples.
   d) Push the RECALL button again will stop the " R.C. " marker from flashing and normal reading will be.

4–5 Period Measurement

1) Input the measured signal to Channel A/BNC socket (3–2, Fig. 1) via. BNC cable (optional, PB–21 or BB–22)
2) Select the " Period Switch " (3–14, Fig. 1) Select the " 10 MHz range Sensitivity Switch " Switch (3–19, Fig. 1) to the " HIGH " (high sensitivity) or " NORMAL " (normal sensitivity) position.
   ** To select the " HIGH " sensitivity normally.*

3) Slide the Gate Time Switch (3−18, Fig. 1) to the " FAST " or " SLOW " position to determine the convenient sampling time & display resolution.
** To select the " FAST " gate time normally.*

Consideration :

a. The input frequency range for period function is from 10 Hz to 10 MHz.

b. The display will show 5 digits then following the unit :
"−S" represent milli−seconds
"uS" represent micro−seconds.

c. The principal of period display is calculated from the measured frequency (Hz), the formula are following :

$$\text{period (mS)} = \frac{1000\ \text{mS}}{\text{frequency (Hz)}}$$

$$\text{or period (uS)} = \frac{1000000\ \text{uS}}{\text{frequency (Hz)}}$$

d. The period range accuracy are based on the digit no. + 1 (max. 5 digits) of measured frequency. For example if measured frequency is 615 Hz (3 digits), then the period values accuracy will be on the leading four digits (1.626 mS).

e. If no signal input (0 Hz), the display will show over range (−−−oL−−−).

4–6 Over Range Indicator

The display will show the over range indicator "– – –oL– – –" along with the " BI BI ... " sound, if

a. Input signal frequency over 10 MHz for 10 MHz range.
b. Input signal frequency over 500 MHz for 500 MHz range.
c. Input " 0 Hz " for the period range.

5. REPLACEMENT OF BATTERY

1) If the meter used the battery power source, when the display values flashed, it is necessary to replace the batteries.
   3–23 Battery Cover Screws/Battery Compartment
2) Loose the Battery Cover Screws (3–23, Fig. 1), take the battery cover away from the instrument and remove the batteries.
   Replace with 6 x 1.5 V AA (UM–3) batteries and reinstate the cover.
3) Make sure the battery cover is secured with the screws after changing battery.

6. RS232 PC SERIAL INTERFACE

The instrument features an RS232 output via 3.5 mm Terminal (3–24, Fig. 1).

The connector output is a 13 digits data stream which can be utilized to the user's specific application.

An RS232 lead with the following connection will be required to link the instrument with the PC serial input.

Meter (3.5 mm jack plug)	PC (9W 'D' Connector)
Center Pin	Pin 2
Ground/shield	Pin 5

The 13 digit data stream will be displayed in the following format :

D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1

Each digit indicate the following status :

D1	To show range status			
	0	2.7 GHz range, MHz	1	500 MHz range, MHz
	3	10 MHz range, Hz	7	Period range
D2	To show the decimal point status (the decimal on what digit no.)			
	For example : Display is 500.389 , then D2 = 3			
	Display is 50038.9 , then D2 = 1			
D3	0	+ (positive value)	1	mS (Period)
	2	uS (Period)	3	– (negative value)
D4	1st digit value			
D5	2nd digit value			
D6	3rd digit value			
D7	4th digit value			
D8	5th digit value			
D9	6th digit value			
D10	7th digit value			
D11	8th digit value			
D12	Show the total digits no., D12 = 8			
D13	(:) Start Word			

Service Information

Warranty Service: Please return the product in the original packaging with proof of purchase to the below address. Clearly state in writing the performance problem and return any leads, connectors and accessories that you are using with the device.

Non-Warranty Service: Please return the product in the original packaging to the below address. Clearly state in writing the performance problem and return any leads, connectors and accessories that you are using with the device. Customers not on open account must include payment in the form of a money order or credit card. For the most current repair charges contact the factory before shipping the product.

Return all merchandise to B+K Precision with pre-paid shipping. The flat-rate repair charge includes return shipping to locations in North America. For overnight shipments and non-North America shipping fees contact B+K Precision.

B+K Precision
1031 Segovia Circle
Placentia, CA 92870
Phone: 714- 237-9220
Facsimile: 714-237-9214

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