

**BK PRECISION<sup>®</sup>**

Instruction Manual

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Model 1870/1875 Handheld Frequency Counter

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## 1. FEATURES

- \* High sensitivity for the VHF & UHF frequency measurement, useful for the CB amateur.
- \* Handheld & pocket size instrument.
- \* Wide measuring range up to 2.6 GHz.
- \* Good resolution, 0.1 Hz min. display unit for 10 MHz range.
- \* Use the exclusive Microprocessor IC offered the intelligent function: Frequency, Period, Multi-resolution, Data hold, Relative measurement, Data record( Max., Min., Average reading).
- \* Auto power off & manual power off.
- \* LCD display for low power consumption & clear read-out even in bright ambient light condition.
- \* The instrument used the low PPM crystal time base to offer high accuracy measurement.
- \* The optional telescoping antenna accessory can be used to pick up transmit frequencies from handheld, fixed or mobile radios such as: POLICES, FIRE FIGHTER'S, HAM, TAXI, AIRCRAFT MARINE, etc. at ranges of approaching 5 to 30 cm(depending on transmitter power, antenna obstructions, etc.).

## 2. SPECIFICATIONS

### 2-1 General Specifications

|                             |   |   |               |
|-----------------------------|---|---|---------------|
| Display                     | 13mm (0.5") LCD (Liquid Crystal Display), 8 digits.   |   |               |
| Measurement                 | Frequency, Data hold, Relative, Memory(max., min., average), Period.                                      |   |               |
| Range                       | 2500 MHz  | 50 MHz to 2500 MHz<br>(typical max. 2600 MHz) |               |
|                             | 100 MHz   | 5 MHz to 120 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 (rms)           | 2500 MHz range  | 50 MHz – 75 MHz                               | $\leq 100$ mV |
|                             |   | 76 MHz – 2500 MHz                             | $\leq 50$ mV  |
|                             | 100 MHz range   | 5 MHz – 100 MHz                               | $\leq 50$ mV  |
|                             |   | > 100MHz to 120MHz                            | $\leq 100$ mV |
|                             | 10 MHz  | $\leq 50$ mV                                  |               |
| Period                      | $\leq 50$ mV  |   |               |
| Frequency Accuracy          | $\pm (4 \text{ PPM} + 1 \text{ d})$ ,<br>( $23 \pm 5$ °C, after calibration).                             |   |               |
| Time Base circuit           | 4.194 MHz quartz crystal.   |   |               |
| Time Base Temp. Coefficient | 0.1 PPM/per °C (typical, $23 \pm 5$ °C).  |   |               |
| Over-input                  | 2500 MHz & 100 MHz range :<br>Max. 5V peak to peak.<br>10 MHz & Period range :<br>Max. 250 V peak to peak |   |               |
| Input Connector             | BNC, female.  |   |               |
| Case                        | Durable & strong ABS-plastic housing.   |   |               |
| Operating Temp.             | 0°C to 50°C (32°C to 122°C).  |   |               |
| Operating Humidity          | Max. 90% RH (0 °C to 35 °C).  |   |               |
| Power Supply                | 4 x 1.5 V AA(UM-3) battery.   |   |               |

|                        |  |   |
|------------------------|--|---|
| Power Consumption      | 2500 MHz & 100 MHz range :<br>Approx. DC 105 mA.                     |   |
|                        | 10 MHz & Period range :<br>Approx. DC 45 mA.                         |   |
| AC Adapter Power Input | Optional, 9V DC , 300 to 500 mA rating, central positive for socket. |   |
| Power Off              | Automatic power off & manual power off.                              |   |
| Dimension              | 173 x 80 x 35mm (6.8 x 3.1 x 1.4 inch).                              |   |
| Weight                 | 340 g/0.75 LB (including battery).                                   |   |
| Standard Accessories   | Instruction Manual ..... 1 PC.                                       |   |
| Optional Accessories   | AT-20  | Telescoping RF pick-up antenna with BNC connector.  |
|                        | PB-21  | Direct probe with BNC connector & alligator clip pair. (Be used only for the measuring frequency < 500 MHz) |
|                        | CA-03  | Soft carrying case.   |

**2-2 Table for Resolution & Sample Time**

| Range    | Gate Time Select | Resolution | Sampling Time |
|----------|------------------|------------|---------------|
| 2500 MHz | 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      |
| 100 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       |
| 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        |

### 3. FRONT PANEL DESCRIPTION

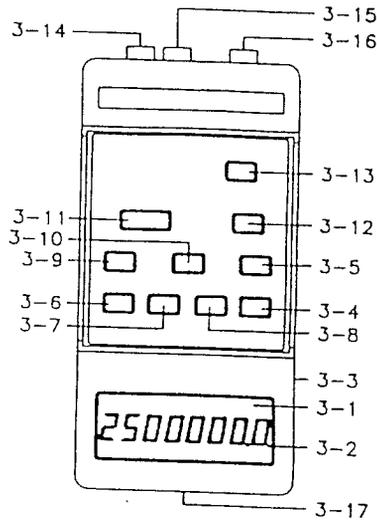


Fig. 1

- |  |  |
|--|--|
| 3-1 Display                                | 3-11 Range Selector                          |
| 3-2 Gate Time Indicator                    | 3-12 Gate Time(FAST/SLOW) Selector           |
| 3-3 AC/DC 9V Adapter Socket                | 3-13 10 MHz Sensitivity Selector             |
| 3-4 Power ON Button                        | 3-14 2500 MHz ( Channel A ) Input BNC Socket |
| 3-5 Power OFF Button                       | 3-15 100 MHz ( Channel B ) Input BNC Socket  |
| 3-6 HOLD(Data Hold) Button                 | 3-16 10 MHz ( Channel C ) Input BNC Socket   |
| 3-7 REL. Button<br>(Relative Measurement)  | 3-17 Battery Compartment /Cover              |
| 3-8 RESO. Button<br>(Resolution selecting) |  |
| 3-9 RECORD Button<br>(Memory Record)       |  |
| 3-10 CALL(Memory Data Call) Button         |  |

## 4. MEASURING PROCEDURE

### 4-1 Frequency Measurement

(1) Push the Power On button(3-4), all the display segments will bright then show "0" or some random values.

Now the instrument is ready for measurement.

(2) Slide the Range Selector(3-11) to the "100 MHz", "2500 MHz" or "10 MHz" position based on the measuring requirement.

**Considering : Always try to select the suitable range to get high sensitivity & good resolution.**

(3) Input the measured signal to Channel A BNC socket (3-14), if the measured frequency is within 100 MHz to 2600 MHz.

Input the measured signal to Channel B BNC socket (3-15), if the measured frequency is within 5 MHz to 100 MHz.

Input the measured signal to Channel C BNC socket (3-16), if the measured frequency is within 10 MHz.

(4) Slide the Sensitivity Selector(3-13) to the "HIGH"(high sensitivity) or "LOW"(low sensitivity) position if the measured frequency is within 10 MHz.

(5) Slide the Gate Time Selector(3-12) to the "FAST" or "SLOW" position to determine the suitable Sampling Time & Resolution.

Considering :If select to "SLOW" position, then push The RESO. button(3-8) at once 3 times will result 3 kinds Sampling Time & Resolution combination. For more details please see the table 2-2, page 3.

*Note : \* The display unit is MHz for 100 & 2500 MHz range.*

*\* The display unit is Hz for 10 MHz range.*

*\* The Gate Indicator(3-2) will be flashed once for each sampling time passed.*

(6) Measuring consideration "DIRECT PROBE" & "RF ANTENNA" :

Due to the limitation for frequency response & input impedance matching of the "DIRECT PROBE(PB-21)", this frequency counter is not proper to measure the frequency directly via PB-21 if the measuring frequency over 500 MHz. It should use the "RF PICK UP antenna(AT-20)" to sense the high frequency( $\geq 500$  MHz) will get the best sensitivity.

**4-2 Data Hold Measurement**

During the measurement, it will hold the display values, if push the HOLD button(3-6) at once.

*Note : 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(3-7) 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.

*Note : 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 out of a sample of ten 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 CALL 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 CALL button again and " - - - Lo - - - " should appear on the display followed by the minimum reading.
  - (c) Push the CALL 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 CALL 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 C BNC socket (3-16).
- (2) Slide the Range Selector(3-11) to the "PERIOD" position. Other measuring procedures are exact same as frequency range(4-1, 4-2, 4-3, 4-4).

*Note :*

- 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 formula of period display values is calculated from the measured frequency (Hz) 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.

#### **4-6 Auto Power Off**

It will power off automatically within 30 minutes if do not slide(touch) any selector(button) & display values do not change within  $\leq 10$  counts.

#### **4-7 Over Range Indicator**

The display will show the over range indicator "— — —oL— — —" and the "BI" sound, if

- a. Input signal frequency over 10 MHz for 10 MHz frequency range.
- b. If no signal input(0 Hz) for the period range.

## 5. REPLACEMENT OF BATTERY

- (1) When the display values flashed, it is necessary to replace the battery.
- (2) Loose the Battery Cover Screw (3-17), take the battery cover away from the instrument and remove the battery.
- (3) Replace with 4 x 1.5 V AA(UM-3) batteries and reinstate the cover.
- (4) Make sure the battery cover is secured with the screw after changing battery.