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Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China





Instruction Manual

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 (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	≤ 100 mV
		76 MHz – 2500 MHz	≤ 50 mV
	100 MHz range	5 MHz– 100 MHz	≤ 50 mV
		> 100MHz to 120MHz	≤ 100 mV
	10 MHz	≤ 50 mV	
	Period	≤ 50 mV	
Frequency Accuracy	± (4 PPM +1 d), (23 ± 5 °C, after calibration).		
Time Base circuit	4.194 MHz quartz crystal.		
Time Base Temp. Coefficient	0.1 PPM/per °C (typical, 23 ± 5 °C).		
Over – input	2500 MHz & 100 MHz range : Max. 5V peak to peak.		
	10 MHz & Period range : 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 : 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.	
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

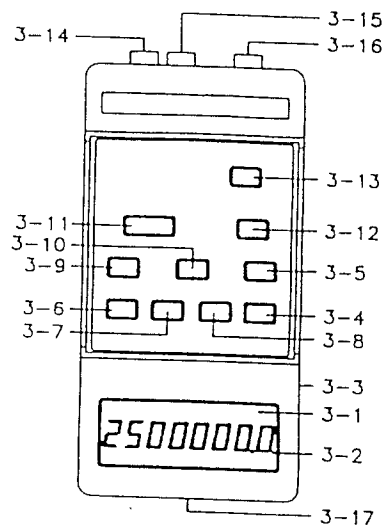


Fig. 1

- | | |
|--|--|
| 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
(Relative Measurement) | 3-17 Battery Compartment /Cover |
| 3-8 RESO. Button
(Resolution selecting) | |
| 3-9 RECORD Button
(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(≥ 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 ≤ 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.