KENWOOD

FREQUENCY COUNTER

FC-758

INSTRUCTION MANUAL

KENWOOD CORPORATION

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CONTENTS

1. GENERAL

The FC–758 is a multi–functional counter. It can be used to measure periods and to count event inputs (event total count) as well as to measure frequencies of up to 1.3 GHz.
The FC–758 counter has two input channels: Channel A and Channel B.
Channel A is designed as an input circuit terminated with a 1.2 Megaohm resistor and used to measure frequencies from 5 Hz to 100 MHz.
Channel B is designed as an input circuit terminated with a 50 ohm resistor and used to measure frequencies from 80 MHz to 1.3 GHz.
The FC–758 counter outputs measurement data to a high–brightness and 8–digit LED display. Its display resolution is 0.1 Hz (MAX.) at up to 10 MHz. The display function enables the users to continue there data measuring operations on a 'Look and Go' basis.
Use of this product would be an advantage in measuring the frequencies in the relatively low frequency range because a period measuring function (unit: microseconds) and an easily–controlled event total count function are supported. Note that this event total count can be controlled externally with rear–panel gate signal or through front–panel operations.
The FC–758 is provided with a self–check function. The function enables the user to check and confirm major measurement functions.
The panel display portion has several easy–to–use LED display functions such as a leading–zero blanking function, measurement unit display function, gate active mode display function, and over–range display (overflow indication) function.
The FC–758 uses a highly stable crystal oscillator as its time base. The time base timer can continue stable oscillation even when the power supply voltage fluctuates or in hard temperature environment. As a result, high–accuracy measurement operations remain unaffected.
The FC–758 counter has the above functions. This means that it is a highly functional frequency counter with high accuracy and that it can help developers and designers as well as production line workers and servicing personnel with their work.

2. SPECIFICATIONS

【Frequency Measurement (Channel A)】	
Measurement Range	kHz mode: 5Hz to 10MHz MHz mode: 5Hz to 100MHz
Accuracy	± Reference Time Accuracy ± 1 count
Resolution	kHz mode: 0.1Hz to 100Hz MHz mode: 1Hz to 1000Hz
Counting Time (Gate Time)	0.01s, 0.1s, 1.0s, 10.0s
Unit	kHz, MHz
【Frequency Measurement (Channel B)】	
Measurement Range	80MHz to 1.3GHz
Accuracy	± Reference Time Accuracy ± 1 count
Resolution	Prescale: 10Hz to 10kHz
Counting Time (Gate Time)	0.027s, 0.27s, 2.7s, 27s
Unit	MHz

【Period Measurement (A)】	
Measurement Range	0.285 μs to 200 ms (5Hz to 3.5 MHz)
Accuracy	± 1count ± Reference Time Accuracy ± Trigger Error*
Resolution	100ps to 100ns
Unit	μs
Minimum Pulse Width	142.5ns
Magnification (Gate Time)	×1, ×10, ×100, ×1000
【Totalize Measurement (A)】	
Measurement Range	5Hz to 10MHz
Maximum Total Count	0 to 99, 999, 999
Control Method	Reset/Hold control from the flont panel. Always active except for the case where the Start/Stop input terminal level is 'InActive (active high).

【Input Characteristics (Channel A)】	
Frequency Band Width	5Hz to 100MHz (Coupling: AC coupling)
Sensitivity (sine wave)	kHz mode: 20mVr.m.s. (5Hz to 10MHz) MHz mode: 20mVr.m.s. (5Hz to 30MHz) 50mVr.m.s. (30MHz to 100MHz)
Impedance	1.2MΩ, 40pF or less
Maximum Input Voltage	125Vr.m.s. at 400Hz
Attenuation	×1 (1/1), ×10 (1/10)
Low Pass Filter	100kHz, −3dB
【Input Characteristics (Channel B)】	
Frequency Band Width	80MHz to 1.3GHz (Coupling: AC coupling)
Sensitivity (sine wave)	10mVr.m.s. (80MHz to 600MHz) 25mVr.m.s. (600MHz to 1.0GHz) 50mVr.m.s. (1.0GHz to 1.3GHz)
Impedance	50Ω
Maximum Input Voltage	1.5Vr.m.s.

【Reference Oscillator】	
Oscillation Frequency	Crystal Oscillation 10.0MHz (Channel A: 5Hz to 100MHz) Crystal Oscillation 3.90625MHz (Channel B: 80MHz to 1.3GHz)
Stabilization (Tenperature Factor, Aging Rate)	3×10^{-6}/0 to 40℃ (10.0MHz) 1×10^{-6}/0 to 40℃ (3.90625MHz) 5×10^{-7}/ Month (10.0MHz) 2×10^{-7}/ Month (3.90625MHz)
【Display Function】	
Display	Eight−digit 7−segment LED Display kHz/μs, MHz, GATE, OVER FLOW
Functions Display	kHz, MHz, CH B, PER, TOTAL, CHECK
Counting Time (Gate time)	CH A: 0.01s, 0.1s, 1.0s, 10s CH B: 0.027s, 0.27s, 2.7s, 27s
【Self-check Function】	
Display	Display a count value of the internal time base timer (10.0MHz).

Counting Time (Gate time)	0.01s, 0.1s, 1.0s, 10s
Resolution	0.1Hz to 100Hz
【General Requirements】	
Power Supply Voltage Power Comsunption	100/120/220/240V ± 10% (Max. 250V), 50/60Hz, 20VA
Within Specifications Temperature and Humidity	23℃ ± 5℃, 70% RH
Operating Temperature and Humidety	0℃ to 40℃, 80% RH
Dimentions	240(W)×64(H)×190(D) mm [Max.260(W)×70(H)×210(D)mm]
Weight	1.8kg
Accessories	Instruction Manual 1 Power Supply Cable 1 Replacement Fuse 1

* Trigger error is typically ± 0.3% of reading divided by the number of cycles averaged, for input signals having better than 40dB S/N ratio and greater than 100mV amplitude.

3. PRECAUTIONS FOR USE

a. Turn off the product and then connect it with the AC wall outlet by using the accessory power cable cord. Refer to the maintenance section in this document in changing the current power supply voltage to a new level.

b. The use of this product under the following ambient conditons is strictly prohibited:

Direct exposure to the sunlight

High-temperature and High-humidity

Mechanical Vibration and Electrical Shock

c. The maximum input terminal voltage levels of this counter are as follows:

(Front Panel)

Channel A Input Juck : 125Vrms (at 400Hz)

Channel B Input Juck : 1Vrms (at 80MHz to 1.3GHz)

(Rear Panel)

TOTALIZE INPUT START/STOP Input Juck : ±5V

d. This counter can start its operation at the moment when power is applied. However, wait 30 minutes to give it a warm and then start your job with it. Accurate measurement will be assured.

The counter is initialized as follows when turned on:

FUNC switch : kHz/10MHz mode

GATE switch : 0.27s/0.01s

kHz/μs display LED:Active

Note that the display indicates "0" if no signal is input to the counter.

4. PANEL EXPLANATION

4-1 Front Panel

① POWER ON ▬/OFF ■ Switch (See Figure 1.)

The POWER ON ▬/OFF ■ switch is provided to apply power to this counter. If pressed(▬), the counter will be turned on. If pressed again(■), the counter will be turned off.

② GATE LED

③ kHz/μs Indicator LED

The kHz/μs LED indicator is provided to remind the user of the current measurement data unit.

This LED indicates the unit of the current measurement operation. If the frequency measurement mode has activated, it means that the measurement value is output in kiloherz. The LED indicates that the measurement value is displayed in microseconds if a period is being measured or the self-check mode is selected.

④ MHz Indicator LED

The MHz LED indicator is provided to remind the user of the current measurement data unit.

This LED turns on when the frequency measurement value is displaed in Megaherz.

⑤ Display LED

The display consists of eight-digit LEDs indicating all the measurement values.

⑥ OVER FLOW Indicator LED

The OVER FLOW LED is provided to notify the user that an overflow has occurred.

This LED blinks when any measurement data exceeds the display range.

⑦ CHANNEL B(80MHz to 1.3GHz) Input juck

The CHANNEL B input juck is a prescale input juck provided to allow object signals to enter the counter.

If the frequency of greater than 100MHz is measured, this juck is used as the input juck. This juck is terminated with a resistor of 50ohm.

This input juck can be used to measure the frequencies in the range between 80MHz and 1,300MHz (1.3GHz).

This input juck can be also used to measure the frequencies of less than 100MHz. However, it is recommended that Channel B be used for this purpose

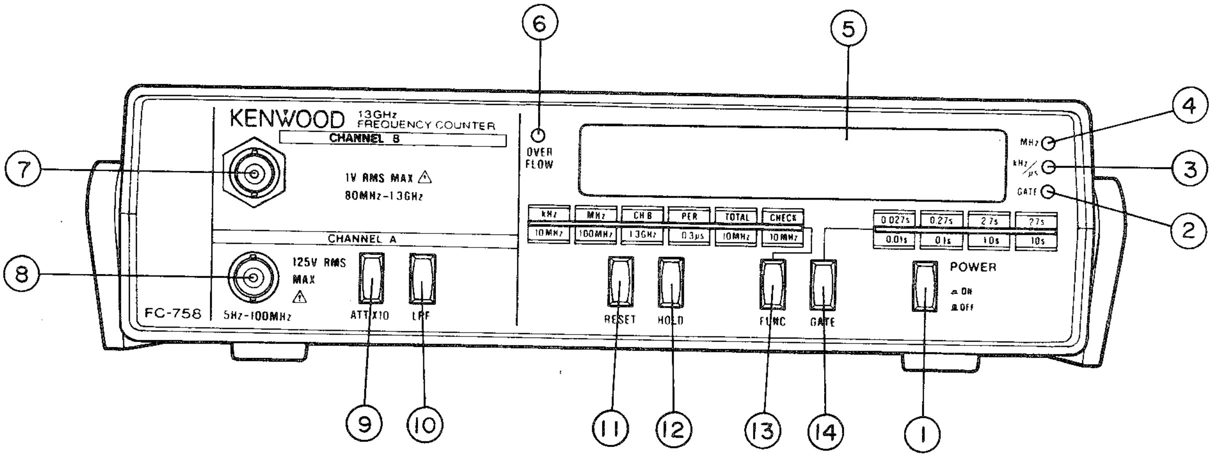


Figure 1. Front Panel

because its resolution functions better than the channel A's one.

⑧ CHANNEL A (5Hz to 100MHz) Input Juck

The CHANNEL A input juck is provided to allow object signals to enter the counter.

If the frequency of less than 100MHz is measured, every kind of cycle is measured, or event inputs are counted, this juck is used as the input.

This juck is a BNC connector terminated with a resistor of 1.2Megaohm.

Note: If a 50ohm system is connected to this counter, the Channel A Input juck needs to be terminated with a resistor of 50ohm. Please keep it in mind.

⑨ ATT x 10 Switch

The ATT (enuation) x 10 switch is provided to enable the internal ATTenuator circuit operation.

If this switch is pressed (x 10), the input signal to channel A is attenuated into 1/10 and then reaches the counter.

If this switch is pressed again (x 1), the input signal to channel A reaches the counter without attenuation.

Note that this switch can work together with channel A only but does not affect channel B.

⑩ LPF Switch

The LPF switch is used to enable the Low Pass Filter circuit operation.

If this switch is pressed (▬), the input signal to channel A is forced to enter a low pass filter of about 100kHz.

If pressed again (■), the input signal reaches the counter directly. This LPF switch does not affect channel B.

⑪ RESET Switch

The RESET switch is provided to clear the counter into 0. This switch can work, independently of any operation mode selected by FUNC switch (13).

If this switch is pressed (▬), the counter will be reset to 0.

If this switch is released (■), a new measurement will be started.

⑫ HOLD Switch

The HOLD switch is provided to perform various operations shown below. Note that the HOLD switch functions depend on operational modes selected by FUNC switch ⑬.

a. In any measurement mode other than the Event Input Total Count operation mode:
If this switch is pressed(▂), the current measurement value indicated by the display LEDs is 'held' and the counter is reset.
If pressed again(▆), a new measurement will be started. The display value being 'held' is not until the new measurement is complete.

b. Event Total Counter (TOTAL/10MHz) Mode:
If this switch is pressed(▂), the current measurement value indicated by the display LEDs is 'held' and the event total count is terminated.
If pressed again(▆), a new counting operation will be started. Note that TOTALIZE INPUT START/STOP input juck ⑮ should be left 'Open' before the new counting operation is started.
operation is started.

⑬ FUNC Switch/Mode Indication LED

The FUNC switch is provided to select the desired operational mode from the available modes.
The Mode Indication LED is provided to enable the user to see the measurement mode currently in use.

The following operational modes can be selected with this switch:

a. kHz/10MHz (frequency) measurement mode
The kHz/10MHz measurement mode is an operational mode in which this frequency counter measures the frequency of an input signal to CHANNEL A. The measurement data will be displayed in 'kHz'.
A desired resolution value can be selected with GATE switch ⑭.
Note : The maximum frequency to be handled in this measurement mode is 10MHz. The proper range should be used according to input frequencies with each range characteristics fully in mind.

b. MHz/100MHz (frequency) mode
The MHz/100MHz mode is an operational mode in which this counter measures the frequencies of input signals to channel A and outputs the measurement data to the display section. They are displayed in MegaHerz (MHz).
A desired resolution value can be selected with GATE switch ⑭.

Note : The maximum frequency to be handled in this measurement mode is 100MHz. The proper range should be used according to input frequencies with each range characteristics fully in mind.

c. CH B/1.3GHz (frequency prescale) mode

The CH B/1.3GHz mode is an operational mode in which this product measures the frequencies of input signals to channel B and outputs them to the display section. They are displayed in MegaHerz (MHz).

A desired resolution value can be selected with GATE switch ⑭ .

d. PER/0.3μs (PERIOD) mode

The PER/0.3μs mode is an operational mode in which this product measures the cycle times of input signals to channel A and then outputs them to the display section. They are displayed in microseconds.

A desired resolution value can be selected with GATE switch ⑭ .

e. TOTAL/10MHz (event input total count) mode

The TOTAL/10MHz mode is an operational mode in which this product counts the number of channel A input cycles and then outputs each count value to the display continuously.

This cycle count and display operations can be externally controlled with the gate signal input to the TOTALIZE INPUT START/STOP input juck on the rear panel or the HOLD switch on the front panel.

f. CHECK/10MHz Mode

The CHECK/10MHz mode is an operational mode in which this frequency counter checks internal functions. If this self–check mode is selected, the frequency of the internal time base timer (10MHz) will be displayed by the 8–digit 7–segment LEDs. Look at the display value to see if this product operates normally or not.

A desired resolution value can be selected with GATE switch ⑭ .

⑭ GATE Switch/GATE LED

The GATE switch is provided to select a desired display resolution value for the period mode (PER/0.3us) or the frequency mode (MHz/100MHz, kHz/10MHz, or CH B/1.3GHz) started by FUNC

switch ⑬ .
The GATE LED is provided to indicate the counter is currently active.
If the switch is pressed, a new display resolution value is selected. This occurs every time when the switch is pressed. There are four display resolution values available. They are :
0.01s, 0.1s, 1s, 10s for Channel A
0.027s, 0.27s, 2.7s, 27s for Channel B

Resolution value	0.027s	0.27s	2.7s	27s
	0.01s	0.1s	1.0s	10s
Magnification	×1	×10	×100	×1000

4-2 Rear Panel (See Figure 2.)

⑮ TOTALIZE INPUT START/STOP Input juck
The TOTALIZE INPUT START/STOP input juck is provided to control the event input count operation mode.
The event input count operation is enabled if the input signal to this juck becomes active (TTL level: 'H').
The event input count operation is forced to terminate if the input signal to this juck becomes inactive (TTL level : 'L'). The event input count operation is also disabled if this juck is grounded to the chassis ground.

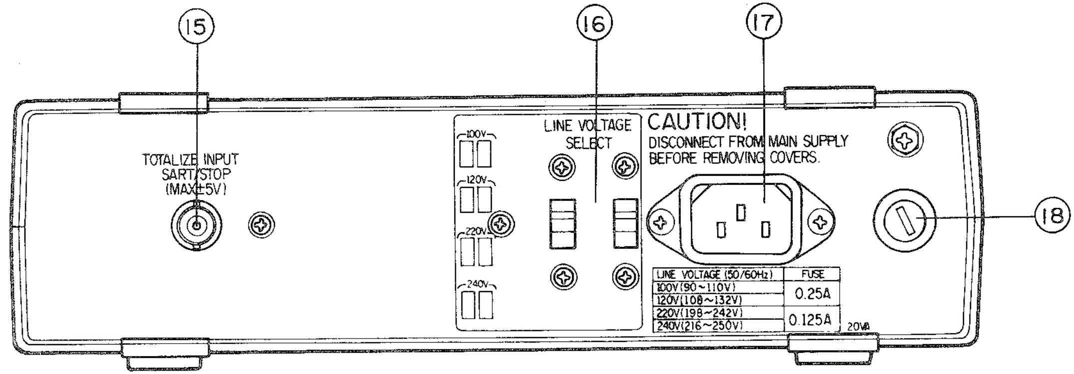


Figure 2. Rear Panel

⑯ Power supply voltage selector (LINE VOLTAGE SELECT)

The power supply voltage selector is provided to select the supply voltage that is applied to the counter.

When you change the current supply voltage, refer to section 7–1 'Maintenance'.

⑰ Power input connector

The power input connector is provided for connecting a power cord to the counter. Use the accessory power cord.

⑱ Fuse Holder

The fuse holder is provided to enable the user to set a protection fuse in the counter.

For the 100V– or 120V–power requirement, use the 0.25A/250V slow–blow type fuse.

For the 220V–or 240V–power requirement, use the 0.125A/250V slow-blow type fuse.

When you replace the current fuse, refer to Chapter 7 'Maintenance'.

4-3 Case Surface

⑲ There is an opening on the case surface to enable the user to fine-adjust the TCXO (standard oscillator).

This adjustment applies to both of the CH A (10.0 MHz) and CH B (3.90625 MHz) channels.
The opening is normally covered with a rubber cap.
If the oscillator needs to be fine adjusted, please contact your dealer representative.

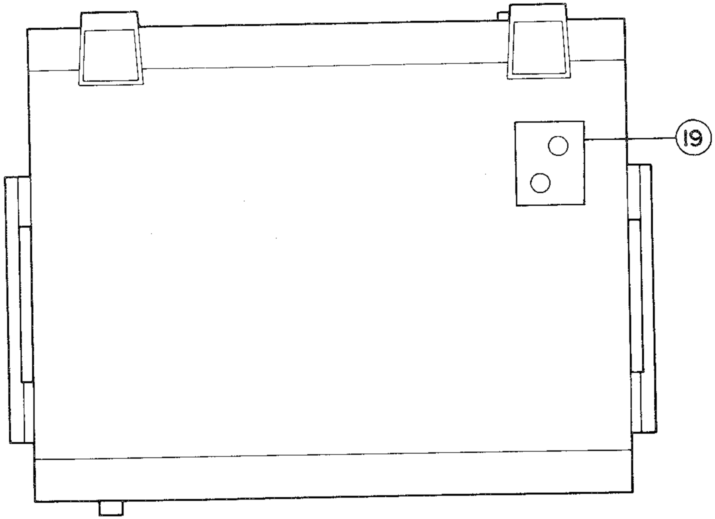


Figure 3. Case Surface

5. OPERATING PROCEDURES

Every time when you start using the FC−758 Multi−Functional Counter, look at the rear panel and verify that the power supply voltage selector setting indicates the level of the supply voltage to be actually applied.

1) Connect the accessory power cord with the power input connector (inlet) of the rear panel and insert the AC plug into the nearby outlet.
2) Press the POWER switch (▁▄▁). The counter will be turned on.
3) Read carefully Chapter 3 'Notes on use' (on page 7) to handle this instrument correctly.

5−1 Frequency Measurement

5−1−1. Frequency Measurement with Channel A (5Hz to 100MHz)

(1) Input a target signal (to be measured) to CHANNEL A input juck ⑧.

(2) Select either the kHz/10MHz mode or MHz/100MHz mode by using FUNC switch ⑬ . kHz/μs LED ③ or MHz LED ④ will be turned on.
Note : The maximum allowable measurement frequency varies depending on the measurement modes. In the kHz measurement mode, up to 10MHz−frequency can be processed while the maximum frequency that can be handled in the MHz mode is 1.3GHz.

(3) Select a desired display resolution value with GATE switch ⑭ .

(4) The frequency of the input signal currently being measured will be output to Display ⑤.
GATE LED ② blinks during the measurement. The measurement value on the display will be updated at the moment when one measurement interval is over (when the GATE LED becomes inactive).

(5) Press ATT x 10 switch (▁▄▁) according to input signal levels. If the internal attenuator circuit is enabled, input signal to the CHANNEL A pin is attenuated into 1/10 before reaching the counter. This attenuates noise−superimposed input signals. In addition, the attenuation circuit preprocesses a signal with rather a high amplitude into a reasonable level. As a result, accurate counting is assured.

(6) Press LPF (low pass filter) switch ⑩ (▬) to eliminate noise signal components. If the internal LPF circuit function is enabled, the input signal to the CHANNEL A juck is handled first by the LPF circuit (about 100kHz) and then input to the counter. Therefore, the counter processes input signals without high-frequency noises only. As a result, accurate low-frequency measurement is assured.

(7) If HOLD switch ⑫ is pressed during frequency measurement, the current measurement value on the Display is held as it is. If the switch is released, a new measurement cycle will be started. However, the measurement value currently being displayed will remain unchanged until the new measurement cycle is complete. That is, the display value being held by the HOLD switch is updated by the output value from the new measurement operation.

(8) If RESET switch ⑪ is pressed during frequency measurement, the measurement value on the Display will be reset to '0'. If pressed again, a new measurement cycle will be started. However, the measurement value will remain '0' until the new cycle is complete.

5-1-2. Frequency Measurement with CHANNEL B (80MHz to 1.3GHz)

(1) Input a target signal (to be measured) to CHANNEL B prescale input juck ⑦.
Note : The maximum input voltage to this juck is 1 Vrms and its input impedance is 50 ohm. ATT x 10 switch ⑨ cannot work together with this juck.

(2) Select the CH B/1.3GHz mode with FUNC switch ⑬.

(3) Select a desired display resolution value by using GATE switch ⑭.

(4) The frequency of the input signal current being measured will be output to Display ⑤.
GATE LED ② blinks during the frequency measurement.
The measurement value indicated by the Display will be updated at the moment when one measurement cycle is complete (when the GATE LED becomes inactive).
Note : It may happen to occur that measurement is delayed or the display is unstable. In this case, refer to section 5-4 'Display Description'.

(5) If HOLD switch ⑫ is pressed during frequency measurement, the current measurement value on the Display is held as it is.
If pressed again, a new measurement cycle will be started. However, the measurement value currently being displayed will remain unchanged until the new measurement cycle is complete.
That is, the display value being held by the HOLD switch is updated by the output value from the new measurement operation.

(6) If RESET switch ⑪ is pressed during frequency measurement, the measurement value on the Display will be reset to '0'.
If the switch is released, a new measurement cycle will be started. However, the measurement value will remain '0' until the new cycle is complete.

(7) ATT x 10 switch ⑨ and LPF switch ⑩ are helpless in the prescale input mode.

5-2 Period Measurement

In the period measurement mode, the cycle time of each input signal is measured.
The cycle time finally output by the counter is the average of all the cycles measured. The number of cycles to be measured can be 1, 10, 100 or 1000.
The maximum input frequency is 3.5 MHz.

(1) Input a target signal (to be measured) to the CHANNEL A input juck.

(2) Select the PER/0.3us (period) mode with FUNC switch ⑬.
The kHz/μs LED will turn on indicating that the measurement value is displayed in microseconds.

(3) Select a desired display resolution value with GATE switch ⑭. This GATE switch is used to specify the number of cycles per cycle measurement.
As already explained, the final cycle time output is the average of all the cycle times. The display resolution LEDs (from the left) indicates 1, 10, 100 and 1000.

(4) The average cycle time of all the periods measured is output to Display ⑤.
GATE LED ② blinks during the period measurement.
The measurement value on the display will be updated at the moment when one period measurement is complete (when the GATE LED turns off). The GATE LED blinking may not be confirmed because

it gets too fast due to high-frequency signal measurement.

Note : It may happen to occur that measurement is delayed or the display is unstable. In this case, refer to section 5-4 'Display Description'.

(5) Press ATT x 10 switch ( ) according to input signal levels. If the internal attenuator circuit is enabled, input signal to the CHANNEL A juck is attenuated into 1/10 before reaching the counter. This attenuates noise-superimposed input signals. In addition, the attenuation circuit preprocesses a signal with rather a high amplitude into a reasonal level. As a result, accurate counting is assured.

(6) Press LPF (low pass filter) switch ⑩ ( ) to eliminate noise signal components. If the internal LPF circuit function is enabled, the input signal to the CHANNEL A juck is handled first by the LPF circuit (about 100kHz) and then input to the counter. Therefore, the counter processes input signals without high-frequency noises only. As a result, accurate low-frequency measurement is assured.

(7) If HOLD switch ⑫ is pressed during period measurement, the current measurement value on the Display is held as it is. If pressed again, a new measurement cycle will be started. However, the measurement value currently being displayed will remain unchanged until the new measurement cycle is complete. That is, the display value being held by the HOLD switch is updated by the output value from the new measurement operation.

(8) If RESET switch ⑪ is pressed during period measurement, the measurement value on the Display will be reset to '0'.
If the switch is released, a new measurement cycle will be started. However, the measurement value will remain '0' until the new cycle is complete.

5-3 Event-Input Total Count Measurement

In the Event Input Total measurement mode, the total number of events generated during a fixed certain period is measured. This measurement period can be set by using the front panel switch or the rear panel gate signal input juck.
The signal input circuit and the counter are coupled with capacitance (AC), which requires at least 5 events per second to be generated.

The maximum input frequency is 10 MHz.

(1) Select the TOTAL/10 MHz (event input total measurement) mode with FUNC switch ⑬.
The selection by GATE switch ⑭ has no significance in this measurement mode.

(2) If you want to control the event input total measurement (event counting) externally, use the input gate signal to TOTALIZE INPUT START/STOP juck ⑮ on the rear panel.
If the TTL H-level signal is input to that terminal the event counting is enabled.
If the terminal level becomes inactive (TTL 'L' level), the event processing will be terminated.
In this case, the total number of events is held by Display ⑤.
If no signal is input to the TOTALIZE INPUT START/STOP juck, that is, if the terminal is left 'open', the count operation will be carried out because the terminal level is TTL 'H'. ???

(3) RESET switch ⑪ is provided to reset the counter display to '0'.
If the switch is released with TOTALIZE INPUT START/STOP juck ⑮ left OPEN, the counter operation will be started at the moment.
If the TOTALIZE INPUT START/STOP juck is used to control the event measurement, the counter operation after the RESET switch release will be dependent on the terminal TTL level.
It will be started immediately if the terminal level is H. Otherwise it will not be started.

(4) Once the event input total measurement is started, the measurement total value is output to the display LED continuously. The terminal count is 99,999,999 (Max.). If the total number of measured events exceeds that terminal count, OVER FLOW LED ⑥ will be turned on while the counting operation still continues.

(5) The counting operation may terminate in the following possible cases :

1) The TTL level of the input gate signal to the TOTALIZE INPUT START/STOP juck is L.
In this case, the counting measurement is terminated and the total count value is held by Display ⑤. If the gate signal changes its TTL level from L to H, the counting measurement will be started again.

2) The user has pressed HOLD switch ⑫ ( ).
In this case, the counting measurement is terminated and the total count value is held by Display ⑤. If the HOLD switch is pressed ( ) again, the counting measurement will be started again.

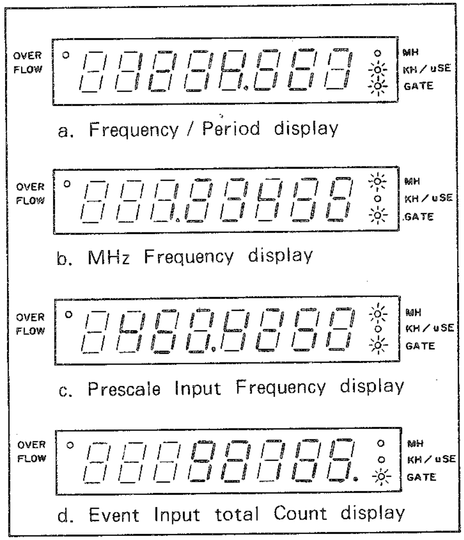
3) The user has pressed RESET switch ⑪ .
In this case, the counter is cleared and the display value is reset to '0'. Note that this product is reset each time when this switch is pressed.

(6) Press ATT x 10 switch ( ) according to input signal levels. If the internal attenuator circuit is enabled, input signal to the CHANNEL A juck is attenuated into 1/10 before reaching the counter. This attenuates noise-superimposed input signals. In addition, the attenuation circuit preprocesses a signal with rather a high amplitude into a reasonal level. As a result, accurate counting is assured.

(7) Press LPF (low pass filter) switch ⑩ ( ) to eliminate noise signal components. If the internal LPF circuit function is enabled, the input signal to the CHANNEL A juck is handled first by the LPF circuit (about 100kHz) and then input to the counter. Therefore, the counter processes input signals without high-frequency noises only. As a result, accurate low-frequency measurement is assured.

5-4 Display function

5-4-1. Display Layout



a. Frequency / Period display

b. MHz Frequency display

c. Prescale Input Frequency display

d. Event Input total Count display

Figure 4. Various Display Examples

Figure 4 shows display examples.

Figure 4 a indicates the value of "1234.567" with kHz/μs LED ③ active. This means that the counter is now measuring the frequency or period selected by FUNC switch ⑬ .

If it is assumed that a frequency is being measured, the display resolution value is 0.001kHz, that is, 1Hz, This means that the gate time (display resolution) has been set to 2.7s/10s.

With those functional parameters left unchanged, use the FUNC switch to select the MHz/100MHz mode. The display value will change to the one as shown in Figure 4 b. This means that the same frequency is still being measured but the measurement value is now displayed in MHz. In other words, the display resolution value has not been changed with GATE switch ⑭ but the display resolution value has changed from 1Hz (0.001kHz) to 10Hz (0.0001MHz).

With this gate time value unchanged, use the FUNC switch to select the prescale mode (CH B/1.3GHz). The measurement value on the display will be change to the one as shown in Figure 4 c. This means that the display resolution value has changed to 100Hz (0.001MHz).

Figure 4 d shows the typical display example in the event total measurement mode. The total measurement value does not require any display unit. As a result, it is displayed in integer (no display data following the decimal point).

Note that low-order digits may be difficult to view because they change very quickly as frequencies becomes higher and higher.

5-4-2. Unstable Display

The least significant digit (±1 digit) of a measurement value may have an error at digital measurement. In this section, errors other than that will be explained.

If noise or ringing is superimposed on an input signal, these unexpected signal waves may work as pseudo trigger signals to cause unstable display.

Under such operating conditions, measurement values may be output to display ⑤ as if they were true. However, they might be inaccurate due to the superimposed noise or ringing.

To solve the above problems, use the internal attenuator circuit and low pass filter (LPF) circuit.

The problems discussed above may be triggered by standing waves.
In this case, the input circuit should be properly terminated or the cable length needs to be adjusted.
The prescale input circuit is internally terminated with a 50−ohm resistance. This means that if the signals output by a 50−ohm external circuit are measured, the problems possibly caused by standing waves can be prevented.
In addition, unstable high−frequency input signal may cause an error.
In the period measurement mode, pseudo trigger signal may cause measurement error. This measurement error can be reduced by increasing the number of measurement cycles. That is, a longer gate time value than the current one should be employed for that purpose.
Any period is a reciprocal of its associated frequency while any frequency is a reciprocal of its associated period.
If relatively low−frequency signal is measured, the cycle measurement mode should be used instead of the frequency measurement mode because higher precision data can be displayed.
If relatively high−frequency signal is measured, the frequency measurement mode should be used instead of the period measurement mode because higher precision measurement data can be output.
Either measurement mode should be employed with a frequency of 10kHz in mind.

5−4−3. Measurement Delay

Display measurement data on Display ⑤ is updated at the moment when each measurement period (or interval) elapses. This applies to every measurement mode except for the event total measurement mode. The GATE LED remains active during the measurement period. This period is dependent on a selected measurement mode and specified resolution value. That is, the end of the period can be defined differently. This delay has significance in some cases. When you are about to change resolution values, operational modes, or to use the hold or reset function, you should take that delay into consideration because a new measurement operation will start.

In the following paragraphs, the relationship between measurement modes and measurement delays will be discussed.

1) Frequency measurement mode

The relationship between the operational modes, resolution values and measurement periods in the frequency mode is shown below :

Measurement Mode	Resolution value setting	Gate Time
kHz	100 Hz 10 Hz 1 Hz 0.1 Hz	0. 01s 0. 1s 1s 10s
MHz	1 kHz 100 Hz 10 Hz 1 Hz	0. 01s 0. 1s 1s 10s
Prescale input (CHANNEL B INPUT JUCK)	10 kHz 1 kHz 100 Hz 10 Hz	0. 027s 0. 27s 2. 7s 27s

As the above table shows, the gate time will be short if a low resolution value is selected. This will be helpful in fine−adjusting an oscillator, which requires quick update.

The update interval will be long if a high resolution value is selected.

2) Period measurement mode

The period measurement mode processes the specified number of cycles and then outputs the average cycle time. The desired number of cycles can be specified by using the GATE switch.

The relationship between the number of cycles and the GATE switch is shown the table below.

Resolution value setting	No. of cycles measured
0.1 μs	1
0.01 μs	10
0.001 μs	100
0.0001 μs	1000

3) Inter-measurement interval

This interval is fixed at 200 milliseconds in all modes expect event input total count measurement and prescale measurement modes.

In prescale measurement mode it is 540ms, and in event input total count measurement mode, counting is continuous.

This fixed interval is independent of gate time, number of cycles, or input frequency.

6. MEASURING CONSIDERATIONS

6–1 Use of attenuator probe

The input impedance (1.2 Megaohm, and 40pF or less) of the CHANNEL A juck is not affected through manipulation of ATT x 10 switch ⑨.

The circuit load can be reduced by the attenuator probe to the CHANNEL A input juck. Set the attenuator probe to the x 10 position to reduce the circuit load.

Note 1 : If 10 : 1 attenuator probe is used, verify that the amplitude of the signal input to the counter satisfies the following condition :

Minimum signal level $<$ Attenuated input signal level

Note 2 : If the prescale input is used, does not use the 10 : 1 attenuator probe. This attenuation circuit is designed based on the input impedance of 1 Megaohm. The prescale input juck is terminated with the resistance of 50 ohm. As a result, the attenuation circuit will function as the 180,000 : 1 if used together with the prescale input juck. Please keep it in mind.

6–2 Change in measurement mode and resolution

A new measurement operation is started each time when a measurement mode or resolution value is changed. The measurement display data on Display ⑤ is not updated until the new measurement cycle is completed.

Even if decimal point place and leading zeroes are corrected, and a new measurement value then appears on the LED display, it may be inaccurate due to display delay. Please keep it in mind.

6–3 Self check mode

The self check mode is provided to check the internal general functions of the FC–758 multi–functional frequency counter for a short time.

(Operational Procedure)

(1) Select the CHECK/10 MHz mode with FUNC switch ⑬.

When the frequency counter enters this mode, the counter input is logically connected to the time base oscillator.

Verify that the output results agree to those listed below.

*

Resolution value setting	Output display	GATE time (measurement interval period)
100 Hz 10 Hz 1 Hz .1Hz	10000.0 kHz 10000.00 kHz 10000.000 kHz 0000.0000 kHz (OVER FLOW LED turn-on)	0.01 second 0.1 second 1 second 10 seconds

* GATE LED ② remains active during the interval period. The measurement interval is 200 milliseconds.

(2) Press HOLD switch ⑫ , the current measurement value on the display will be held. The GATE LED remains inactive while the HOLD switch is being held down. The GATE LED will resume blinking at the moment when the HOLD switch is released. (If a resolution value is changed, display data will be updated when the first GATE interval period is over.)

(3) Press RESET switch ⑪ , and the current display value will be cleared.

The GATE LED remains inactive while the RESET switch is being held down.
The GATE LED will resume blinking at the moment when the RESET switch is released.
The measurement data on the display will be updated when the first GATE interval time is over.

7. MAINTENANCE

> CAUTION
>
> Be sure to disconnect the power cable from the socket, before conducting the following operation.

(1) Fuse Replacement

When the fuse is broken, check what caused it and remove the fuse.

If the power supply voltage is 100V to 200V, use the 0.25A-rating fuse for replacement.

If the power supply voltage is 220V to 240V, use a slow blow fuse with the rating of 0.125A/250V for replacement.

(2) Change in power supply voltage

The power supply voltage that is applied to this product is 100V.

If a different-level power supply voltage needs to be applied to the product, use the power supply voltage selector (labeled as LINE VOLTAGE SELECT) according to the voltage select information on its left.

Bear in mind that voltage change results requires a new fuse rating.

Case 1 : Voltage change from 100V/200V to 220V/240V

Fuse rating : 0.25A/250V to 0.125A/250V

Case 2 : Voltage change from 220V/240V to 100V/200V

Fuse rating : 0.125A/250V to 0.25A/250V

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