

USER'S MANUAL

使用説明書

5MHz FUNCTION GENERATOR



FG-52

FG-52 使用說明書 USER'S MANUAL

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一. FG-52簡介

FG-52是部0.05Hz~5MHz的函數信號產生器，它具有非常多的功能與高度穩定性，非常適合學校的電子、物理等實驗室及電子公司的開發室及生產線使用，以下簡述幾項特點：

- 1.多種波形選擇：可調式週期控制，並具備反向開關，因此至少可產生正弦波、三角波、方波、正斜波、負斜波、正脈波、負脈波及直流等8種波形。
- 2.可取代脈波產生器：週期、時間、振幅連續可變，配有反向開關可製造負脈波，另外DC offset可使用脈波載在直流電源之上或之下。
- 3.可當作掃描產生器：具備線性(LINER)及對數(LOG)掃描，掃描速率從5s到10ms，掃描寬度最大達100倍。
- 4.可當作計頻器使用：除了可以顯示本機產生的波形頻率外亦可兼外測計頻器，輸入電壓範圍從30mV~150V，輸入頻率範圍從0.2Hz~60MHz，具備自動換檔(Auto Range)、自動關時(Auto gatetime)、小數點自動對位、顯示單位(Hz/kHz)自動換算等功能。顯示5位數最高解析及達0.001Hz，絕非一般傳統計頻器所能取代。
- 5.散熱良好頻率穩定：函數波產生器使用電容器充放電的原理來製作波形，因此電容器容量的穩定決定波形的穩定，但電容器的容量會隨環境溫度的變化成正比，另就是電容器容量卻與產生的頻率成反比。所以一般函數波產生器的通病是加熱越久頻率越低，本機使用直流風扇使內部溫度盡快達到平衡，溫度平衡後頻率亦趨于穩定。



二. FG-52規格

頻率共同性

產生頻率範圍：0.05Hz~5MHz共8個檔位以5位數紅字LED顯示自動換檔最高解析度達0.001Hz

輸出波形：共8種波形三角波正弦波方波直流(電壓可變)正脈波(脈寬可變)負脈波(反相開關)
正斜坡(斜率可變)負斜坡(反相開關)

穩定性：0.1%於開機15分鐘後

0.2%於開機24小時後

直流抵補(DC OFFSET)：連續可變有開關隔離，最大直流10V(無載)，5V(50 負載)

三角波

頻率範圍：0.05Hz~5MHz以5位數LED顯示

最大解析度：0.001Hz

對稱比率：50%(上升波段)比50%(下降波段)，誤差
<1%(0.1Hz~100KHz)

線性：<1%(0.1Hz~100KHz)

正弦波

頻率範圍：0.05Hz~5MHz以5位數LED顯示

最大解析度：0.001Hz

對稱比率：50%(上升波段)比50%(下降波段)，誤差
<1%(0.1Hz~100KHz)

失真度：<1%至100KHz)

諧波比：<30dB~5MHz

頻率響應：<0.1dB~100KHz<1.5dB~5MHz

方波

頻率範圍：0.05Hz~5MHz以5位數LED顯示

最大解析度：0.001Hz

對稱比率：50%(正半波)比50%(負半波)，誤差
<1%~100KHz)

上升時間：<90ns(20Vp-p無載)

斜坡

頻率範圍：0.05Hz~4.5MHz以5位數LED顯示

最大解析度：0.001Hz

對稱比率：連續可變90%~10%

線性：<1%(0.1Hz~100KHz)

脈波

頻率範圍：0.05Hz~4.5MHz以5位數LED顯示

最大解析度：0.001Hz

週期比：1:1~10:1連續可調

反相：設置反相開關可轉換為負脈波輸出

直流

電壓：+10V~-10V由OFFSET開關連續可調式輸出

特點：具有乾電池電源輸出效果方便實用

主輸出端

輸出阻抗：50 Ω ，誤差<2%

最大輸出：20Vp-p(無載)誤差:±1V, 10Vp-p(50 Ω 負載)。

誤差:±0.5V

最小輸出：0.1Vp-p(無載), 0.05Vp-p(50 Ω 負載)。

衰減器：-26dB衰減開關一只(1/20)；衰減誤差<2%。

同步輸出端

輸出阻抗：50 Ω ，誤差<2%。

輸出位準：TTL位準，>3Vp-p固定振幅。

扇出數：>20個。

上升時間：<60nS。

VCF輸入端

輸入位準：0~10V電壓輸入。

最大頻率變化率：1:1 ~ 1:100。

輸入頻率：DC~1KHz。

掃描同步輸出端

輸出阻抗：1K Ω ，誤差<2%。

輸出波形：線性或對數掃描斜波

輸出振幅：10Vp-p(無載)，5Vp-p(1K Ω 負載)。

輸出頻率：連續可變，0.2Hz~100Hz。

掃描產生器

掃描方式：線性(LINEAR)/對數(LOG)掃描，用開關切換。

掃描速率：5sec~10mS,連續可變。

掃描寬度：1:1 ~ 1:100(配合頻率旋鈕使用)。

計頻器

共同性

顯示：5位數0.36吋高亮度紅色LED顯示。

最大解析度：0.001Hz

單位：Hz/KHz (自動轉換)。

時基(TIME BASE)：20MHz

溫度係數：<20PPM/°C。

誤差：<0.02% ± 一位。

電源供應：+5V / 160mA

內部計頻

檔位：自動換檔(0.001Hz/0.01Hz/0.001KHz/0.01KHz)。

共四種解析度，CPU自動選擇其一顯示。

計頻範圍：0.500Hz~5000.0KHz，自動選擇小數點及單位顯示。

閘時(GATE TIME)：可變0.25sec~5sec自動設定。

最少顯示位數：四位數。

外部計頻

最大電壓輸入：<150Vrms。

輸入阻抗：1M，誤差<2%。

輸入頻率範圍：0.2Hz~60MHz。

耦合(COUPLING)：(HF)--量測100KHz以上頻率，最高頻率超過60MHz。

(LF)100KHz FILTER--量測100KHz以下頻率，並通過100KHz低通濾波器將高頻雜波濾除。

閘時(GATE TIME)：可變0.25sec~10sec依輸入頻率自動設定。

檔位：自動換檔(0.001Hz/0.01Hz/0.001KHz/0.1KHz/1KHz)

共五種解析，CPU自動選擇其一顯示。

最少顯示位數：四位數。

輸入靈敏度：>30mVrms(1MHz)。



計頻器顯示值/閘時/運算範圍一覽表

標準值	GATE TIME	INT	EXT.HF	EXT.LF
0.2Hz	10S	-----	-----	0.200Hz
0.5Hz	2S	0.500Hz	-----	0.500Hz
1Hz	1S	1.000Hz	-----	1.000Hz
10Hz	0.25S	10.000Hz	-----	10.000Hz
100Hz	0.25S	100.00Hz	-----	100.00Hz
1KHz	0.25S	1.000KHz	-----	1.000KHz
10KHz	0.25S	10.000KHz	-----	10.000KHz
100KHz	0.25S	100.0KHz	100.00KHz	100.0KHz
1MHz	0.25S	1000.0KHz	1000KHz	-----
10MHz	0.25S	-----	10000KHz	-----
60MHz	0.25S	-----	60000KHz	-----

一般特性：

操作環境：溫度0° C 40° C；溼度0~90%。

操作電源：AC 115V(+/-10%) 50/60Hz, FUSE 600mA
AC 230V(+/-10%) 50/60Hz, FUSE 300mA

消耗功率：最大25VA(瓦特)。

散熱：專用排熱風扇DC 12V/100mA。

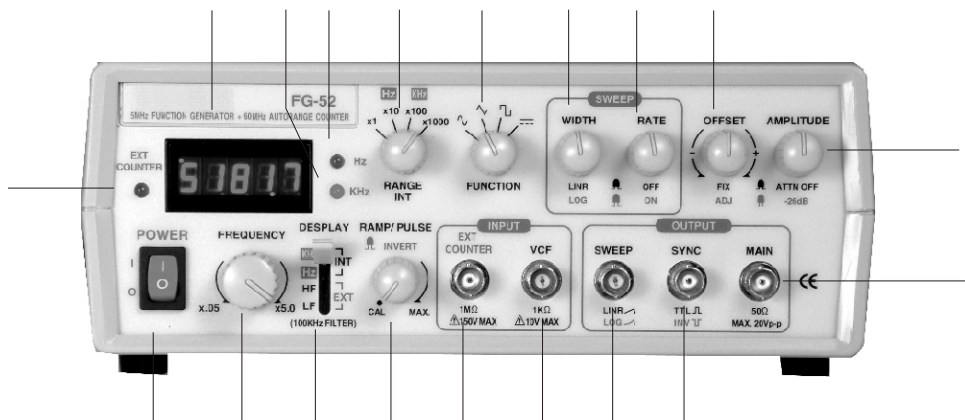
外型尺寸：275mm(寬) x 90mm(高) x300mm(深)。

重量：2.5Kg(淨重)。

附件：使用說明書，電源線，信號輸出線。



三. FG-52面板標示與說明 (參考圖7-1)



(圖7-1)

編號	面板標示	名稱	作用與說明
(1)	POWER	電源開關	往上押開關則接通 AC 電源，同時上方之紅色 LED 會亮，代表 ON。
(2)	FREQUENCY	頻率調整旋鈕	此旋鈕可依刻度指示，產生所需求之頻率。
(3)	SYNC OUTPUT	同步輸出端	由此 BNC 可輸出與主輸出端同步之方波信號，位準為 TTL 邏輯波。
(4)	SWEEP OUTPUT	掃描信號基本波輸出端	本 BNC 專門送出掃描信號，不受機器是否處在掃描 ON/OFF 狀態影響。輸出阻抗 $1K\Omega$ ，固定 $10V_{p-p}$ 振幅，信號有二種選擇 LINEAR/LOG。
(5)	MAIN OUTPUT	主輸出端	本機最重要的輸出 BNC 端子，輸出阻抗 50Ω ，最大振幅 $20V_{p-p}$ (無載)。
(6)	AMPL/(PULL -26dB)	波幅旋鈕，衰減 20 倍開關	調整輸出波幅大小，順時針為最大反之最小，拉出此旋鈕波幅立即衰減 20 倍。
(7)	OFFSET/(PULL ADJ)	直流抵補旋鈕，直流抵補開關	通常此旋鈕無作用，保持 OFF 狀態，除非配合拉起開關，順時針為正電壓，反時針為負電壓，最大抵補電壓為 $\pm 10V$ (無載)。
(8)	RATE/(PULL SWEEP ON)	掃描速率 掃描 ON/OFF 開關	順時針轉最快可達 $10mS$ ，反時針轉最慢達 $5S$ 。掃描波輸出端在④，此時本旋鈕不受 ON/OFF 影響，可直接輸出；但欲控制本機信號亦同時在⑤輸出時則必須拉起本旋鈕開關，調變後在 OUTPUT(5)送出掃描調變信號。
(9)	WIDTH/(PULL LOG SWEEP)	掃描寬度 線性/對數掃描開關	本旋鈕必須在 SWEEP ON 狀態下才發揮功用，它控制掃描調變的寬度，順時針時寬度最大，反之最小；附屬開關為控制掃描波形態，正常為線性掃描波，拉起旋鈕為對數掃描波。
(10)	FUNCTION	函數波形選擇鈕	共四種波形可供選擇應用；由左邊順時針算起分別為正弦波、三角波、方波、直流，每次只能擇一輸出。

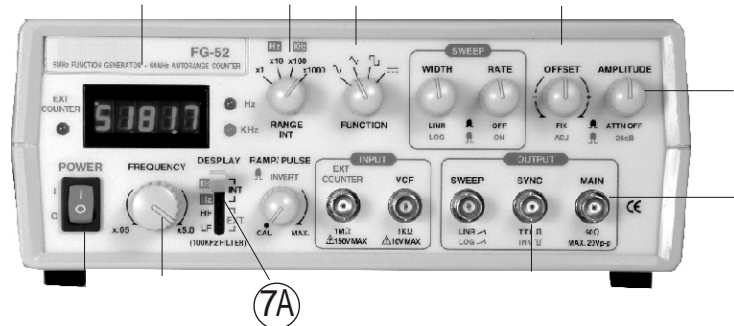
(11)	RANGE	頻率範圍鈕	共分四段範圍可供選擇應用；由左邊順時針起算分別為 X1、X10、X100、X1000K、四檔、選擇其中一種與 ② FREQUENCY相乘的積即為產生頻率，欲產生1000倍頻率請(16)推到KHz。
(12)	Hz	單位--赫芝	由 CPU 演算後自動顯示、頻率的單位。
(13)	KHz	單位--仟赫芝	由 CPU 演算後自動顯示、頻率的單位。
(14)	88888	紅色 LED 顯示幕	由 CPU 演算後的值以 5 位數 0.36 吋 LED 顯示讀值時請配合(12)或(13)之指示單位。
(15)	EXT COUNTER	外部計頻指示	紅色 LED 指示外部計頻狀態。
(16)	DESPLAY	計頻器顯示 選擇開關	欲計算之頻率經由此開關選擇通過之來源。
	INT KHz	內部計頻 x1000 倍	指內部產生之頻率 x1000 倍並同時進入計頻器，結果在(14)顯示。
	INT Hz	內部計頻 x1 倍	指內部產生之頻率 x1 倍並同時進入計頻器，結果在(14)顯示。
	EXT HF	外部計頻 高頻輸入	由此開關選擇避開低頻諧波，而得到欲測量之高頻信號進入計頻器。
	EXT LF (100KHz FILTER)	外部計頻 低頻/100KHz 濾波	由此選擇外部低頻信號進入本段；可濾除 100KHz 以上寄生雜波使低頻信號穩定顯示。
(17)	RAMP/PULSE (PULL INVERT)	斜波脈波控制旋鈕 (拉起為反相電路開關)	此旋鈕可使三角波成為斜波而方波可改變為脈波；另經由反相開關可獲得負斜波及負脈波。
(18)	EXT COUNTER INPUT	外部計頻輸入端	外部信號經此 BNC 進入計頻器前級放大器，輸入頻率由 0.2Hz~60MHz 最大信號不得大於 150Vrms.
(19)	VCF INPUT	VCF 輸入端	由此 BNC 輸入直流信號可控制本機產生頻率、輸入交流掃描信號則可作外部掃描功能；輸入交流正弦波則可作外部 FM 調變（輸入信號<10V，輸入頻率<1KHz）。本輸入端的輸入阻抗 1KΩ。

四. FG-52使用說明

FG-52是目前市售函數波產生器中功能最多應用最廣，使用最方便的超級機種，因此熟練本機操作將對您的實驗，幫助甚大；當您熟練本機後您將以本機代替函數波產生器，脈波產生器掃描生器，計頻器等；您的工作桌立即簡潔起來，不再機滿為患；熟練本機最好的方法就是連接到示波器觀察二者間互動情況，再加以熟練操作技巧，那您的實驗必然事半功倍水到渠成。

* 注意：以下操作本機時未特別標示之旋鈕均表示PUSH狀態。

(一).新機檢查及當作函數波產生器(如圖8-1)



(圖8-1)

(1).檢查機背之電壓設定與欲使用之電壓相同，並更換指定額定之FUSE。

電壓	範圍	頻率	FUSE
115V	100~125V	50 / 60Hz	600mA
230V	200~250V	50 / 60Hz	300mA

(2).按POWER電源開關。

(3).5位數LED會亮起某一數字，代表POWER ON 狀態。

(4).將OUTPUT接到示波器CH1。

(5).將SYNC OUTPUT 接到示波器CH2，並設定為示波器指定觸發(TRIGGER)。

(6).轉動FREQUENCY 可在LED字(3)及示波器CRT上發現頻率產生較輕微的變化從X0.05 X5.0。

(7).轉換RANGE檔，將發現頻率LED字幕(3)及示波器CRT上產生劇烈變化，每轉動一檔，頻率分別增加10倍或減為1/10，從左邊順時末算起分別為X1、X10、X100、X1K。另撥動(7A)Hz與KHz分別代表頻率X1及X1000倍值從本檔指示值與(6)FREQUENCY指示值相乘的積，大約就是LED字幕(3)顯示值。

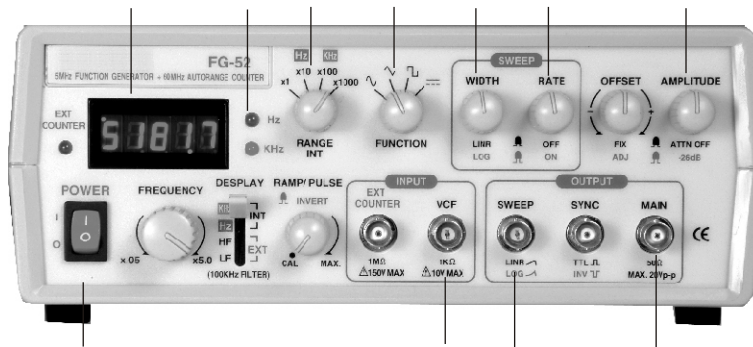
(8).FUNCTION提供多達四種函數波形以供利用，藉著觀測任何一種波形變化情形，如面板標示分別提供為三角波、正弦波、方波、直流波共4種。

(9).AMPL控制振幅的大小,最大達到20Vp-p(無載),試拉起旋鈕(PULL -26dB)振幅立即只剩1/20;另外觀測CH2的同步信號(5)不受振幅影響,永遠提供類方波,非常適合邏輯實驗或當測試機的觸發來源等應用。

(10).轉動OFFSET無作用,是因為在一般情況下有開關隔開DC,必須拉起旋鈕(PULL ADJ)才可供使用,本功能雖不常用,但非常實用,尤其是做電子電路實驗時當做晶體或IC的偏壓使用,OFFSET調整範圍最大達到+-10V(無載)。

**OFFSET抵補電壓很大時,有飽合剪截現象屬正常現象。

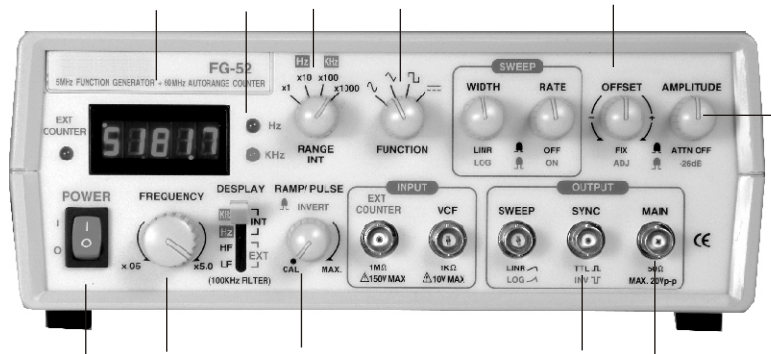
(二).作為掃描產生器操作 (參考圖8-2)




(圖8-2)

- (1). 押電源開關至ON。
- (2). LED字幕會顯示某一數字代表已接通AC電源。
- (3). 頻率單位Hz/KHz CPU會選擇其一配合頻率，點亮紅色LED單體。
- (4). OUTPUT 連接到示波器CH1。
- (5). SWEEP OUTPUT 連接到示波器CH2；示波器選擇TRIG CH2。
- (6). SWEEP RATE 掃瞄速率；轉動此旋鈕再觀看示波器螢幕發現有線性鉅齒產生，頻率從5S到10mS連續可調。
- (7). 再拉出SWEEP WIDTH旋鈕(PULL LOG SWEEP)，則示波器螢幕的斜波將改為對數掃瞄波 (LOG SWEEP WAVEFORM).
 - * * 示波器TRIG再選擇CH1，觀測CH1波形。
- (8). 轉動AMPL振幅旋鈕可得到欲產生之波幅；需要極小之波幅可拉起旋鈕(PULL-26dB)此時輸出振幅僅1/20。
- (9). 選定基本波範圍RANGE，從X1、X10、X100、X1K共四段。
- (10). FREQ頻率旋鈕，指示(X0.05~X5.0)值乘(9)RANGE所得的積，顯示在(2)LED DISPLAY；經CPU計算後自動顯示小數點及單位(3)Hz/KHz。
 - * * 拉起掃瞄開(6)PULL SWEEP ON 此時展開掃瞄功能,看示波器CRT波形變化情況。
 - * * 轉動(7)SWEEP WIDTH 可控制掃瞄寬度；再拉起此旋鈕PULL LOG SWEEP再觀測示波器螢幕掃瞄波呈現對數掃瞄狀況。
- (11). 測試VCF INPUT功能；首先將(6)SWEEP RATE旋鈕壓平(PUSH)，保持一般狀況，此時將(5)SWEEP OUTPUT連接到(11)VCF INPUT觀測示波器波形變化；此時波形輸出亦為掃瞄波形，只是從外部輸入監控而已。
 - * * 當未執行SWEEP功能及VCF功能時，在(2)LED螢幕上顯示的頻率就是掃瞄起始頻率。
 - * * 試著從另一台信號產生器輸入正弦波(當作調變波)連接至本機(11)VCF INPUT，可觀測FM調變情況，當然要切記本機基本波要高於另一台輸入調變波才會合乎學理。

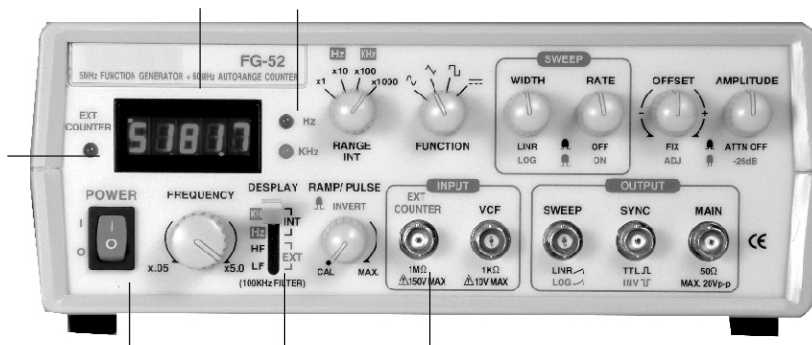
(三). 做為脈波產生器使用(參考圖8-3)



(圖8-3)

- (1). 押電源POWER至ON。
- (2). LED顯示器會亮，表示已接通電源。
- (3). OUTPUT連接至示波器CH1。
- (4). SYNC OUTPUT連接至示波器CH2並設定為觸發源。
- (5). 選擇FUNCTION檔至「」方波並轉動 (11) PULSE到適當位置。
- (6). 選擇需要的RANGE。
- (7). 轉動FREQUENCY至欲設定值。
 - * 脈波頻率可直接由面板(2)LED指示。
- (8). 單位會自動配合顯示。
 - * 脈波寬度可由 (11) PULSE旋鈕設定。
 - * 欲輸出負脈波可將 (11) PULSE旋鈕拉起PULL: INVERT反相功能。
 - * 負脈波寬度由 (11) 旋鈕控制。
- (9). AMPL控制OUTPUT(3)輸出振幅大小；拉起此旋鈕(PULL-26dB)則輸出僅剩1/20。
 - * (4) SYNC OUTPUT不受(9) AMPL影響，恒為TTL位準。但會依(5) FUNCTION 送出同步於該波形之對應波。
- (10). OFFSET拉出PULL ADJ可做正負直流電壓抵補，當抵補電壓很大時有飽合剪截效果乃屬正常現象。

(四). 當作計頻器使用(參考圖8-4)



(圖8-4)

- (1). 押電源POWER至ON。
- (2). LED會亮表示已接通AC電源。
- (3). DISPLAY共有四段，分述如下：
 - EXT HF:當做外部計頻器使用，可隔離直流成份專門針對高頻使用(100KHz 60MHz)。
 - EXT LF:當做外部計頻器使用，使用低通路，阻隔高頻，內含100KHz濾波器可濾除寄生雜波，使低頻率計頻更加穩定，此段專門針對0.2Hz~100KHz低頻使用。
 - INT/Hz：當作內部計頻使用，從0.05Hz 5000Hz。(針對內部RANGE檔位相對顯示)
 - INT/KHz：當作內部計頻使用，但所得的值 X1000倍，亦就是從0.05KHz 5000KHz，專門針對內部產生的高頻使用。
- (4). 將待測頻率送入EXT INPUT。
- (5). EXT COUNTER紅色LED恆亮指示進入外頻功能。
- (6). 單位Hz/KHz指示燈會自動選擇。
 - *** 顯示器(2)小數點會隨計頻結果自動跳位。

. NOTICE BEFORE OPERATION

1. Unpack the instrument :

After receipt of the instrument, immediately unpack and inspect it for any damage which might have been sustained when in transportation or shortage of accessories. If any sign of damage and shortage of accessories are found, immediately notify the dealer.

2. Environments :

Normally, operational temperature of the instrument is 10 to 40 (50 to 104). Operation of the instrument outside of this temperature range may cause damage to the circuits.

Do not use the instrument in a place where strong magnetic or electric field exists. Such fields may disturb the measurement.

3. Check the Line Voltage :

The instrument can operate on any one of the line voltages shown in the below table by inserting the line voltage selector plug in the corresponding position on the rear panel.

Before connection the power plug to an AC line outlet, be sure to check that voltage selector plug is set in the correct position corresponding to the line voltage.

CAUTION : The instrument may not properly operate or may be damaged if it is connected to a wrong voltage AC line. When line voltages are changed, replace fuses also as required.

SELECTOR	LINE VOLTAGE	FUSE
115V	100~125V 50/60Hz	600mA
230V	220~240V 50/60Hz	300mA

Hints for operation the instrument observe the following suggestions for successful instrument operation.

1. Never place heavy objects on the instrument.
2. Never place a hot soldering iron on or near the instrument.
3. Never insert wires, pins or other metal objects into ventilation fan.
4. Never move or pull the instrument with power cord or probe cord. Especially never move instrument when power cord or signal probe is connected to a circuit.
5. If the instrument is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

WARNING : The following precautions must be observed to help prevent electric shock.

1. When the instrument is used to make testing. There is always a certain amount of danger from electrical shock. The person using the instrument in such condition should be a qualified electronics technician or otherwise trained and qualified to work in such circumstance.
2. Do not operate the instrument with the cover removed unless you are a qualified service technician.
3. The ground wire of the 3-wire Ac power plug places the chassis and housing of the instrument at earth ground. Use only a 3-wire outlet, and do not attempt to defeat the ground wire connection or float the instrument. to do so may pose a great safety hazard.
4. Do not obstruct the ventilation holes in the rearpanel. As this will increase the internal temperature.
5. Never apply external voltage to output BNC of the instrument.
6. Excessive voltage applied to the input BNC may damage the instrument.



. FG-52 GENERAL

DESCRIPTION :

The FG-52 is a super deluxe function Generator combined a 5 digits, high resolution 60MHz counter.

The FG-52 is a rugged, easy to operate, excellent heat dissipation and high stability instrument.

The FG-52 is 4 in 1 instrument. It can be used as the following discribed 4 kinds of electronic instrument respectively.

1. To be as Function Generator :

8 wave forms selected by rotary switch instead of push-button to prevent mis-touch or bad connection. Max.output 20Vp-p (Non-load),and Mini. output 0.1Vp-p (Non load).

2. To be as Pulse Generator :

FG-52 provide positive pulse and reverse negative pulse output by Pull Reverse Switch, Max. output 20Vp-p (Non-load).

Frequency display by LED, pulse width from 0.4sec to 100ns.Can meet most of Audio, Vidio and other Basic electronic application requirement.

3. To be as Sweep Generator :

FG-52 provide linear sweep or log sweep selection switch to select the sweep mood. Max. sweep width 1:100 and sweep speed 5sec to 10ms. Also FG-52 provide VCF input and synchronous Output Function. Convenient to operate.

4. To be as counter :

FG-52 is a 5 digits micro-control counter. FG-52 provide Auto range, Auto gate time and high resolution --0.001Hz, High input impedance --1M Ω , High band width --0.2Hz 60Mhz, High voltage resistance --150Vp-p features, Also, FG-32 provide Adjustable Trigger $\pm 2.5V$ with LED indicate. Display unit Auto - indicate, HF / LF selector,100Khz filter.

5.To be as Dry Battery :

FG-52 provide a DC Output function. The output voltage from +10V to -10 continuous adjustable. Can be used as a low power DC source. Dry Battery.

. FG-52 SPECIFICATION

1. General specification :

A : Generator

Frequency -- 0.05Hz 5MHz display by 5 digits LED, Max. resolution 0.001Hz in 8 ranges.

Wave form output -- Sine, Square, Triangle, Positive , Ramp, Negative Ramp, Positive Pulse and Negative Pulse, DC 8 wave forms.

Stability -- 0.1% 15 minutes after switch "ON".

0.2% 24hrs after switch "ON".

DC offset : $\pm 10V$ (No. Load), $\pm 5V$ (50 Load), continuous adjustable, controlled by a offset switch.

B : Counter

Display -- 5 digits 0.36" red LED.

Max. Resolution -- 0.001HZ.

Display unit -- Hz / KHz Automatically controlled by CPU.

C : Common Specification

Limits of operation -- 0 40 , 10% 80%R.H.

Storage Enviroment -- -20 70 , 0% 90%R.H.

Power consumption -- 25W.

power source -- AC 115V ($\pm 10\%$) 50/60Hz, FUSE: 600mA
AC 230V ($\pm 10\%$) 50/60Hz, FUSE: 300mA

Ventilation -- DC 12V / 100mA Fan.

Dimensions -- 275 x 90 x 300mm

Weight -- 2.5Kgs Net.

Accessory -- Power cord, operation manual.

2. Triangle wave :

Frequency : 0.05Hz 5MHz, 5 digits LED display, Max. resolution 0.001Hz

Symmetry : 50% (Rise wave) to 50% (Fall wave), < 1%, 1Hz 100KHz.

linearity : < 1%, (1Hz 100KHz).

3. Sine Wave :

Frequency : 0.05Hz 5MHz, 5 digits LED display, Max. resolution 0.001Hz.

Distortion : < 1%, 1Hz 100KHz.

Harmonic ratio : < 30dB, 100KHz 5MHz

Frequency response : < 0.1dB, up to 100KHz.

< 1.5dB, 100KHz to 5MHz.

4. Square wave :

Frequency : 0.05Hz 5MHz, 5 digits LED display, Max. resolution 0.001Hz.

Symmetry : 50% (Positive half) to 50% (Negative half). < 1%, 1Hz 100KHz

Rise time : < 90ns(20Vp-p , No load).

5. Ramp wave :

Frequency : 0.05Hz 4.5MHz, 5 digits LED display, Max. resolution 0.001Hz, 8 range selected by rotary switch.

Symmetry : 90% (Rise wave) to 10% (Fall wave), continuous adjustable.

linearity : < 1%, (0.1Hz 100KHz).

6. Positive pulse :

Frequency : 0.05Hz 4.5MHz, 5 digits LED display, Max resdution 0.001 Hz.

Width : 0.4sec 100ns, continuous adjustable.

Symmetry : 1:1 to 10:1 continuous adjustable. 1Hz 100KHz.

Reverse : Pull the Rev, switch, the output will becomes Negative Pulse.

7. DC :

Output voltage : +10V to -10V continuous adjustable by OFFSET switch.

8. Main output :
Output impedance : 50 Ω , < 2%
Max. Output : 20Vp-p (Non-load), ± 1 Vp-p.
10Vp-p (50 Ω load) ± 0.5 V.
Min. Output : 0.1Vp-p(Non-load), or 0.05Vp-p (50 Ω load)
Attenuator : One -26dB(1/20) Attenuator, < 2% Accuracy

9. Synchronous Output :
Output impedance : 50 Ω , < 2%, Accuracy.
Output level : TTL level, > 3Vp-p fix amplitude.
Fan out : > 20
Rise time : < 60nS.

10. VCF input :
Input impedance : 0 - 10V
Input frequency : DC - 1KHz
Input frequency variety : 1:1 to 1:100

11. Sweep synchronous output :
Output impedance : 1K Ω , < 2%
Output wave form : Linear or log sweep ramp wave.
Output amplitude : 10Vp-p (Non load) or 5Vp-p (1K Ω load)
Output frequency : 0.2Hz - 100Hz continuous adjustable.

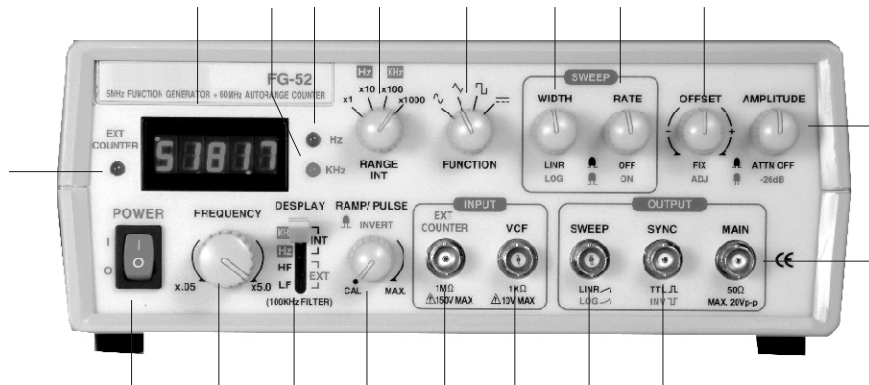
12. Sweep generator :
Sweep form : Linear or log switchable.
Sweep speed : 5sec - 10ms, continuous adjustable.
Sweep width : 1:1 - 1:100

13. Counter :
Display : 5 digits, 0.36" RED LED display.
Max. Resolution : 0.001Hz
Display unit : Hz / KHz Auto range.
Time base : 20MHz
Temperature coefficient : < 20ppm /
Accuracy : < 0.02% ± 1 digit.
Power supply : +5V, 160mA

Internal counter :
Range : Auto range with 4 resolution, 0.001Hz / 0.01Hz / 0.001KHz
/ 0.01KHz, Auto control by CPU.
Display : 0.500Hz - 5000.0KHz Auto select by CPU.
Gate time : Variable, 0.25sec - 5sec, Auto - setting.
Min. Display digits : 4 digits.

External counter :
Max. Input voltage : < 150Vrms
Input impedance : 1M Ω , < 2 %
Input frequency : 0.2Hz - 60MHz
Coupling : HF -- For 100KHz up frequency.
LF -- With 100KHz filter, for the frequency lower than 100KHz
Min. display digits : 4 digits.
Gate time : 0.25sec - 10sec, Auto - setting depends on the input frequency
Sensitivity : > 30mVrms (1MHz)

. FG-52 FRONT PANEL DESCRIPTION



1. POWER SWITCH -- Push the switch "ON" will light the LED of the digits (14) to indicate power "ON".
2. FREQUENCY -- Turn the switch to set the desired frequency generated. This knob is for micro - adjust.
3. SYNCHRONOUS OUTPUT -- The BNC synchronous output the TTL level square wave signal, the output frequency as MAIN output.
4. SWEEP OUTPUT -- Sweep signal output BNC. It will operate individually whether the instrument was under sweep mode operation or not, Output impedance 1k , output amp. 10Vp-p, output signal : Linear or Log.
5. MAIN OUTPUT -- Function wave signal output BNC, Max. output impedance 50 Max. amplitude 20Vp-p (Non load).
6. AMPLITUDE -- Turn the switch to adjust the output signal amplitude. Pull out the switch to attenuate the output 20 times.(or -26dB)
7. DC OFFSET -- The switch will set at OFF position in normal operation. When use for BIAS circuit, pull "ON" the switch and turn to adjust DC offset voltage.
8. SWEEP RATE -- Turn the switch to adjust the sweep rate from 5sec to 10mS and the signal will output from (4). When pull the switch, the signal will synchronous output from (4) and (5).
9. SWEEP WIDTH -- The switch will effected only under switch (8) was "ON". Turn the switch to adjust the sweep width. In normal position. It is " Linear sweep " and it will be under " Log sweep " when pull out the switch.
10. FUNCTION WAVE SELECTOR -- Turn the switch to select the output wave forms.Sine, Ttriangle, Square, DC, 4wave forms.

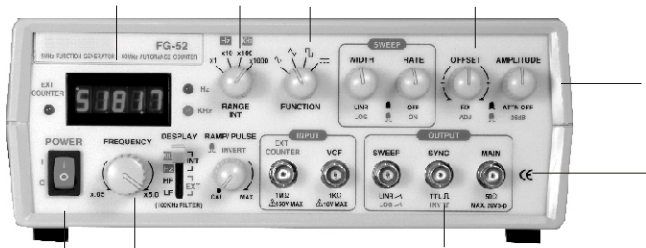
11. FREQUENCY RANGE -- Turn the switch to set the frequency of the output signal. The frequency display on (14) will be the product of the indicated digits by (2) and (11). The frequency will be 10 times difference on each step. x1, x10, x100, x1000 4 ranges.
12. Hz -- the LED lit means the display units are "Hz".
13. KHz -- the LED lit means the display units are "KHz".
14. LED DIGITS -- 5 digits to indicate frequency generated or EXT input. The units will be indicated by (12) or (13) selected by CPU automatically.
15. EXT-COUNTER -- The red LED indicate Ext. counter condition.
 - LED Light -- Trigger level too high.
 - LED Dark -- Trigger level too low.
 - LED flash -- Triggering state.
16. DISPLAY -- Indicate the source of the frequency display by (14).
 - INT Hz / KHz -- Display the frequency of the signal generated by the FG-52.
 - EXT HF -- Display the external input high frequency signal, Set at this position to strain out DC signal and low frequency harmonic signal. Input only the expected high frequency signal.
 - EXT - LF 100KHz Filter -- Display the external input low frequency signal, Set at this position to strain out the signal higher than 100KHz make the low frequency signal more stable.
17. RAMP / PULSE -- Turn this switch to display RAMP wave from Tri wave and display PULSE from squ wave. When at pull Invert position, The display will be negative Ramp and negative Pulse.
18. EXT-INPUT -- External signal input BNC. The input frequency 0.2Hz to 60MHz, Max. input voltage 150Vrms (when (17) was at "PULL" position) .
19. VCF-INPUT -- External input DC signal to control the frequency generated. External input AC sweep signal to make it as External sweep. External input AC sine wave to make it as external FM modulation.
 - Input signal 0 10V, < 1KHz.
 - Input impedance - 1K .

. FG-52 OPERATION INSTRUCTIONS

WARNING : Before applying power to your FG-52, make sure that the input voltage setting is correct for your power source.

CAUTION : All the knobs are set at " PUSH " position on operation if not special marked to be set at " PULL " .

(A). Function Generator and Inspection (Ref. to Fig.9-1)

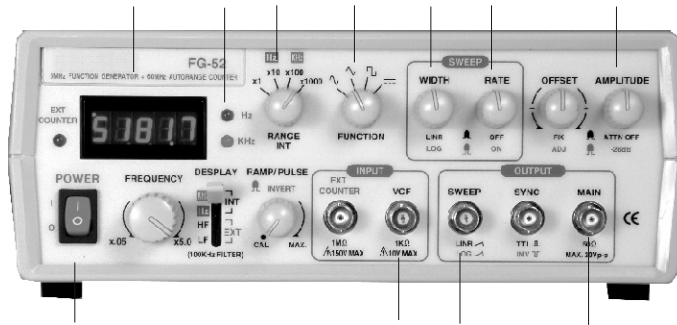


(Fig9 - 1)

1. Push the power switch on and make sure that the LED of the 5 digits are lit.
2. Connect OUTPUT BNC of FG-52 to the CH1 input BNC of your Oscilloscope, and the SYNC OUTPUT BNC to CH2, and set the trigger source of your oscilloscope at CH2.
3. Turn the FREQUENCY knob from x0.05 to x5.0. You will find the display of 5 digits LED and oscilloscope will be changed slightly on each step.
4. Turn the RANGE knob from x1 to x1000. You will find the display of 5 digits LED value will change 10 times on each step and the oscilloscope too, And then see (7) switch at Hz or KHz the display value will be changed to x1 or x1000 too.
5. Turn the FUNCTION knob to select the wave form output to CH1 of your Oscilloscope. CH2 will be TTL square wave only.
6. Turn the AMPL knob to adjust the amplitude of the signal output to CH1, and when " PULL " out the switch, the amplitude will be reduced 20 times (-20dB) but the display of CH2 (Sync output signal) will keep unchanged.
7. Turn the OFFSET knob. You will find both CH1 and CH2 will not be changed. This switch will operate only at " PULL " position. PULL out the offset switch and turn to set DC offset voltage (from +10V to -10V) of the main output signal. But the sync output signal will not be affected.

Note : When the offset voltage is higher than the wave (+ or -) the display wave form will be cut OFF.

(B). SWEEP GENERATOR (Ref. to Fig 9-2)



(Fig9-2)

1. Switch on the FG-52 and lit the 5 digits LED.
2. Connect the main OUTPUT BNC to the CH1 input BNC of you Oscilloscope.
3. Connect the SWEEP OUTPUT BNC to the CH2 input BNC of your Oscilloscope and set the trigger source of the oscilloscope at CH2.
4. Turn the SWEEP RATE knob, the CH2 of the oscilloscope will display a linear saw - tooth wave, the frequency will be variable from 5sec to 10mS by turn the switch. CH1 will display the wave according to the FUNCTION switch position.
PULL out the switch to set "SWEEP ON". the display of CH2 will keep unchange, the display frequency will be variant by turn the knobs. But the display of CH1 will be sweep wave, and the sweep speed will depend on the sweep rate.

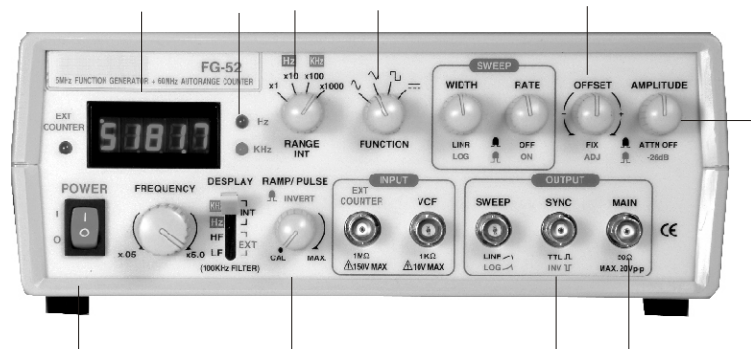
NOTE : After "PULL SWEEP ON", the trigger source of the oscilloscope must be changed from CH2 to CH1.

5. Turn the SWEEP WIDTH knob to adjust the sweep width by the display of CH1.

NOTE : Be sure that the SWEEP RATE SWITCH was at " PULL " position. When PULL out the sweep width switch, the sweep mode will changed from linear to log sweep. The wave form display of CH1 will becomes log form.

6. AMPL and FUNCTION knobs will operate as Generator.
7. Frequency display on 5 digits LED as Generator, before "PULL SWEEP ON". this frequency will be the start frequency. After "PULL SWEEP ON", the sweep condition include frequency, wave form and sweep mode etc. will be observed from the CRT of the Oscilloscope. The display on LED will continuous variety.
8. VCF INPUT -- Set the sweep rate switch at "PUSH" position to set FG-52 at normal generator mode. connect the sweep output BNC to VCF INPUT BNC and check the wave form display on the scope CH1. the wave form display would be the sweep wave. When input a sine wave from an other generator to VCF INPUT to obaerve the FM display. Be sure the frequency of the basic wave (FG-52) are higher than the external input signal.

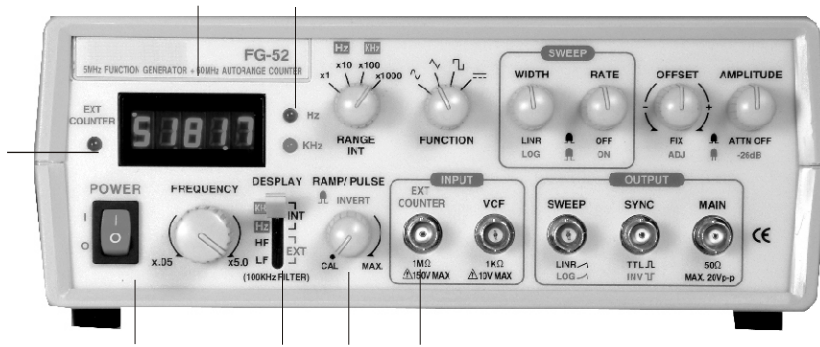
(C). PULSE wave Generator (Ref. to Fig.9-3)



(Fig9-3)

1. Push the power on and lit the 5 digits LED.
2. Connect the main output to CH1.
3. Connect the SYNC output to CH2 and set the trigger source of the Oscilloscope on CH2.
4. Set the FUNCTION knob on Squwave position, and turn (11) knob till the display become pluse wave form you want.
5. Set the FREQUENCY and RANGE to the desired frequency display on (2) LED.
6. Pulse width : the pulse width can be adjustable by knob (11)
7. Pull (11) knob to display negative pulse position and test the negative pulse as positive pulse.
8. Turn the AMPL to adjust the amplitude of the signal output from the main output BNC (3). The signal will be -26dB when " PULL " out the switch. But the signal output from " SYNC " output BNC (4) will not affect by this switch. the output signal of " SYNC " output will keep on TTL level.
9. Set the DC offset voltage by pull out the " OFFSET " switch and turn to sdjst the DC offset voltage from +10V to -10V.

(D). Frequency counter (Ref. to Fig. 9-4)



(Fig 9-4)

1. Switch on the power switch, lit the LED digits.
2. DISPLAY : The coupling provide 4 steps.
 - (a). INT/Hz : to be used as internal counter from 0.05Hz~5000Hz.
 - (b). INT/KHz : to be used as internal counter from 0.5KHz to 5MHz.
 - (c). EXT HF : To use as External Counter for high frequency (100KHz to 60MHz).
 - (d). EXT LF : To use a External counter for low frequency (0.2Hz 100KHz).
3. Connect the EXT INPUT BNC to the external signal source, eit the LED
6. Display unit : The display unite of the FG-52 will be on Hz or KHz automatically controlled by CPU.