

GOODWILL INSTRUMENT (MALAYSIA) SDN. BHD.

CALIBRATION STANDARD PROCEDURES

**FUNCTION GENERATOR
MODEL : GFG-813**

**APPLICABLE ODM MODEL :
FG-813; BK-3040**

GW GOODWILL INSTRUMENT (M) SDN BHD.		
APPROVED BY	CHECKED BY	PREPARED BY

**TOTAL PAGE : 15
(INCLUDING COVER PAGE)**

NO	Adjustment	Location	Particular	Specification	Remarks
1	Initial Setting		POWER Switch = ON; EXT COUNTER : release all buttons; MAIN GENERATOR : AMPL=Max, ATT= Release, OFFSET & SYM= Push, TRIGGER PHASE=Free run; MODULATION : AM, FM & SWP=Release, MODULATION Output=Max, SYM=CAL.		Instrument Used : 1. Dmm [GDM-8045G] 2. 20Mhz O'scope 3. 10 Mhz Standard Timebase 4. Leveled Sinewave Generator [SG-503]
2	+ 17V Adjust.	VR101 {GFG-427}	Measure the output voltage of R101 lead (right) relative to GND, adjust VR101 to get +17.0V show on DMM.	+ 17 +/- 0.01V	DMM : 20 VDC
3	- 17V Adjust.	VR102 {GFG-427}	Measure the output voltage of R102 lead (left) relative to GND, adjust VR102 to get -17.0V show on DMM.	- 17 +/- 0.01V	DMM : 20 VDC
4	Offset Null Adjust.	VR207 {GFG-428}	Dial scale=Max, Main Generator RANGE=100; Measure the voltage drop on R237 or R238 relative to GND by using DMM. Adjust VR207 to get a reading of 110mV.		DMM : 200 mVDC
5	EXT Counter Sensitivity Adjust.	VR001 {GFG-429}	COUNTER=Ext, GATE Time=0.1sec, 1/10 @ 1/1 button=Release; Apply a 10 Mhz 15 mVrms Sinewave signal to EXT COUNTER Terminal, adjust VR001 until the display is stable. Check the display steadiness of multiple level X1, X.1 & X.01[SG 503] for EXT ATT=1/1 and X1 & X.1 for EXT ATT=1/10. Push 30M/10M button to select 30M; Repeat the above checking procedures for the range of 30 Mhz by apply 30Mhz 15 mVrms sinewave signal to EXT COUNTER Terminal.	<= 15 mVrms	SG 503 : 15 mVrms Freq : 10.0 Mhz & 30.0Mhz
6	EXT Counter 10Mhz Timebase Adjust.	VC001 {GFG-429}	GATE Time=1sec,10M/30M=Release; Apply 10 Mhz standard Time base to EXT COUNTER Terminal, adjust VC001 until the counter reads 10Mhz.	10 Mhz +/- 100 hz	
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NO	Adjustment	Location	Particular	Specification	Remarks
1	Initial Setting.		MAIN GENERATOR : AMPL=Max, SYNC=Push, OFFSET=Push, ATT=Release, TRIGGER PHASE = Free Run; MODULATION : AM, FM & SWP = Release.		Instrument Used : 1. Frequency Counter [GFC-8130G] 2. 100 Mhz O'scope
2	Main Generator Dial	VR201	Dial Scale=Max, RANGE=1K, Counter EXT/INT=Release	< 0.5 %	100Mhz O'scope :
	Scale MAX Squarewave	VR204	Main FUNCTION=Squarewave;Connect SYNC output		V/D=5V , T/D=2uS;
	Symmetry Adjust.	{GFG-428}	to Freq Counter [GFC] & MAIN output to a 100Mhz O'scope.Adjust VR201 so that the reading show on GFC is 13.4Khz. Adjust SWEEP VAR of O'scope to get a positive halfcycle of 10 div show on CRT. Select the the SLOPE to -ve,adjust VR204 to get a balanced waveform.		GFC-8130G Setting : FUCTION=FREQ A GATE TIME=Push & Min TRI LEVEL=Push LPF,ATT,COUP=Release
3	Main Generator Dial	VR205	O'scope sweep variable=lock;		100Mhz O'scope :
	Scale MIN Squarewave	VR206	Dial Scal=Min, Adjust VR206 to get a 5 Div positive		V/D=5V , T/D=1mS;
	Symmetry Adjust.	{GFG-428}	cycle and adjust VR205 to get 5 Div negative cycle.		
4	Main Generator Dial	VR201	Loosen dial scale lock nut, adjuts dial scale to get a		GFC-8130G Setting :
	Scale Accuracy Adjust.	{GFG-427}	balance on 1 & 10 scale; tighten the lock nut, turn dial scale to 10, adjust VR201 to get 10Mhz. Make sure the output freq of dial scale Max is greater than 13Mhz.		FUCTION=FREQ A, GATE TIME=Push & Min, TRI LEVEL=Push,
5	Main Generator Dial	VR205	Dial Scale=Min; Connect SYNC output to GFC input	94.5 to 95.5 Hz	100Mhz O'scope :
	Scale MIN Frequency & Squarewave Symmetry	VR206	terminal & MAIN output to O'scope with BNC-BNC. Set O'scope T/D=0.5mS, adjust O'scope SWEEP VAR		V/D=5V , T/D=0.5mS; GFC-8130G Setting :
	Adjust.	{GFG-427}	to get a 10 Div positive cycle. Set O'scope triggering to -ve slope; adjust VR205 to get a 10 Div negative cycle. Check GFC reading to make sure that the output freq is within 94.5 to 95.5 Hz. If not, re-adjust VR205 & VR206 with condition that the duty cycle must balance.		FUCTION=FREQ A, GATE TIME=Push & Min, TRI LEVEL=Push, LPF,ATT,COUP=Release
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6	Main Generator Dial		Dial Scale= Min; Check duty cycle with O'scope when	< 0.5%	O'scope Setting :
	Scale MIN Squarewave		MAIN RANGE=10, 100, 1K, 10K. If duty cycle is out		RANGE V/D T/D
	Symmetry Check.		of specifications, repeat from step 5.		10 5 V 20 mS
					100 5 V 2 mS
					1K 5 V 0.2 mS
					10K 5 V 20 uS
7	Main Generator Dial		Dial Scale= Max; Check duty cycle with O'scope when	< 0.5%	O'scope Setting :
	Scale MAX Squarewave		MAIN RANGE=0.1, 1, 10, 100, 1K. If duty cycle is out		RANGE V/D T/D
	Symmetry Check.		of specifications, repeat from step 2.		0.1 5 V 20 mS
					1 5 V 2 mS
					10 5 V 0.2 mS
					100 5 V 20 uS
					1K 5 V 2 uS
8	1 Mhz Frequency	VC205	MAIN Generator : RANGE=100K; Dial Scale=10,	970 ~ 1030 Khz	GFC-8130G Setting :
	Adjust.	{GFG-428}	FUNCTION=Squarewave; Adjust VC205 to get 1 Mhz		
			output.		
9	10 Mhz Frequency	VC302	MAIN Generator : RANGE=1M; Adjust VC302 to get	9.5 ~ 10.5 Mhz	GFC-8130G Setting :
	Adjust.	{GFG-428}	10.4 Mhz output.		
10	5 Mhz Frequency	VC301	Dial Scale=5; Adjust VC301 to get 5 Mhz output.	4.75 ~ 5.25 Mhz	GFC-8130G Setting :
	Adjust.	{GFG-428}			
11	Dial Scale Max		Dial Scale=Max; FUNTION=Squarewave; check the	> 13.1 Mhz	GFC-8130G Setting :
	Frequency Check.		output freq. If the frequency is less than 13.1 Mhz,		
			repeat from step 8 to step 11.		
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1	Initial Setting.		MAIN Generator : AMPL=Max, SYM & OFFSET=Push, ATT=Release, TRIGGER PHASE=FREE RUN; MODULATION : OUTPUT=Max, SYM=CAL, FUNCTION=Squarewave.		Instrument Used : 1. Frequency Counter [GFC-8130] 2. 100 Mhz O'scope
2	Dial Scale Accuracy Check.		MAIN Generator : RANGE=100; Connect SYNC OUTPUT to GFC then check the output frequency from dial scale = 0.1 to 13.	SCALE FREQUENCY 0.1 0 ~ 65 Hz 1 35 ~ 165 Hz 2 135 ~ 265 Hz 3 235 ~ 365 Hz 4 335 ~ 465 Hz 5 435 ~ 565 Hz 6 535 ~ 665 Hz 7 635 ~ 765 Hz 8 735 ~ 865 Hz 9 835 ~ 965 Hz 10 935 ~ 1065 Hz 11 1035 ~ 1165 Hz 12 1135 ~ 1265 Hz 13 1235 ~ 1365 Hz	GFC-8130G Setting : FUCTION=FREQ A GATE TIME=Push & Min TRI LEVEL=Push LPF,ATT,COUP=Release
3	MODULATION Generator Frequency Control MAX Squarewave Symmetry Adjust.	VR803 {GFG-427}	MODULATION : RANGE=10K, FREQUENCY=Max; Connect MOD OUTPUT to Freq. Counter & O'scope, adjust VR803 so that Duty Cycle=50 : 50. Adjust MODULATION Freq control to get an output freq of 5 Khz Set O'scope V/D to 10uS then check the squarewave duty cycle again.	< 0.5 %	GFC-8130G Setting : As Previous O'scope Setting : V/D=0.5 V T/D=2 uS
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4	MODULATION Generator	VR802	MODULATION : FREQ = Min;	< 0.5 %	O'scope Setting :
	Frequency Control MIN	{GFG-427}	Adjust VR802 to get 50 : 50 duty cycle.		V/D=0.5 V
	Squarewave Symmetry				T/D=0.5 mS
	Adjust.				
5	MODULATION Generator		MODULATION : FREQ = Min;	< 0.5 %	
	Frequency Control MIN		Check output duty cycle when MODULATION generator		O'scope Setting :
	Squarewave Symmetry		RANGE is 100 and 10K.		RANGE=100
	Check.				V/D=0.5 V T/D=50 mS
					RANGE=10K
				V/D=0.5 V T/D=0.5 mS	
6	MODULATION Generator		MODULATION : FREQ = Max;	> 15 : 1	O'scope Setting :
	Frequency Control MAX		Check output duty cycle when MODULATION generator		RANGE V/D T/D
	Squarewave Symmetry		RANGE is 1, 100 and 10K.		1 0.5 V 20 mS
	Check.				100 0.5 V 0.2 mS
					10k 0.5 V 2 US
7	MODULATION Generator		MODULATION : RANGE=10K, Adjust MODULATION	> 15 : 1	O'scope Setting :
	Variable SYM Check.		Generator freq control to get an output of 1Khz; turn		V/D = 0.5 V
			SYM control fully clockwise. Check duty cycle of the		T/D = 0.5 mS
			output.		
8	Main Generator Variable		MAIN : RANGE=100, Dial Scale=10,	Fully Anticlockwise :	O'scope Setting :
	SYM Check.		FUNCTION=Squarewave;	> 20 : 80	V/D = 5 V
			Connect MAIN output to O'scope, pull main generator	Fully Clockwise :	T/D = 0.1 mS
			SYM control , turn it fully clockwise and check duty	> 80 : 20	
			cycle of the output.		
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1	Initial Setting.		MAIN : AMPL=Max, SYM,OFFSET=Push, ATT=Release FUNCTION=Sinewave, TRIGGER PHASE=FREE RUN; MODULATION : FUNCTION=Sinewave, OUTPUT=Max, AM, FM & SWP=Release, SYM=CAL.		Instrument Used : 1. Distortion Meter [GAD-201B & DM-153B] 2. Frequency Counter [GFC-8130G] 3. DC Power Supply [GPR-3030D] 4. DMM [GDM-8045G]
2	MAIN Generator Distortion Adjust.	VR401 VR402 {GFG-427}	MAIN : RANGE=10K, Dial Scale=2; Connect MAIN OUTPUT to Distortion Meter [GAD-201B] through 50 Ohm load. Adjust VR401 & VR402 to get least distortion.	< 0.4 %	GAD-201B Setting : RANGE/SPOT=Press SPOT=20K Set INPUT LEVEL =10 V DISTORTION=3 % then Press HOLD
3	MAIN Generator Distortion Check.		Check Distortion of Main Generator output with setting as shown below : Dial Scale RANGE Dist Meter 1 1K GAD-201B 10 100 GAD-201B 10 1 DM-153B 1 10 DM-153B 5 10K DM-153B	< 0.4 %	GAD-201B Setting : Same As Step 2 Except SPOT=1K
4	MAIN Generator ATT Check.		MAIN : RANGE=100, Dial scale=10; ATT= depress -20dB then -40dB; Connect DM-153B to MAIN OUTPUT to check the accuracy of attenuation.	(- 20 +/- 1) dB (- 40 +/- 1) dB	
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5	MODULATION Generator Distortion Adjust.	VR901 VR902 {GFG-427}	MODULATION : RANGE=10K; Connect MODULATION OUTPUT to Distortion Meter & Frequency counter. Turn MODULATION Generator FREQ control to get an output frequency of 5 Khz. Adjust VR901 & VR902 to get least distortion.	< 1.5 %	GAD-201B Setting : RANGE/SPOT=RANGE RANGE = X 100 T. FREQ; D Scale=50 Set I/P LEVEL to 1 V & DISTORTION to 3 % then press HOLD
6	MODULATION Generator Distortion Check.		Check the distortion of MODULATION Generator OUTPUT with setting as below :	< 1.5 %	1Khz GAD-201B Setting : RANGE/SPOT=SPOT SPOT = 1 Khz 10Khz GAD-201B Setting RANGE/SPOT=RANGE RANGE = X 100 T. FREQ; D Scale=100
			RANGE FREQUENCY D.METER		
			10K 1 KHz GAD-201B		
			10K 10 KHz GAD-201B		
			100 10 Hz DM-153B		
7	VCG 1000 : 1 Check.		MAIN : RANGE=100K, Dial Scale=10. Connect DC Power Supply to VCG IN terminal with reverse polarity, slowly increase supply voltage until the output frequency reduce to 1 Khz. Observe supply voltage.	[-] 1.6 V ~ [-] 2.4 V	
8	VCG Impedance Check.		Connect DMM to VCG IN terminal, measure VCG IN input impedance.	3.50 ~ 3.85 K Ohm	DMM Setting : V/mA/Ohm = Ohm RANGE = 20 K
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NO	Adjustment	Location	Particular	Specification	Remarks
1	Initial Setting.		MAIN : AMPL=Max, SYM,OFFSET=Push. ATT=Release TRIGGER PHASE=FREE RUN. MODULATION : AM, FM & SWP = Release, OUTPUT=Max, SYM=CAL		Instrument Used : 1. 100 Mhz O'scope [GOS-6100] 2. Function Generator [GFG-8016G]
2	MAIN Generator Squarewave Rising & Falling Time Adjust.	VC701 {GFG-427}	MAIN : FUNCTION=Squarewave, RANGE=100 K, Dial Scale=10; Connect MAIN OUTPUT to O'scope through 50 Ohm load, adjust VC701 to get 18 nS rising & falling time.	< 20 nS	O'scope Setting : V/D = 2 V T/D = 20 nS
3	Squarewave Overshoot Check.		Remove 50 Ohm load, check positive & negative cycle overshoot. If the overshoot is out of spec, repeat step 2.	< 4 sub div	O'scope Setting : V/D = 2 V T/D = 0.2 uS
4	Sinewave Frequency Response Adjust.	C407 {GFG-427}	MAIN : FUNCTION=Sinewave, RANGE=100, Dial Scale=10; Connect MAIN OUTPUT to O'scope through 50 Ohm load, turn O'scope VAR vertical sensitivity so that O'scope show 8 Div vertically. Set MAIN generator frequency RANGE to 1M, adjust C407 to get 7.2 Div. Check the frequency response at 13Mhz.	6.4 ~ 7.6 Div or <= +/- 2 dB	O'scope Setting : V/D = 2 V T/D = 2 mS
5	Trianglewave Frequency Response Adjust.	C223 {GFG-427}	MAIN : FUNCTION=Trianglewave, RANGE=100, Dial Scale=10; Connect MAIN OUTPUT to O'scope through 50 Ohm load, turn O'scope VAR vertical sensitivity so that O'scope show 8 Div vertically. Set MAIN generator frequency RANGE to 1M, adjust C223 to get 7.2 Div. Check the frequency response at 13Mhz.	6.4 ~ 7.6 Div or <= +/- 2 dB	O'scope Setting : V/D = 2 V T/D = 2 mS
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6	AM Modulation Balance Adjust.	VR601 {GFG-427}	MAIN : FUNCTION=Sinewave, RANGE=10K, Dial scale=Max; MODULATION : FUNCTION=Sinewave, AM=Press, Press; RANGE=100, FREQ=Max. Adjust VR601 to get a balanced Modulation waveform.	< 0.5 Sub Div of 8 Div	O'scope Setting : V/D = 2 V T/D = 0.5 mS
7	AM Modulation DC Offset Adjust.	R614 {GFG-427}	Check AM Modulation DC Offset. If it is out of spec, change the value of R614.	< 1 Sub Div of 8 Div	O'scope Setting : Same as Step 6
8	AM Modulation EXT Sensitivity Check.		MODULATION : FUNCTION=Release; Apply 1 Mhz, 10 Vpp sinewave to EXT MOD input, check AM Modulation waveform.	> 100 %	O'scope Setting : V/D = 2 V T/D = 0.2 uS
9	Max TRIGGER PHASE Angle Check.		MAIN : RANGE=100K, FUNCTION=Trianglewave, Dial Scale = 10; MODULATION : FUNCTION=Squarewave, AM=Release, RANGE=10K, FREQ=Max; [Rear Panel] : TRIGGER=MULTIPLE/INT; Connect MAIN OUTPUT to O'scope, adjust VAR vertical sensitivity of o'scope until the signal amplitude is 8 Div show on the scope CRT. Turn TRIGGER PHASE fully clockwise, check the TRIGGER PHASE angle.	> 90	O'scope Setting : V/D = 2 V T/D = 10 uS
10	Min TRIGGER PHASE Angle and SINGLE Trigger Check.		[Rear Panel] : TRIGGER=SINGLE/INT; Adjust TRIGGER PHASE anticlockwise to lowest trigger phase angle.	< - 80	O'scope Setting : V/D = 2 V T/D = 0.2 uS
11	EXT TRIGGER Check.		[Rear Panel] : TRIGGER=MULTIPLE/EXT; Apply 1 Khz TTL signal to EXT TRIGGER INPUT [rear panel]; check the functioning of EXT TRIGGER.		O'scope Setting : V/D = 2 V T/D = 0.1 mS
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