Beckman Industrial™

Function Generator
MODEL FG2

Operator's Manual

CIRCUITMATE™

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Operator's Manual

A Subsidiary of Emerson Electric Company

Instrumentation Products Division • Beckman Industrial Corp. • Brea, CA 92621

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WARRANTY

90-Day Limited Warranty

The Model FG2 Function Generator is warranted in entirety against any defects of material or workmanship which develop for any reason whatsoever, except abuse, within a period of ninety (90) days following the date of purchase of the function generator by the original purchaser. This warranty is extended by Beckman Industrial Corp. only to the original purchaser or original user of the function generator, who must, as a CONDITION PRECEDENT TO WARRANTY COVERAGE AND PERFORMANCE THEREUNDER BY BECKMAN INDUSTRIAL CORP., complete and return the Warranty Registration Card, received on purchase of the function generator.

In the event a defect develops during the warranty period, Beckman Industrial Corp. will, at its election, repair or replace the function generator with a new or reconditioned model of equivalent quality. In order to obtain performance of any obligation of Beckman Industrial Corp. under the warranty, the original purchaser or user must call Beckman Industrial Customer Service at (714) 773-6889 to obtain a Return Authorization Number as well as instructions on where to send the defective Function Generator, postage prepaid along with a handling charge of $5.00*, to obtain warranty service.

In the event of replacement with a new or reconditioned model, the replacement unit will continue the warranty period of the original function generator. The turnaround time for replacement units at the Service Center is typically only four (4) working days.

*Prices are subject to change without notice.

WARRANTY (Continued)

ANY IMPLIED WARRANTIES ARISING OUT OF THE SALE OF A FUNCTION GENERATOR INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE ABOVE-STATED 90-DAY PERIOD. BECKMAN INDUSTRIAL CORP. SHALL NOT BE LIABLE FOR LOSS OF USE OF THE FUNCTION GENERATOR OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES, EXPENSES, OR ECONOMIC LOSS, OR FOR ANY CLAIM OR CLAIMS FOR SUCH DAMAGE, EXPENSES, OR ECONOMIC LOSS.

Some states do not allow limitations on how long implied warranties last or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

BECKMAN INDUSTRIAL CORP.
Brea, California

Section One
INTRODUCTION

The Model FG2 Function Generator is a wide-range instrument capable of producing signals in the 0.2 Hz to 2.0 MHz range. Thus, it is especially useful for applications ranging from vibration testing, general audio testing through AM radio applications, ultrasonic device testing, and servo system testing. It is a general purpose, feature-packed instrument designed for easy operations. The front panel is laid out logically; there are numerous LED indicators to provide feedback to the user.

The Model FG2 Function Generator is an AC-operated instrument with many outstanding features:

1. Produces square, triangle, and sine waves and TTL pulses
2. Produces signals in the 0.2 Hz to 2.0 MHz range in seven decade increments
3. Variable frequency multiplier
4. Duty cycle control
5. Variable DC offset control
6. Signal inversion
7. Output amplitude control
8. VCF (voltage controlled frequency) input
9. Self extinguishing plastic case, test leads, and AC power cord.

Section Two
UNPACKING

The box should contain the following items:

1. Model FG2 Function Generator.
2. AC power cord.
3. Coaxial test lead (2 each).
4. Operator's manual.
5. Warranty card.

Section Three
SAFETY PRECAUTIONS

Always strictly observe the following precautions when operating this instrument.

1. Be sure that the AC power input is the same as specified on the label at the back of this instrument.
2. Strictly observe the VCF input limits as outlined in the electrical specifications section.
3. Use this instrument within an ambient temperature range of 0°C to 50°C.
4. Do not place this instrument on top of other high temperature equipments.
5. Never permit water to enter the interior of this instrument.
6. Never subject this instrument to severe shock.

Section Four
FEATURE DESCRIPTION

For features described in this section, refer to Figure 1. It is HIGHLY RECOMMENDED that the user become familiar with the controls and indicators described below before operating the instrument.

1. POWER Switch
   This switch turns power on.

2. POWER ON Indicator
   This LED is lit when power is on.

3. RANGE (Hz) Selector
   Seven fixed decades of frequency are provided by the RANGE (Hz) pushbutton switch. Each of the seven pushbuttons is interlocked. Depressing one button will release the button previously selected.

4. INVERT Switch
   This pushbutton switch is provided to invert the time symmetry set by the DUTY control. Table 1 illustrates the effect of the INVERT switch and DUTY control, described in item 8.

Table 1. DUTY Control

INVERT Switch	DUTY Control	MAIN Output			PULSE Output
		Square	Triangle	Sine	
Out	Cal				
In	Cal				
In	Max CW				
Out	Max CW				

NOTE: The time symmetry as illustrated is for reference only. Any desired time symmetry ratio may be set as desired within the limits as described in Section 4, #8, DUTY Control.

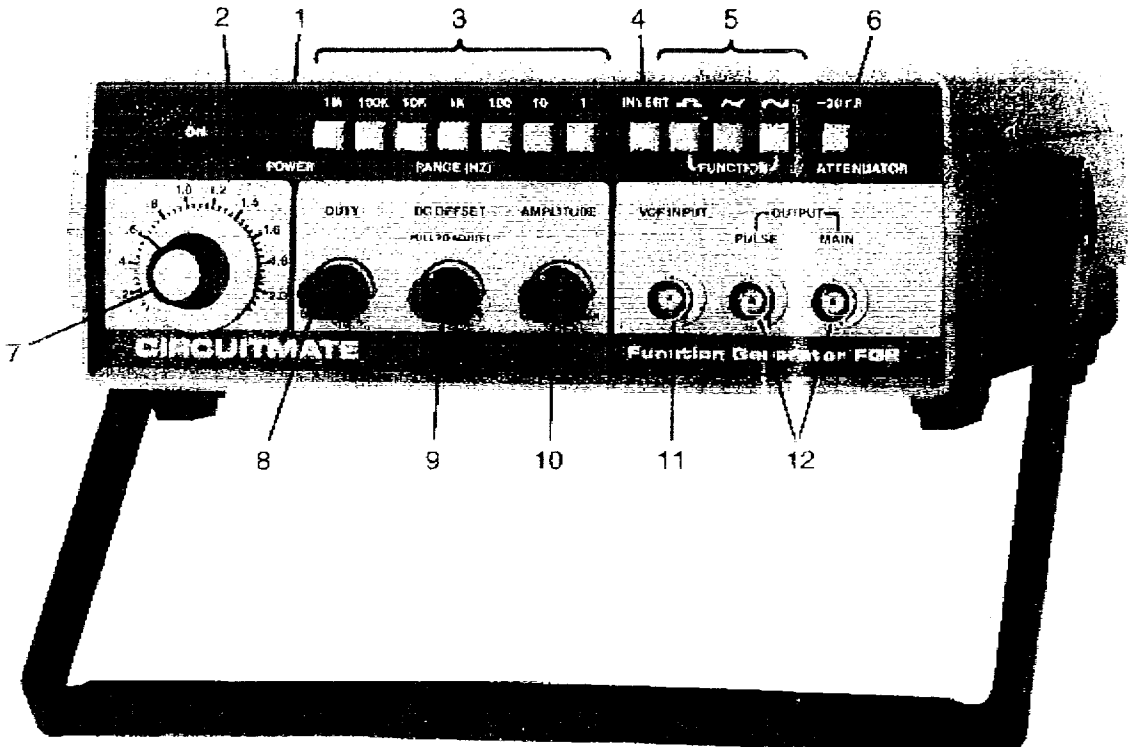


Figure 1. Model FG2 Function Generator

5. FUNCTION Selector
   Three interlocking pushbutton switches provide selection of the desired output waveform. Depressing one switch will release the switch previously depressed.

6. ATTENUATOR Switch
   Pushing this switch in will result in a fixed 20 db attenuation of the output waveform amplitude.

7. MULTIPLIER
   The MULTIPLIER is a variable potentiometer allowing frequency settings between fixed ranges. Although the dial scale is calibrated from 0.2 to 2.0, the dynamic range of the MULTIPLIER is actually larger. However, settings below 0.2 and above 2.0 are nonlinear.

8. DUTY Control
   Time symmetry of the output waveforms, as well as the TTL PULSE output, is controlled by the DUTY potentiometer. When this control is set to the CAL position, the time symmetry of the output waveforms is 50/50, or approximately 100% symmetrical. This is the 50% duty cycle point.

   The variable symmetry allows the time period of one-half the waveform to be changed while the other half remains fixed as determined by RANGE and MULTIPLIER settings. This unique feature provides ramp waveforms, variable pulse width, and variable duty cycle pulses, and skewed sine waves.

9. DC OFFSET Control
The DC OFFSET Control is provided to allow the DC level of the output waveforms to be set as desired. The amount of offset plus the amplitude setting must not exceed the maximum peak-to-peak amplitude or clipping will result. (See peak-to-peak amplitude specification in the electrical specifications section.) Table 2 illustrates the effect of the DC OFFSET control.

10. AMPLITUDE Control
The AMPLITUDE Control provides 20 db of attenuation of the output waveform selected by the FUNCTION switch.

Table 2. DC OFFSET Control

DC OFFSET	AMPLITUDE	OUTPUT
0	Max	+10V -10V
Max CW	Max	+10V 0V
Max CCW	Max	0V -10V
Mid CW	Max	+10V 0V
Mid CCW	Max	0V -10V

11. VCF INPUT
The VCF (voltage-controlled frequency) input is provided for externally sweeping the frequency. Approximately + 10V applied at the VCF input will sweep the generator frequency down three decades, or 1000:1. Similarly, approximately – 10V applied at the VCF input will sweep the generator frequency up three decades, or 1:1000.

12. OUTPUT Control
Square, triangle, and sine waveforms of 20V p-p amplitude (open circuit) are provided at main output jack. The pulse jack provides a TTL compatible pulse output, also of up to 20V p-p amplitude (open circuit).

Specifications are subject to change without notice.

5.1 GENERAL SPECIFICATIONS

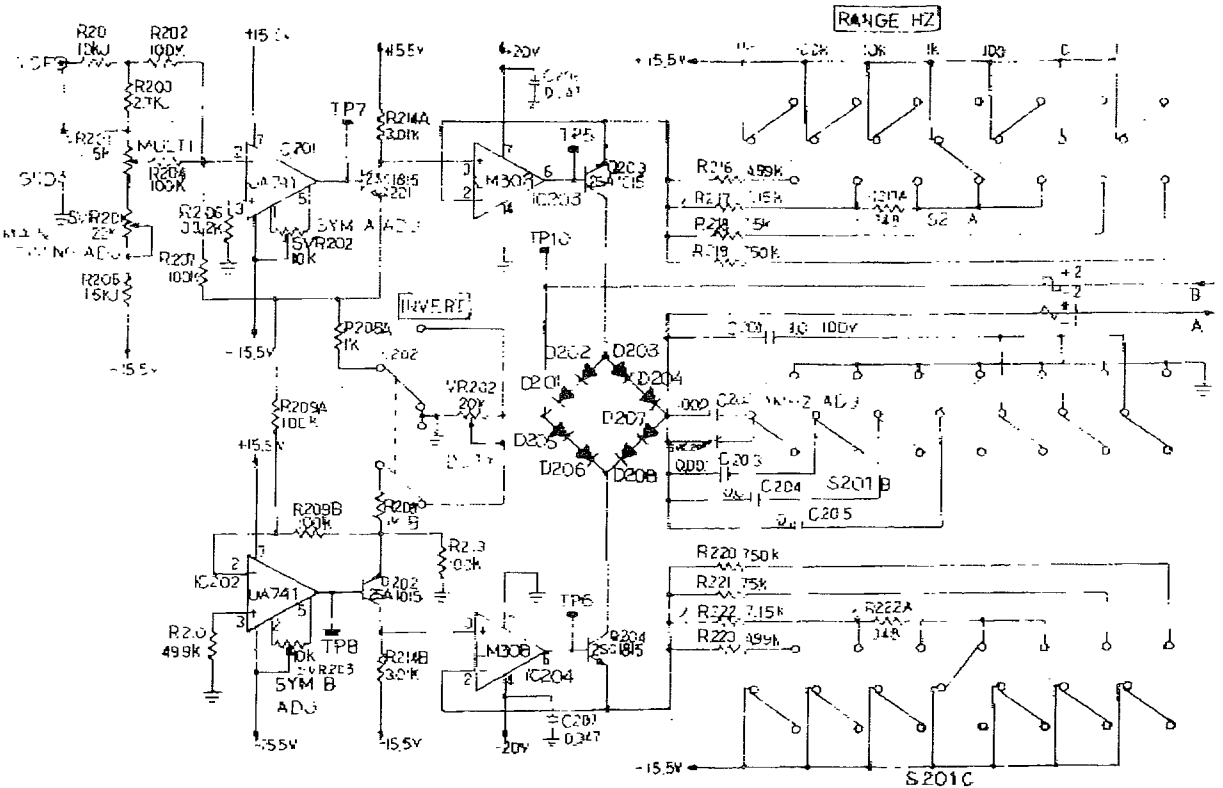
Output	Square wave, triangle wave, and sine wave (selectable). TTL pulse (5 TTL loads)
Input	voltage controlled frequency
Frequency Range	0.2 Hz to 2 MHz (7 ranges)
Storage Temperature	−40°C to +70°C, 70% R.H.
Operating Temperature	0°C to +50°C, 80% R.H.
Weight	3.5 lb. (1.5 kg) typical
Dimensions	235 mm wide × 85 mm high × 280 mm long
Accessories	test leads (2 each), AC power cord, and fuse (3 each, one installed)

5.2 ELECTRICAL SPECIFICATIONS

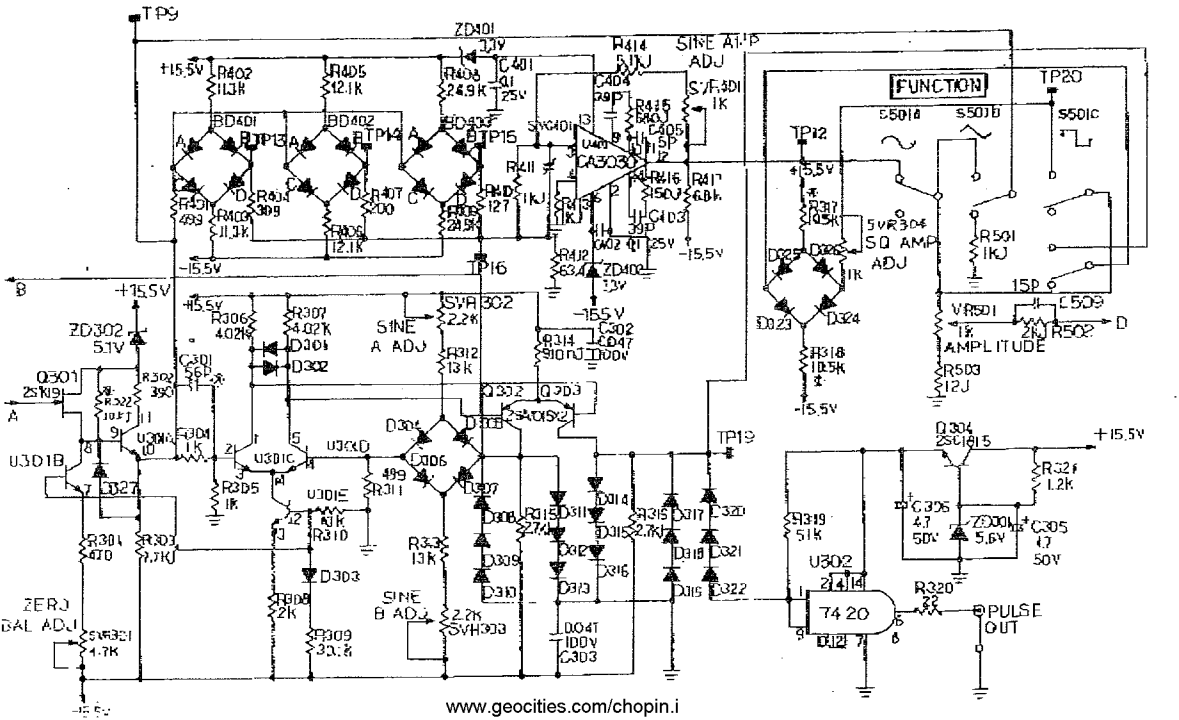
At 23°C ±5°C, 70% R.H. Max after 1 hour warmup time

Power Consumption	15 VA Max. at 117 VAC
Frequency Ranges with RANGE setting at: 1	0.2 Hz to 2.0 Hz
10	2 Hz to 20 Hz
100	20 Hz to 200 Hz
1K	0.2 kHz to 2.0 kHz
10K	2 kHz to 20 kHz
100K	20 kHz to 200 kHz
1M	0.2 MHz to 2.0 MHz

Frequency Multiplier	0.2 to 2.0
Frequency Accuracy	±5% of full scale
Voltage-Controlled Frequency Range	1000:1 minimum for 0 to 10 (±1)V input 1:1000 minimum for 0 to −10 (±1)V input
Input Impedance	10K Ohm ±10%
Sinewave Distortion	<1% for frequency below 200 kHz all harmonics 30 db down minimum
Square Wave Rise and Fall Time	<100 nsec
Pulse Output Rise and Fall Time	<25 nsec (5TTL loads)
Main Output Amplitude	>20V p-p (open circuit) >10V p-p (into 50 ohm load)
Impedance	50 ohms ±6%
Amplitude Adjustment	<632 mV p-p to >20V p-p open circuit (20 db attenuator off)
Attenuator	−20 db ±10 db
DC Offset Control	<−10V to >+10V (open circuit) <−5V to >+5V (into 50 ohm load)
Duty Cycle Control	5 to 1 minimum duty cycle change (50% at max. CCW (or Cal) position)



Oscillator Schematic



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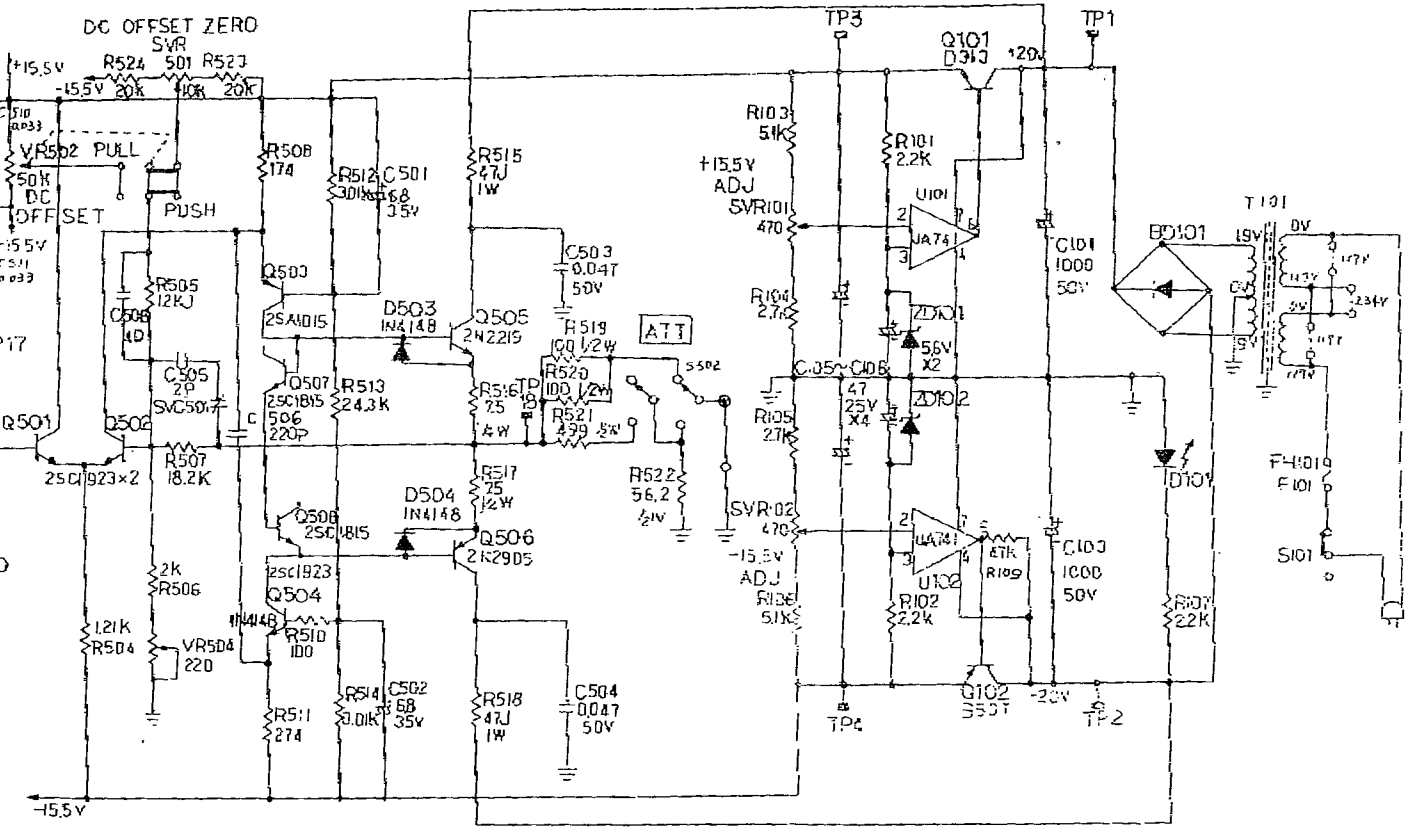
Sine Wave Converter and TTL Output Schematic



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Power Supply and Main Output Driver Schematic

Section Seven
SERVICE

7.1 FUSE REPLACEMENT

1. Disconnect AC power cord.
2. Open instrument case by loosening the four screws in the middle of the rubber feet.
3. Replace fuse (located on printed circuit board, next to the transformer) with only the proper size fuse, as specified below:

   For 115V version—0.3A, 250V fuse.
   For 230V version—0.2A, 250V fuse.

4. Re-secure instrument case.

7.2 OTHER SERVICES

WARNING

Attempts to service this instrument by unauthorized personnel will void the warranty.

For other service needs, please consult our Customer Service Department.