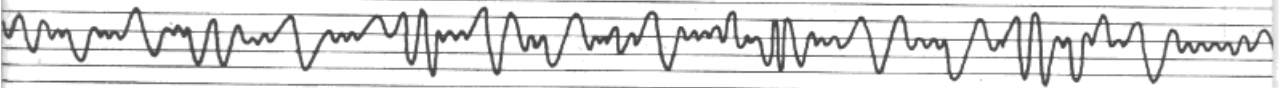


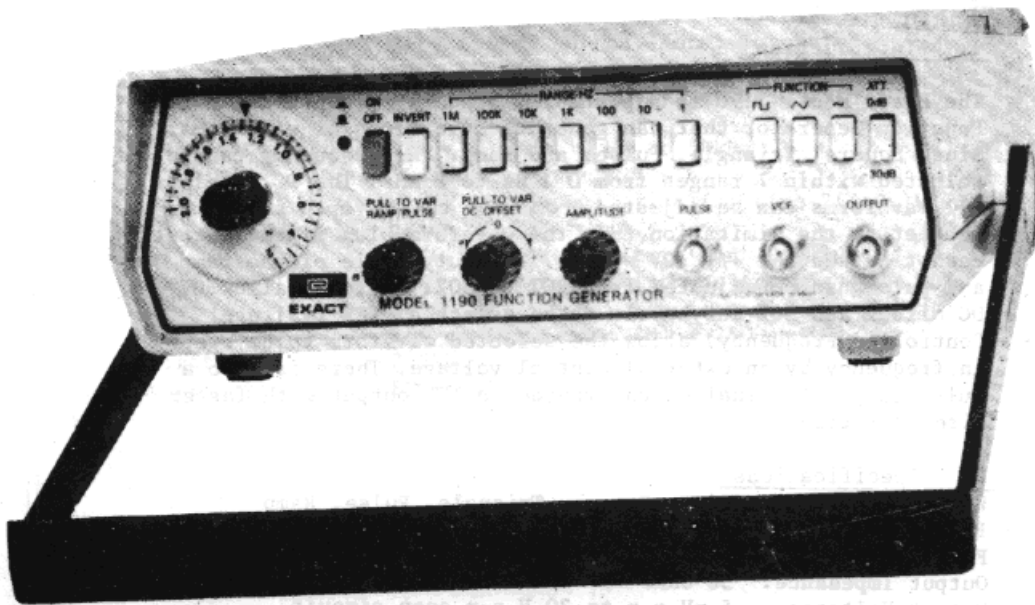
FUNCTION GENERATOR  
MODEL 1190

# INSTRUCTION MANUAL



**EXACT electronics**  
 a division of **DYNATECH NEVADA INC**  
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 Telex 170054

Picture of MODEL 1190



## II. General Information

### 1. Introduction

The Exact Model 1190 is a portable, bench-type, sophisticated Function Generator that can generate five kinds of waveforms: Sine, Square, Triangle, Pulse, and Ramp. The frequency can be selected within 7 ranges from 0.1 Hz to 2 MHz. The DC level of all waveforms can be adjusted from -10V to +10V (open circuit) subject to the limitation that the waveform plus signal output cannot exceed the +/- 10V window. The duty cycle of the ramp and pulse can be adjusted from 20% to 80%. Switches allow 0V DC offset and 50% duty cycle to be selected. VCF (Voltage Controlled Frequency) allow the selected waveform to be swept in frequency by an external control voltage. There is also a Pulse Output terminal which provides a TTL output with faster rise/fall time.

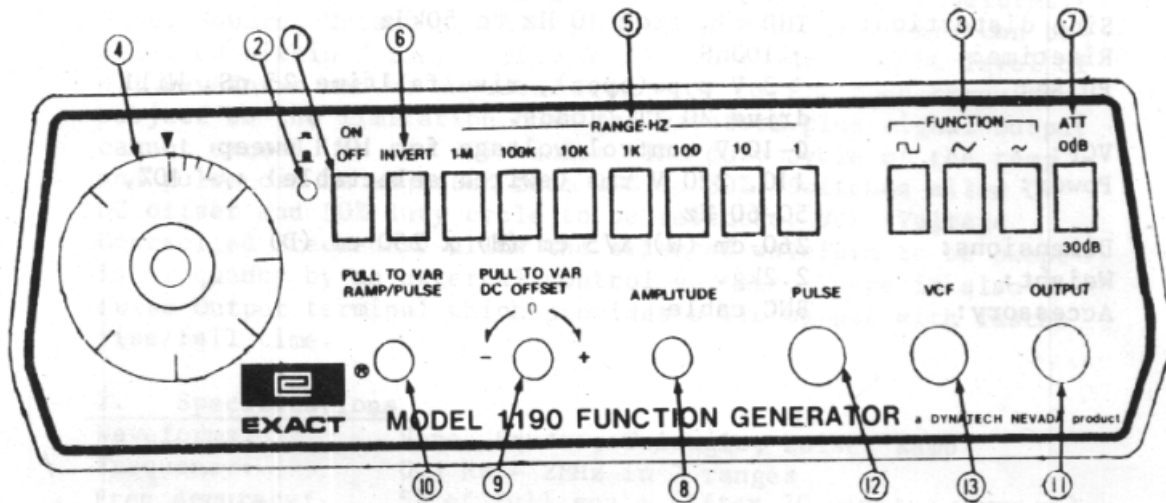
### 2. Specifications

Waveforms:	Sine, Square, Triangle, Pulse, Ramp
Frequency:	0.1 Hz - 2MHz in 7 ranges
Freq accuracy:	5% of full scale (After 20 minutes warm-up)
Output Impedance:	50 Ohms +/- 10%
Output Voltage:	5 mV p-p to 20 V p-p open circuit
Attenuator:	0 dB, -30 dB
DC level:	+ 10V to -10V, continuously variable, with

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Duty Cycle:	zero offset switch. Note: Output waveform plus DC offset may not exceed +/- 10V. 20%-80%, continuously variable with 50% switch.
Sine distortion:	THD < 1% from 10 Hz to 50kHz
Risetime:	< 100nS
Pulse:	> 3 V p-p (open), rise/falltime 25 nS. Will drive 20 TTL loads.
VCF:	0-10 V control voltage for 10:1 sweep
Power:	110, 220 V rms (switch selectable) +/- 10%, 50-60 Hz
Dimensions:	260 cm (W) X 75 cm (H) x 250 cm (D)
Weight:	2.2kg.
Accessory:	BNC cable

### 3. Front Panel Features:



#### 4. Front Panel Illustration

- 1) Power On/Off Switch-Pushbutton switch to apply and remove power.
- 2) Indicating Lamp-LED to indicate power on condition.
- 3) Function Switch-Selects desired waveform.
  - ~:Sinewave
  - ⌌:Squarewave and Pulse (with variable duty cycle).
  - ∧:Trianglewave and Ramp (with variable duty cycle).
- 4) Frequency Dial-Multiplies Range Switch setting from .2-2.0.
- 5) Range Switch-Seven ranges selectable from X1 Hz to X1 MHz
- 6) Invert-Inverts the output waveform (changes the phase 180 deg.)
- 7) Attenuator-Provises 30 dB attenuation of the output when depressed.
- 8) Amplitude-Allows the output amplitude to be continuously varied.
- 9) DC Offset Variable-With knob in, DC offset is zero.  
With knob out, the DC level can be adjusted from -10 V to +10V.
- 10) VAR Ramp/Pulse-With knob in, duty cycle is 50%  
With knob out, duty cycle can be varied from 20% to 80%.

- 11) Output-The main output waveform can be taken from this terminal.
- 12) Pulse-TTL compatible square or pulse (with variable duty cycle).
- 13) VCF-An input to allow the frequency to be controlled from an external voltage.

#### 5. Operation

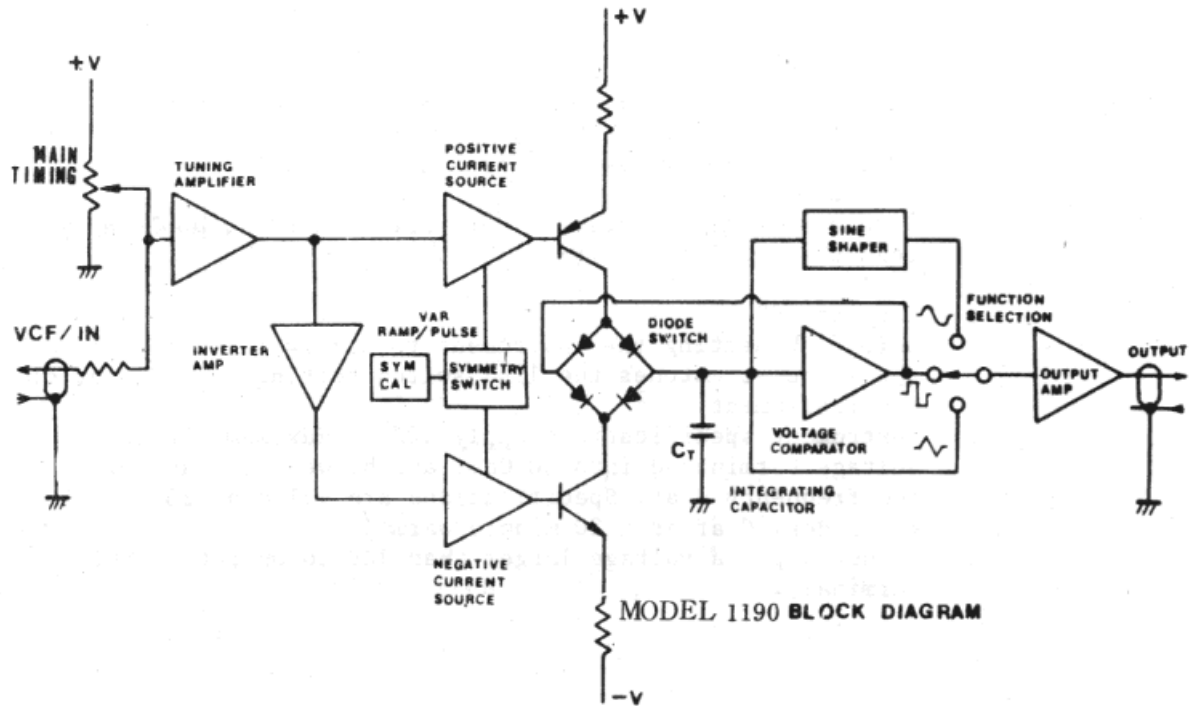
- 1) Connect the instrument to the AC power source and depress the power switch.
- 2) Push the Function Switch to select the desired waveform.
- 3) To obtain pulse or ramp, pull out the Ramp/Pulse switch; otherwise leave it pushed in.
- 4) Push the Range Switch to select the frequency range and turn the frequency dial. The frequency output will be:  
 $f = \text{Dial indication} \times \text{Range}$
- 5) Push on the 30 dB Attenuator when a small signal is required.
- 6) Turn the Amplitude control to set the desired output amplitude.
- 7) If DC offset is required pull out the DC offset control and set the DC by rotating the knob. Otherwise leave the control pushed in.
- 8) When a TTL level is needed, it can be taken from the Pulse

output. It is not affected by the amplitude control, attenuator, or function switch settings.

- 9) Depress the Invert switch when inverted waveforms are needed.
- 10) When a voltage controlled frequency is needed, apply a control signal to the VCF input.

#### 6. Caution

- 1) Before connecting the instrument to AC power, verify that the AC power matches the line switch setting on the rear of the instrument.
- 2) Instrument specifications apply 10% to maximum output voltage terminated into 50 Ohms and between 0.2 and 2.0 on the frequency dial. Specifications are valid at 25 deg C +/- 5 deg. C after a 20 minute warmup.
- 3) Do not apply a voltage larger than 10V to Output or VCF terminals.



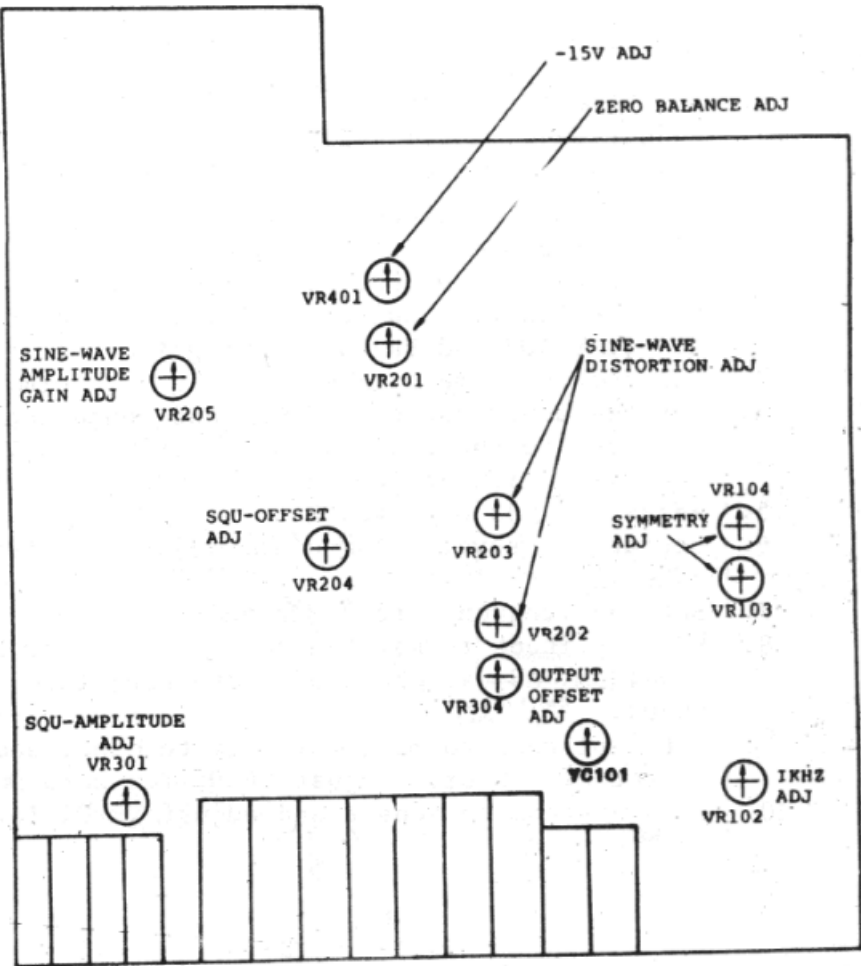
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### III. Maintenance

#### 8. Adjustment Procedures

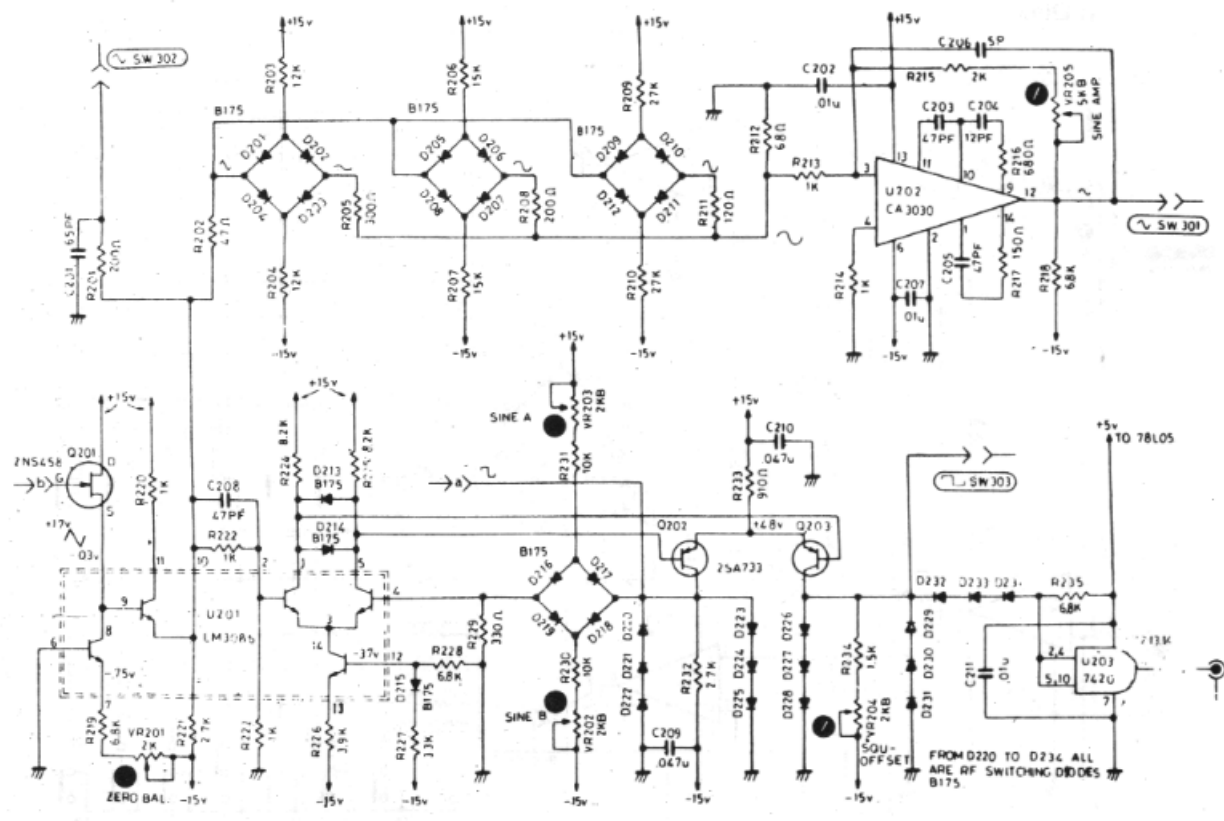
1. Adjust VR401 until the negative supply voltage equals the positive supply voltage (about 15V +/- 3%).
2. Set the Range Switch to 10 kHz and adjust the Frequency Dial for closest match between 1 kHz and 20 kHz On the dial, with a counter connected to the Pulse output.
3. Set the Function Switch to Triangle and freq. to 1 kHz. Adjust VR103 and VR104 to bring frequency to 1 kHz and to balance the time symmetry of the waveform.
4. Set Frequency range to 1 kHz and connect a distortion analyzer to the output. Adjust VR202 and VR203 to minimize the distortion at 400 Hz and 1 kHz alternately.
5. Adjust 20 kHz with VR102.
6. Repeat 2-5 several times and adjust the frequency dial at 1 kHz.
7. Set the frequency to 2 MHz and adjust with VC101.
8. Set Amplitude to max and adjust VR205 for 20 V p-p sine waveform. Adjust the squarewave amplitude to 20 V p-p with VR301.
9. Set Amplitude to max, waveform to sine, and turn the DC offset switch off. Adjust VR304 for zero DC offset.
10. Set waveform to square and adjust VR204 for zero DC offset.

9. Adjustment Location



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