INSTRUCTION MANUAL

MODEL 134
SWEEP GENERATOR
Voltage Controlled Frequency Generator

WAVETEK
Box 651, San Diego, Calif., 714-279-2200
Box 1967, Indianapolis, Ind., 317-783-3221
INSTALLATION

Converting to 230-Volt Line Power

The Model 134 Sweep Generator is shipped from the factory with the power transformer connected for 115-volt line power, unless ordered for 230-volt use. Converting a 115-volt unit for 230-volt operation is a simple matter:

1. Remove power cord.
2. Loosen two captive thumb screws on rear panel and remove panel.
3. The conversion switch is located on the chassis. Use a thin-bladed screwdriver to move the 115-230 switch to the 230 position.
4. Replace 1/4-ampere fuse with a 1/8-ampere fuse of the same type.

Connect Signal and Chassis Grounds

The instrument is shipped from the factory with the signal ground floating above chassis ground, unless otherwise specified. A common signal/chassis ground can be obtained as follows:

1. Remove power cord.
2. Loosen two captive thumb screws on rear panel. Remove panel and cover.
3. Solder a jumper wire between the ground lugs (green wires) of the SYNC OUT connector and the power connector (Figure 2-1).

INSPECTION

The following procedures should be performed to assure the user that the instrument has arrived at its destination in proper operating condition. Complete calibration and checkout instructions are provided in Section 4 for determining if the instrument is within electrical specifications.

Checking Visually

After carefully unpacking the instrument, visually inspect the external parts for damage to knobs, dials, indicators, surface areas, etc. If damage is discovered, file a claim with the carrier who transported the instrument. Retain the shipping container and packing material for use in case reshipment is required.

Checking Electrically

Refer to Installation paragraph for 115-volt or 230-volt line power instructions.

The procedural steps in this paragraph provide a quick checkout of instrument operation. If electrical deficiencies exist, refer to the Warranty in the front of this manual. The following test equipment, or equivalent, is recommended for performing this electrical inspection. (Refer to Table 2-1 and Figure 2-2 for operating control descriptions.)

<table>
<thead>
<tr>
<th>Name</th>
<th>Manufacturer</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oscilloscope</td>
<td>Tektronix</td>
<td>544</td>
</tr>
<tr>
<td>Dialamatic Voltmeter</td>
<td>Wavetek</td>
<td>201</td>
</tr>
<tr>
<td>Function Generator</td>
<td>Wevetek</td>
<td>110</td>
</tr>
<tr>
<td>Counter-Timer</td>
<td>Monsanto</td>
<td>101A</td>
</tr>
</tbody>
</table>

Table 2-1. CONTROLS, INDICATORS, CONNECTORS

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREQ HZ range selector</td>
<td>Selects frequency range from x10 to x1M in increments of 10. Line voltage applied to power supply in any range position. Also has power off position.</td>
</tr>
</tbody>
</table>
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<tr>
<td><strong>Name</strong></td>
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</tr>
<tr>
<td>Frequency dial</td>
<td>Selects frequency in continuously variable operations from 0.02 to 2.0; dial divisions in increments of 0.05.</td>
</tr>
<tr>
<td>VERNIER frequency control</td>
<td>Provides fine tuning with 1% of full-scale range. When frequency dial is set at .02 (1/100 of range) VERNIER controls frequency to approximately .002 (1/1000 of range).</td>
</tr>
<tr>
<td>Function selector</td>
<td>Selects sine, triangle, square, or sweep (sawtooth) wave output.</td>
</tr>
<tr>
<td>20 V P-P MAX control</td>
<td>Adjusts output level from 100 mV to 10 V p-p (50Ω load).</td>
</tr>
<tr>
<td>DC OFFSET potentiometer</td>
<td>Adjusts baseline of output waveform over ±1/2 of full-scale level.</td>
</tr>
<tr>
<td>MODE selector</td>
<td>Selects operational mode: continuous, triggered, gated, or tone burst for cw operation; continuous or triggered for sweep operation.</td>
</tr>
<tr>
<td>TRIG LEVEL control</td>
<td>Adjusts firing points of generator with external trigger/gate operation, or internal tone-burst operation.</td>
</tr>
<tr>
<td>SWEEP WIDTH selector</td>
<td>Selects sweep bandwidth.</td>
</tr>
<tr>
<td>VARIABLE control</td>
<td>Fine tuning for sweep bandwidth.</td>
</tr>
<tr>
<td>SWEEP TIME</td>
<td>Selects sweep repetition rate.</td>
</tr>
<tr>
<td>VARIABLE control</td>
<td>Fine tuning for sweep repetition rate.</td>
</tr>
<tr>
<td>Frequency dial index</td>
<td>Illuminated frequency dial alignment point. Illumination also indicates power applied.</td>
</tr>
<tr>
<td>50Ω OUT connector</td>
<td>Connects selected output waveform to load.</td>
</tr>
<tr>
<td>SYNC OUT connector</td>
<td>Connects output pulse for synchronizing applications.</td>
</tr>
<tr>
<td>VCG IN connector</td>
<td>Connects 0 to ±5-volt dc programming or wideband ac input signal to VCG circuit.</td>
</tr>
<tr>
<td>TRIG IN connector</td>
<td>Connects external trigger or gate signal into trigger comparator circuit.</td>
</tr>
<tr>
<td>SWEEP OUT connector</td>
<td>Connects sawtooth output of sweep generator to external 600-ohm load.</td>
</tr>
</tbody>
</table>

1. Turn FREQ HZ selector to the x1k position. (This connects ac power to the unit and establishes the frequency multiplier.)
2. Connect oscilloscope to the 50Ω OUT connector with 50-ohm terminator.
3. Set frequency dial to the 1.0 mark and MODE selector to CONT.
4. Set function selector to $\wedge_0$.
5. Rotate 20 V P-P MAX control to its maximum clockwise position.
6. Check for 1-kHz sine wave with greater than 10 V p-p amplitude on oscilloscope.
7. Select $\wedge_0$ and $\wedge_1$ with function selector and check for 10 V p-p amplitude on oscilloscope.
8. Turn frequency dial from maximum counterclockwise to maximum clockwise positions and check for frequency change.
9. Rotate 20 V P-P MAX control from maximum clockwise to maximum counterclockwise positions and check for decreasing amplitude.
10. Rotate VERNIER to maximum cw position. Set frequency to 20 Hz with counter. Connect 0 to +5 Vdc input to the VCG IN connector. Slowly increase voltage input from 0 to maximum and check that frequency of output waveform increases approximately from 20 Hz to 2 kHz.
11. Set MODE selector to TRIG. Disconnect power supply from VCG IN connector. Rotate TRIG LEVEL control while observing oscilloscope. One cycle of selected waveform should appear.
12. Set MODE selector to GATED. Rotate TRIG LEVEL control while observing oscilloscope. Waveform should appear at cw position and disappear at ccw position.
13. Set MODE selector to CONT SWP. Set frequency to 20 Hz.
Hz with counter. Set SWEEP WIDTH to 2.0. Set SWEEP TIME to 1 s. Displayed frequency should sweep recurrently from 20 Hz to 2 kHz at a 1 Hz rate.

14. Set MODE to TRIG SWP. Rotate TRIG LEVEL control, while observing oscilloscope. Displayed frequency should sweep once from 20 Hz to 2 kHz in 1 second.

15. Set MODE selector to TONE BURST. Rotate TRIG LEVEL control, while observing oscilloscope. Tone bursts at 20 Hz should appear with burst duration varying with rotation of TRIG LEVEL control.

16. Connect oscilloscope to SWEEP OUT connector. Set MODE selector to CONT. Set SWEEP TIME to 1 mS. Oscilloscope should display a 1 kHz sawtooth.

17. Connect oscilloscope to SYNC OUT connector. Set frequency dial to 2.0. Oscilloscope should display a 2-kHz square wave.

OPERATION

NOTE
One-half hour warmup is required for generator to stabilize at specified accuracies.

Operating as a Function Generator

NOTE
A 50-ohm termination results in 10 V p-p maximum output level. Open-circuit termination gives 20 V p-p. Loads between these limits provide intermediate maximum output levels.

1. Set MODE selector to CONT position.
2. Set function selector for desired waveform.
3. Set FREQ HZ range selector to desired multiplier.
4. Set desired frequency dial mark under illuminated dial.

NOTE
The VERNIER control must be in full cw position for calibrated-frequency operation over the .1 to 2 dial range. If this control is in full ccw position, dial range is uncalibrated, but extended to approximately 1/1000 of full scale.

5. Set 20 V P-P MAX control for desired output level.
6. If triggered/gated operation is desired, inject a 1-volt peak signal into TRIG IN connector with MODE selector in TRIG or GATED position. Trigger operation provides one cycle of the selected waveform for each step-voltage
input. Gated operation produces a tone burst with its duration equal to the duration of the step voltage.

**NOTE**
A 1-volt peak signal is required for trigger rates up to 200 kHz. Proportionally higher voltage is required for higher frequencies.

**Operating as a VCG Generator**
1. Scr MODE selector to CONT position.
2. Set function selector for desired waveform.
3. Set FREQ HZ range selector to desired multiplier.
4. Connect external voltage source (dc programming or wideband ac signal) to VCG IN connector.

**NOTE**
VCG input requires 0 to ±5 volts for operation over full-scale range, but can withstand many times maximum input.

5. Set frequency dial as follows:
   a. For frequency modulation with ac input, set dial for center frequency.
   b. For increasing frequency sweep with positive dc input, set dial to lower frequency limit.
   c. For decreasing frequency sweep with negative dc input, set dial to upper frequency limit.

**NOTE**
VERNIER control must be in full cw position for calibrated frequency operation over the .1 to 2 dial range. If this control is placed in full ccw position, dial range is uncalibrated, but extended to approximately 1/1000 of full scale.

6. Set 20 V P-P MAX control for desired output level.

**Operating as a Sweep Generator**
1. Set MODE selector to CONT SWP.
2. Set function selector for desired waveform.
3. Set FREQ HZ range selector to desired multiplier.
4. Set SWEEP TIME for reciprocal of desired repetition rate.
5. Set frequency dial and SWEEP WIDTH selector for desired frequency excursion; i.e., with FREQ HZ at x10 kHz SWEEP TIME at 1 mS, frequency dial at .6, and SWEEP WIDTH at 1.4, the output frequency will sweep from 6 kHz to 20 kHz at a 1 kHz repetition rate.
6. Set 20 V P-P MAX control for desired output level.
7. If triggered-sweep operation is desired, inject a 1 volt peak signal into the TRIG IN connector with MODE selector in TRIG SWP position. Trigger-sweep operation provides one frequency excursion of the selected waveform for each step-voltage input.

**Operating as a Ramp Generator**
1. Connect coaxial cable between SYNC OUT (on rear panel) and TRIG IN connectors.
2. Set function selector to sweep.$^\downarrow$
3. Set SWEEP WIDTH to 0.
4. Set SWEEP MODE to TRIG SWP.
5. Adjust TRIG LEVEL control for sweep generator firing point.
6. Set ramp parameters as follows:
   a. Repetition rate with FREQ HZ selector and frequency dial.
   b. Ramp amplitude with 20 V P-P MAX control.
   c. Ramp slope with SWEEP TIME controls.
   d. Ramp baseline with DC OFFSET potentiometer.