MODEL 1000A

FM ALIGNMENT GENERATOR

COMPLETE RECEIVER ALIGNMENT — A MINIATURE LOW DISTORTION FM TRANSMITTER PLUS FAST, ACCURATE DUAL SWEEP ALIGNMENT

Five instruments in one!

1. Dual sweep alignment.
2. Complete stereo generator.
3. Monophonic FM generator.
4. Clean CW signal.
5. SCA modulation.

DESCRIPTION

The all solid-state 1000A FM ALIGNMENT GENERATOR is designed specifically to permit fast, accurate adjustment of monaural and stereo FM systems. DUAL SWEEP, a refinement of conventional sweep alignment techniques, provides a unique visual display of receiver performance. An operator need only connect the 1000A RF output to the receiver antenna terminals and feed the receiver audio output to the 1000A's built-in filter. Distortion and tuning characteristics will then be displayed — even on an inexpensive scope — without probing inside the receiver.

The 1000A offers much more than DUAL SWEEP capability. With a highly linear modulator, it produces complete, high quality, monaural and stereo signals exceeding FCC specs. An internal RF oscillator is tuneable across the fm band and provides an output continuously adjustable in level from 0.5 to 30,000 μv.

SOUND TECHNOLOGY

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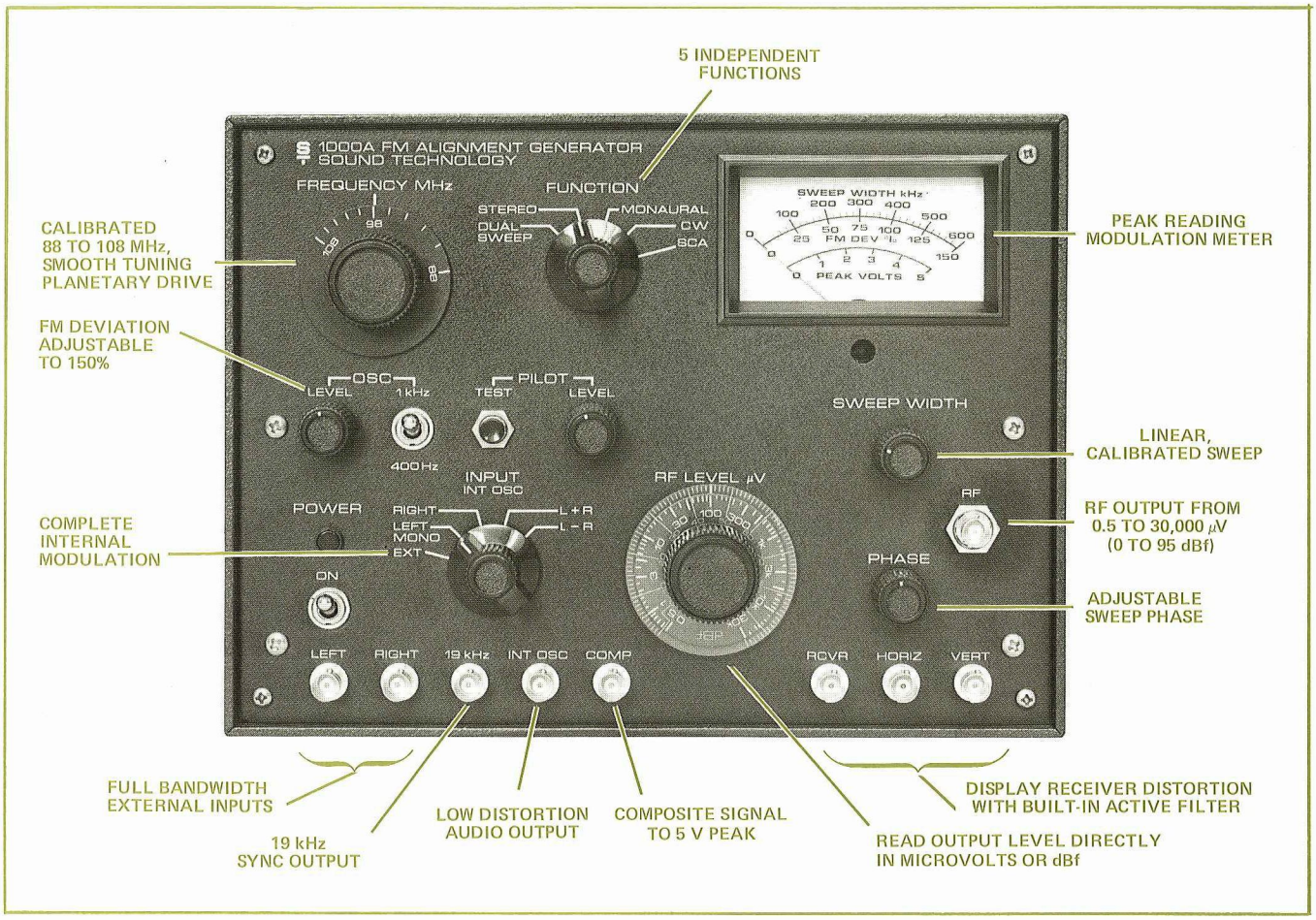
CAMPBELL, CALIFORNIA 95008
(408) 378-6540



Features

- ★ Unique DUAL SWEEP function with a wide-band linear modulator and a built-in active filter lets you see at a glance the critical parameters, LINEARITY, BANDWIDTH, and TUNING SYMMETRY – without probing inside the receiver.
- ★ Conventional sweep alignment capability.
- ★ Linear, calibrated sweep permits direct determination of receiver bandwidth and tuning symmetry.
- ★ RF tuneable from 88 to 108 MHz. Modulation sensitivity held constant across the band.
- ★ Piston attenuator calibrated from 0.5 to 30,000 µV permits a quick look at receiver alignment vs RF level.
- ★ Precision stereo modulator utilizes crystal controlled digital circuits for precise phase relationships. Overall separation better than 50 dB at 1 kHz.
- ★ Low distortion MONAURAL function for over-all receiver distortion measurements.
- ★ CW function provides a signal with very low incidental FM for receiver quieting (signal-to-noise ratio) tests.
- ★ Internal SCA modulation for receiver SCA trap adjustments.
- ★ Sweep width, monaural and stereo modulation, pilot level (X10 scale on PILOT TEST), and composite output monitored on peak reading meter.
- ★ Metered COMPOSITE output for separate alignment and testing of stereo decoders.
- ★ Optional wideband modulation input.
- ★ Optional front panel switch selects 400 Hz or 1 kHz as internal oscillator frequency.

Applications

- ★ Development of stereo FM systems.
- ★ Rapid, accurate production alignment of stereo equipment.
- ★ Servicing FM tuners, receivers, and stereo adapters.
- ★ Fast determination of receiver performance without internal connections.
- ★ Manufacturer's final QA of receivers.
- ★ Development of SCA equipment.

What Dual Sweep Does

Dual sweep permits receiver alignment with unexcelled rapidity and precision by providing an accurate scope display of linearity and distortion. A highly linear modulator driven by a dual frequency sweep signal yields far more resolution and accuracy than conventional sweep techniques. All the signals required for a display of receiver distortion, bandwidth, and tuning characteristics are provided by the 1000A. The text below describes how the dual frequency sweep method works.

How Dual Sweep Works

To understand the operation of DUAL SWEEP, consider the effect of a non-linear S-curve on a low level 10 kHz modulating signal. As shown in Figure 1, changing the carrier frequency from F1 to F2 shifts the demodulation region to a different portion of the S-curve and results in a change in the detected 10 kHz output voltage. The ideal S-curve would have a constant amplitude in the pass band.

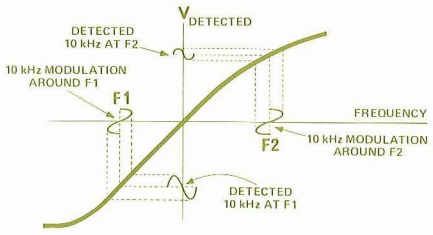


Figure 1.

10 kHz output level is actually a measure of S-curve slope over a very small region. As the carrier frequency is shifted over the receiver band, changes in the detected output are directly proportional to S-curve non-linearity and resulting receiver distortion. Receiver linearity could actually be measured by hand tuning an oscillator with 10 kHz low level FM and plotting receiver output voltage vs. carrier frequency (Figure 2) — a slow and cumbersome technique.

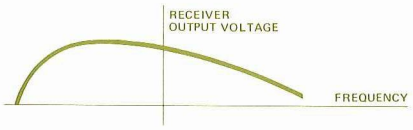


Figure 2.

The DUAL SWEEP signal eliminates the need for hand tuning by superimposing the 10 kHz on a 60 Hz sweep signal, permitting a scope display. Receiver output will be a 60 Hz waveform with 10 kHz superimposed on it. In order to determine the 10 kHz amplitude (our measure of linearity and thus distortion), the 60 Hz must be filtered out. The 1000A has a built-in filter to provide a clean 10 kHz signal. By using the 60 Hz modulation signal for horizontal deflection of a scope and the filtered detector output for vertical deflection, receiver linearity will be displayed as in Figure 3.

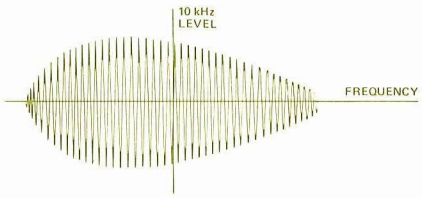


Figure 3.

Advantages of Dual Sweep

Because DUAL SWEEP measures the slope of the S-curve, it provides a display of receiver distortion which is far more sensitive than that obtained by conventional sweep methods. DUAL SWEEP has all the advantages of minimum distortion alignment (it is a direct measure of IM distortion) and yet retains the benefits of conventional sweep alignment. We all know that sweep alignment is highly desireable, not only because of the rapidity and ease of adjustment that goes with a scope display, but because of the information contained in the pattern we see. A conventional sweep display provides immediate information on the effect of receiver adjustments on tuning symmetry and bandwidth, but is not a sensitive measure of distortion. Alignment with a distortion analyzer can yield low distortion but may result in critical tuning characteristics. DUAL SWEEP combines the advantages of both techniques — and eliminates the disadvantages of each.

Not only can a receiver's distortion be measured over its full bandwidth using DUAL SWEEP, but the character of the distortion is displayed on the scope. Figure 4 shows a scope display of the DUAL SWEEP pattern for a receiver with even-order distortion.

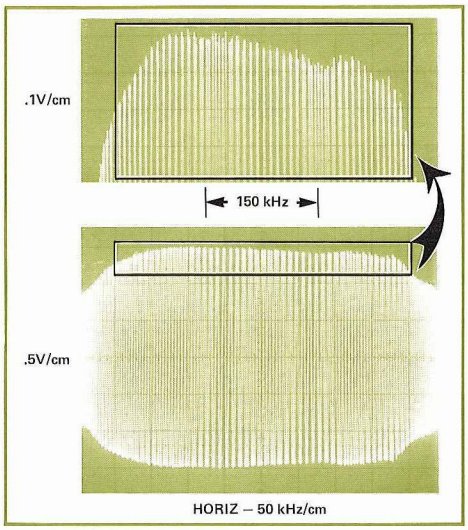


Figure 4. DUAL SWEEP pattern for 0.7% THD.

Specifications

FM RF OUTPUT

TUNING RANGE: 88 to 108 MHz. 6:1 planetary drive provides approx. 10 kHz tuning resolution.

RESIDUAL FM (CW MODE): $<$25 Hz, 20 Hz to 15 kHz (measures quieting to -70 dB).

DRIFT: $<$10 kHz/hr after 1 hour warm-up.

TOTAL HARMONIC DISTORTION: $<$0.1% at 1 kHz monaural, $<$0.2% stereo, 100% modulation.

RESIDUAL FM (MONO OR STEREO): $<$75 Hz, 20 Hz to 15 kHz.

RESIDUAL 38 kHz SUBCARRIER: $<$0.5%, applies to stereo only.

OUTPUT LEVEL: 0.5 to 30,000 μV into 50 ohm load, continuously adjustable. Accuracy is ±1 dB at 98 MHz. Sealed RF unit provides sufficiently low leakage to permit accurate measurements below 0.5 μV.

OUTPUT IMPEDANCE: 50Ω, VSWR $<$1.3, 200 Vdc isolation.

DUAL SWEEP

INCREMENTAL LINEARITY: ±0.3% for 150 kHz bandwidth. (Incremental linearity is the change in small signal FM deviation sensitivity over a stated bandwidth and is equivalent to peak intermodulation distortion).

SWEEP WIDTH: Adjustable and metered from 0 to 600 kHz.

SWEEP LINEARITY: ±3% of width.

RCVR INPUT: Impedance: $>$100KΩ at 10 kHz, $>$10MΩ at 60 Hz. Maximum input is 25 volts peak.

VERT OUTPUT: Impedance 10KΩ. RCVR input-to-VERT output gain ≈ 30 at 10 kHz. 10 kHz modulation in DUAL SWEEP ≈ 10%.

HORIZ OUTPUT: Impedance 20KΩ. Level ≈ 20 volts peak-to-peak.

SWEEP PHASE: Adjustable over 60° range at 60 Hz.

STEREO

SEPARATION: $>$50 dB at 1kHz. Specification includes mono/stereo subchannel separation and pilot phase accuracy and is applicable to composite or RF outputs.

PILOT: 19 kHz ±2 Hz, adjustable from 0 to 20%. PILOT TEST pushbutton removes external LEFT and RIGHT or INT OSC modulation and expands meter scale to 15% full scale.

EXTERNAL LEFT (MONO) AND RIGHT INPUTS

FREQUENCY RESPONSE: ±0.5 dB, 50 Hz to 15 kHz.

INPUT IMPEDANCE: 10KΩ.

LEVEL: ≈ 0.4V rms for 100% modulation (no damage at 15 volts peak).

19 kHz OUTPUT

WAVEFORM: 19 kHz ±2 Hz squarewave, ≈5 volts peak-to-peak.

OUTPUT IMPEDANCE: 3.3KΩ.

INT OSC OUTPUT

FREQUENCY: 1 kHz ±10%, 10 kHz with FUNCTION switch on DUAL SWEEP, 67 kHz on SCA.

TOTAL HARMONIC DISTORTION: $<$0.1% at 1 kHz.

LEVEL: ≈ 2 V rms.

OUTPUT IMPEDANCE: 1KΩ.

COMPOSITE OUTPUT

LEVEL: Adjustable and metered from 0 to 5 volts peak.

OUTPUT IMPEDANCE: $<$600Ω.

TOTAL HARMONIC DISTORTION: $<$0.2% at 5 volts peak.

RESIDUAL 38 kHz SUBCARRIER: $>$ 50 dB down from 5 volts peak. Applicable to stereo only.

RESIDUAL HUM AND NOISE: $>$60 dB down from 5 volts peak.

METERED FUNCTIONS

MONO AND STEREO: 0 to 150% peak reading.

DUAL SWEEP: 0 to 600 kHz sweep width.

PILOT: 0 to 15%.

COMPOSITE OUTPUT: 0 to 5 volts peak.

ACCURACY: ±7% of reading ±2% of full scale, 88 to 108 MHz.

OPTIONS

WIDEBAND AUXILIARY INPUT (Rear Panel BNC): This wideband modulation input may be used for SCA program material, intermodulation distortion tests, or for adding other complex modulation to the conventional stereo signals. Order M1.

INTERNAL OSCILLATOR: With your order you may specify a 400 Hz internal oscillator instead of the standard 1 kHz at no additional charge.

400Hz/1kHz INTERNAL OSCILLATOR: Front panel toggle switch allows choice of 400 Hz or 1 kHz internal oscillator frequency. Permits measurement of receiver distortion at 400 Hz, separation at 1 kHz as specified in IHF standards. Order M2.

BROADCAST QUALITY STEREO MODULATOR: When M3 is included, a more complex stereo filter is installed in the 1000A. This permits a separation specification of 50 dB from 50 Hz to 8 kHz decreasing to 40 dB at 15 kHz. Essential for receiver design and for receiver testing and evaluation at high audio frequencies. Order M3.

GENERAL

DIMENSIONS: 8-3/8" high x 11-1/8" wide x 11-3/4" deep.

POWER: 115V ±10%, 50 to 60 Hz, 12.5 W.

WEIGHT: 12 lbs.

SHIPPING WEIGHT: 18 lbs.

All prices f.o.b. Campbell, California — data subject to change without notice.

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