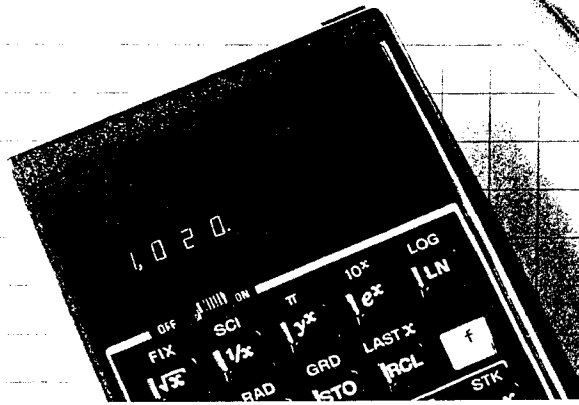


# MODEL 1020A ALIGNMENT GENERATOR

SOUND TECHNOLOGY  
 IEC REFERENCE STANDARD  
 60 dB Total Harmonic Distortion  60 dB Separation to 10kHz  85 dB Signal-To-Noise Ratio



**A NEW INDUSTRY STANDARD FOR PRECISION FM ALIGNMENT AND ANALYSIS**

With the introduction of the Model 1020A, the audio engineer and technician can now have performance that is *an order of magnitude better* than our original FM generator. The 1020A features system specifications of 0.01% THD, separation of 60dB (20Hz to 8kHz) 55dB at 15kHz and stereo signal-to-noise ratio of 85dB. These impressive specifications apply from audio inputs to the modulated rf output.

The predecessor to the new Model 1020A was introduced more than 10 years ago—the Model 1000A. It was the first FM stereo generator capable of yielding test results for stereo receivers down to 0.1% THD. Its integral stereo modulator featured performance that guaranteed an overall system specification of 0.1% THD, and stereo separation of 50dB at 1kHz with a subsequent customer ordered option that extended the separation specification to 40dB at 15kHz.

**ADVANCED STEREO AND FM MODULATOR DESIGNS MEAN GREATER ACCURACY**

The 1020 achieves excellent separation at high frequencies by incorporating a new crystal-controlled, time-multiplexed stereo modulator (encoder).

Pilot phase is adjusted precisely to insure that excellent separation is achievable in the detected output. Residual 38kHz is down more than 65dB and spurious signals above 53kHz are down more than 70dB from 100% modulation. Composite output from the modulator is available on the front panel for testing stereo demodulators or modulating other FM/RF sources.

The ultra-linear, low-noise FM modulator maintains the tight system THD, separation and noise specifications.

**DIGITAL FREQUENCY DISPLAY AND OSCILLATOR STABILITY**

A shielded counter is built-in to measure carrier frequency without degrading the accuracy of low level sensitivity measurements. Carrier frequency range is from below 88MHz to above 108 MHz and is measured to a precision of 10kHz. An anti-backlash gear train assembly permits easy adjustment to achieve this resolution.

The fundamental oscillator used in the RF head has inherently high stability; temperature coefficient is less than 5kHz/°C. The RF Output Level is

controlled by a precision piston attenuator with very low leakage.

**EXTENSIVE FEATURES TO ACCOMPLISH CONFORMANCE TO IEEE STD. 185-1975**

"Standard Methods of Testing Frequency Modulation Broadcast Receivers" (IEEE STD. 185-1975) has been approved by the Electronics Industries Association and the Institute of High Fidelity. The 1020A facilitates testing to this standard with these special features:

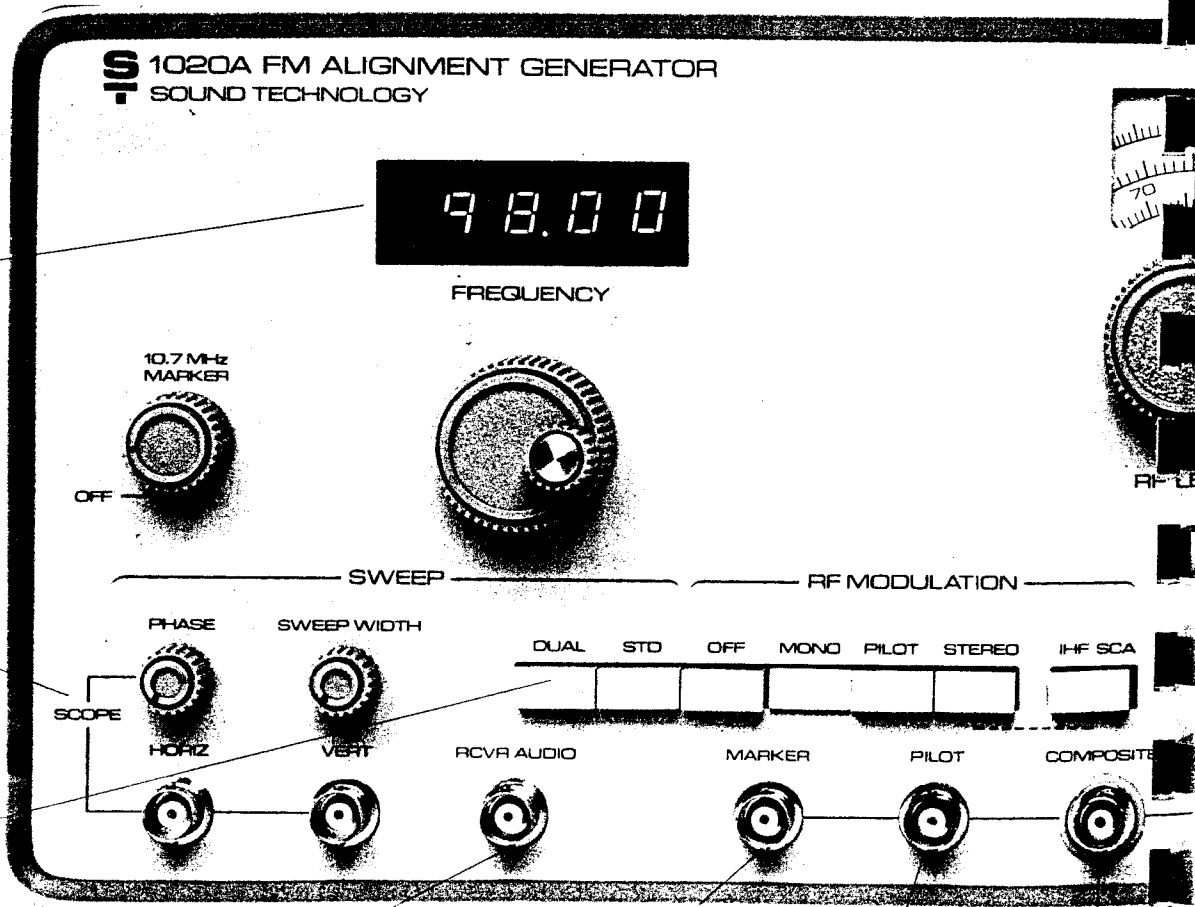
- L,R,L=R, and L--R for either internally or externally generated audio signals.
- Large RF dial calibrated in microvolts (50 ohm load) and dBf for 75 and 300 ohm loads.
- Internally generated 67kHz SCA carrier modulated at 2.5kHz with a ±6kHz deviation.
- Pilot-only modulation which allows measurement of stereo signal-to-noise ratios down to 85dB below 100% modulation.
- Expanded meter scale for accurate setting of pilot level.

DIGITAL READOUT OF FREQUENCY TO 10kHz RESOLUTION

EXTERNAL WIDE-BAND MODULATION INPUT (Rear panel)

SCOPE SIGNALS FOR SWEEP ALIGNMENT

SMPT E.M MODULATION CAPABILITY



INPUT TO HIGH PASS FILTER FOR DUAL SWEEP ALIGNMENT

10.7MHz VARIABLE LEVEL MARKER

19kHz SYNC OUTPUT

COMPOSITE OUTPUT

- Internally generated, low-distortion 100Hz, 1kHz, 6kHz and 10kHz test signals for standard distortion and stereo separation tests.

### ADDITIONAL FEATURES

To facilitate the testing of receiver de-emphasis, the 1020A includes selectable 25, 50 or 75 microsecond pre-emphasis. This also allows the instrument to be connected to a tape recorder or phono preamp for simulation of a very high quality FM radio station. To facilitate IF alignment, the 1020A has a built-in 10.7MHz Marker with a variable output of 2.0mV to 200mV (50 ohm load).

### SWEEP FUNCTIONS - STANDARD & DUAL (Patented)

The 1020A incorporates a linear sweep mode with both standard and dual functions for accurate IF and discriminator alignment. The sweep width is adjustable and metered from 0 to 600kHz. The HORIZ output to a scope provides the same waveform used to drive the linear RF modulator so that the horizontal display is linear in

frequency. A PHASE control is used to superimpose both forward and reverse sweeps. The Sound Technology patented DUAL SWEEP mode similar to that used in the Model 1000A is included. In this mode, a 7kHz signal (fixed at 10% modulation) is superimposed on the line-frequency, sweeping modulation. The receiver's output is fed back to the RCVR AUDIO connector and the line frequency is filtered out so that the VERT output to an oscilloscope is only the amplitude modulated 7kHz, which, when plotted versus the swept frequency shows the deviation of discriminator response from a straight line. The receiver's discriminator is aligned for the flattest possible envelope and with minimal band edge deterioration. It is important that the IF/Discriminator response be well controlled (no precipitous peaks or valleys in the DUAL SWEEP mode) for a bandwidth of 240kHz in order to handle overmodulation peaks without excessive degradation of the audio.\*

### ADDITIONAL FLEXIBILITY

The 1020A also includes a wideband

auxiliary input (rear panel) that permits summing of any external signal with the modulation selected on the front panel controls. Applications for this feature include CCIF (two-tone) distortion measurement and modulation from an SCA generator. This EXTERNAL WIDE-BAND MODULATION INPUT is summed into the composite signal ahead of the modulation metering circuit.

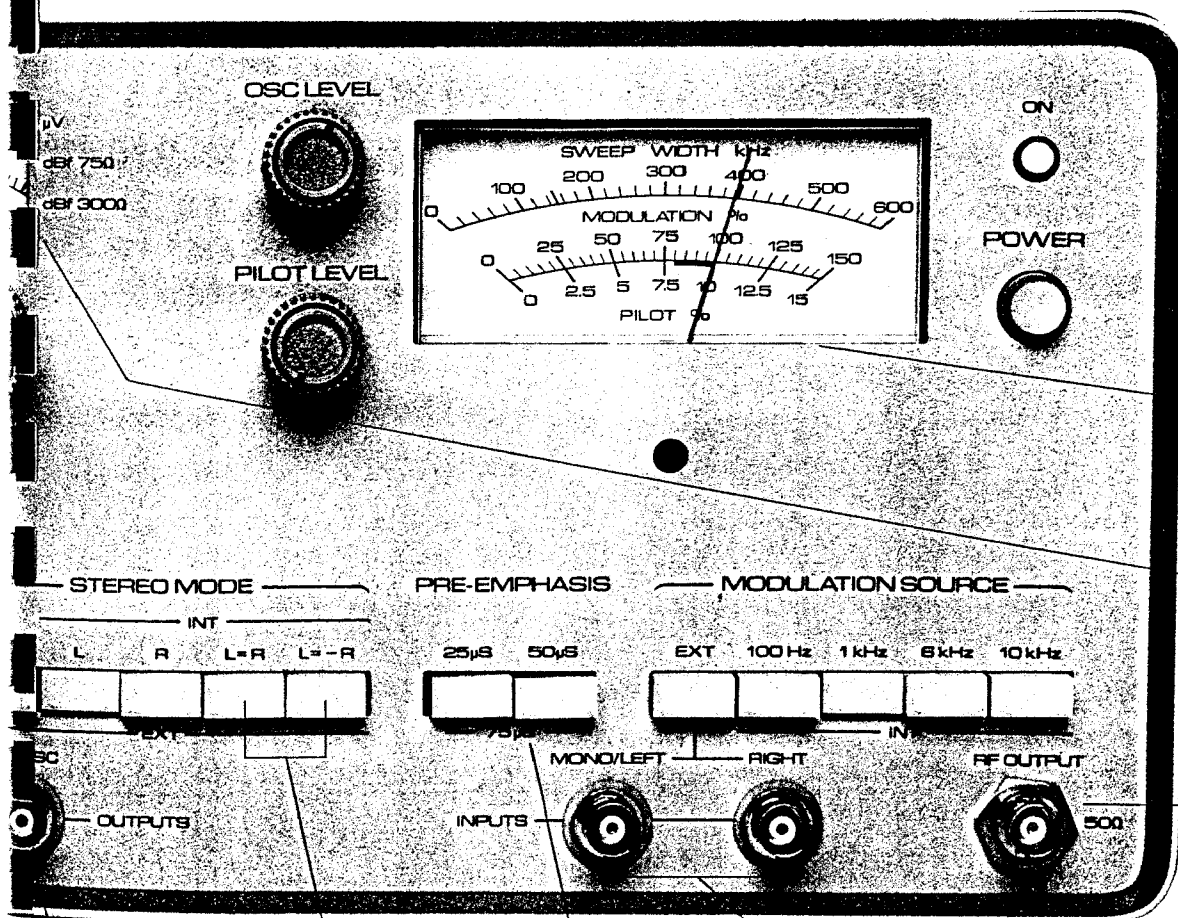
A peak-reading analog meter displays modulation levels on three scales: 0-15% for pilot level, 0-150% for mono or stereo modulation and 0-600kHz for sweep width.

The 1020A joins the Sound Technology Model 1000A as an advanced test instrument for precise measurements and evaluation of the newer high performance FM receivers and tuners. It has been designed to reduce the testing time necessary to perform highly accurate test procedures whether the application is in Research and Development, Quality Assurance, or Servicing.

The 1020A may be rack mounted, and a travel case is also available.

Sound Technology manufacturers an entire line of precision test instrumentation for the audio engineer including several models of Distortion Analyzers, and the Model 1500A Microprocessor-based Tape Recorder/Audio Test System.

\*FCC Rules & Regulations 73.317 Section 12: & 73.268



PEAK READING METER  
0 to 15% SCALE FOR SETTING PILOT  
0 to 150% SCALE FOR MODULATION LEVEL  
0 to 600kHz SCALE FOR SWEEP WIDTH

EXPANDED SCALE RF LEVEL DIAL (MICROVOLTS AND dBµ FOR 75 AND 300 OHMS)

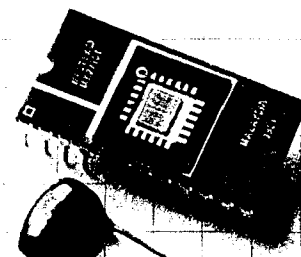
RF OUTPUT: 0.3 MICROVOLTS TO 30 MILLIVOLTS

LOW DISTORTION AUDIO OUTPUT

PRECISION L=R AND L=-R MODULATION

25, 50 AND 75 MICROSECOND PRE-EMPHASIS

FULL BANDWIDTH EXTERNAL INPUTS



# SPECIFICATIONS

## SYSTEM SPECIFICATIONS (Audio inputs to FM RF output)

**Total Harmonic Distortion:**  
20-30°C (68-86°F)  
MONO or STEREO (L, R, OR L=R): 0.01%  
(0.02%, 10-40°C)  
STEREO (L = -R) : 0.02% (0.03%, 10-40°C)

**Stereo Separation:**  
L-R: >60 dB, 20 Hz to 10 kHz, decreasing to  
55 dB @ 15 kHz (65 dB at 98 ± 3 MHz)  
M-S (L = R or L = -R, 1 kHz): >66 dB.

**Residual Noise:**  
dB below 100% Modulation at 1 kHz with 75 μ sec  
de-emphasis

RF MODULATION	IEEE/IHF (200 Hz - 15 kHz)	FLAT (30 Hz - 15 kHz)
OFF or MONO	89	84
PILOT	85	-
STEREO	83	-

## FM RF OUTPUT

**Tuning Range:** <88 MHz to >108 MHz.  
**Output Level:** 0.3 μV to 30 mV into 50 Ω load.  
With 1:1 matching transformer 1 to 100 dBf 75Ω  
-5 to 95 dBf 300Ω  
**Level Accuracy:** ± 1 dB ± 0.1 μV @ 98 MHz;  
± 1.3 dB ± 0.1 μV, 88-108 MHz. Sufficiently low  
leakage to permit accurate measurements below  
0.5 μV.  
**Output Impedance:** 50 Ω, VSWR < 1.2  
250 Vac, 50/60 Hz isolation.  
**Drift:** < 2kHz / Hr after 1 Hr warm-up.  
**Temperature Coefficient:** < 5 kHz / °C.

## COMPOSITE OUTPUT

**L/R Separation:** >65 dB 20 Hz - 10 kHz,  
decreasing to 55 dB @ 15 kHz.  
**M-S Separation:** Same as system spec.  
**Residual 38 kHz:** >65 dB below 100% modulation.  
**Spurious Signals above 53 kHz:** >70 dB below  
100% modulation.  
**Pilot:** 19 kHz ± 1 Hz, 0 - 25% modulation.

## SCA MODULATION

**IEEE/IHF Standard:** 67 kHz frequency modulated  
at 2.5 kHz with ± 6 kHz deviation.

## INTERNAL OSCILLATOR

**Frequencies:** 100 Hz, 1 kHz, 6 kHz, 10 kHz, ± 2%  
**Distortion:** 1, 6, 10 kHz: <0.002%; 100 Hz: <0.003%

## DISPLAY CHARACTERISTICS

**Meter Accuracy:** ±2% of full scale.  
**RF Frequency Counter:** 5 digit display, 10 kHz  
resolution.  
**Accuracy:** ±1 digit.

## SWEEP CHARACTERISTICS

Power line frequency and 7 kHz (fixed at 10%  
modulation) superimposed in DUAL SWEEP  
alignment or SMPTE IM testing. Line frequency  
alone in STD sweep mode.  
**Sweep Width:** Adjustable 0 - 600 kHz.  
**Linearity:** ±5% of width.  
**Incremental Linearity (eq. to peak IM distortion):**  
<0.04% at 150 kHz sweep width.  
**Horiz Phase:** 60° range.

## INPUT/OUTPUT SPECIFICATIONS

**Left/Right external inputs:** Zin 50k// 30 pf.  
Sensitivity 0.25 V for 100% modulation.  
**Pilot Output:** 1 Vrms, 10 KΩ max load.  
**Internal Oscillator:** 2.5 Vrms at 100% modulation,  
10 KΩ max load.  
**RCVR Audio:** Input Z 100 K // 30 pf.  
**Scope Vert:** Zs = 10 K, Gain from RCVR AUDIO =  
20 at 7 kHz.  
**Scope Horiz:** Output 20 Vp-p, Zs = 10 K.  
**Wide Band Aux Input:** (rear panel) Input Z 5KΩ,  
2.5 V for 100% modulation, 11 V p-p max.

## PRE-EMPHASIS

**Time Constants:** 25, 50, and 75 μs, Accuracy  
0.1 dB

## 10.7 MHz MARKER

**Accuracy:** ±1 kHz.  
**Output:** 200 mV into 50 Ω load.  
**Adjustment Range:** >40 dB.

## ENVIRONMENTAL CONDITIONS

**Ambient Temperature:** 10 - 40°C (50 - 104°F)  
**Relative Humidity:** to 90%

## POWER REQUIREMENTS

Four selectable line voltages;  
100V nom (86-106 V),  
120V nom (104 to 127 V),  
220V nom (190-233 V),  
240V nom (208-250 V),  
48-66 Hz line frequency.  
**Power Consumption:** 35 VA

## GENERAL

**Dimensions:** 7" (178mm) high x 17" (432mm) wide  
x 16.4" (417mm) deep.  
**Weight:** 25 lb. (11.4 kg.)  
**Shipping Weight:** 34 lb. (15.5 kg.)

## ACCESSORIES AVAILABLE

ST 100 50 Ω single ended to 300 Ω balanced  
matching transformer, 1:1 voltage ratio.  
ST 105 50 Ω to 75 Ω matching transformer, 1:1  
voltage ratio.  
Rack Mounting Adapters, Transport Case

**SOUND  
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