

1.0 GENERAL DESCRIPTION

This section includes an introductory description of the FS-1000 Synthesizer and available options, electrical and mechanical specifications, and an overview of the principles of operation.

1.1 INTRODUCTION

The FS-1000 Frequency Synthesizer is an accessory device which allows precise digital control of frequency when operating with any of the following three instruments:

- a. MSR-903 Microwave Surveillance Receiver.
- b. SG-811 Swept Signal Generator.
- c. 1290C Precision Attenuation Measurement Receiver.

Together the synthesizer and companion unit form a precise microwave system with accurate frequency control and exceptional stability and spectral purity.

The FS-1000 senses which companion unit is connected and automatically provides the appropriate band data, offsets and program sequences to obtain phase-lock at the selected frequency. The user need not make any adjustments or internal wiring alterations to change companion units.

Functionally the synthesizer digitally tunes the YIG oscillator within the companion unit, samples its RF output and phase-locks it to an oven controlled crystal source.

The following options are available:

OPTION 1 - 100 Hz Resolution:

The standard unit has 10 kHz resolution. Option 1 improves the resolution to 100 Hz, and makes the unit compatible with companion units capable of operation to 40 GHz by multiplication. This option can be easily retrofitted in the field.

OPTION 2 - Parallel BCD Freq Control:

The standard unit has an IEEE-488 interface. When option 2 is selected the parallel BCD (A9) board replaces the (A7) IEEE-488 interface board. No wiring change is required to implement this option and field change is possible within a few moments.

OPTION 3 - Optical Encoder:

The optical encoder gives the user a manual tuning feel while retaining synthesizer frequency accuracy. This option should be included at the time of purchase since a different front panel is required.

OPTION 4 - Rack Mounts:

For installation in standard 19 inch equipment racks.

REMOTE OPERATION:

Remote RF head operation in conjunction with the MSR-903 or SG-811 is possible utilizing cables available from the factory. This function is built into the FS-1000 with the added cables and mounting hardware being the only added requirements.

With compliments

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1.2 ELECTRICAL AND MECHANICAL SPECIFICATIONS

Frequency Range:

30 MHz-18 GHz (with MSR-903)
10 MHz-18 GHz (with SG-811 & 1290C)

Operation to 40 GHz is possible with Option 1 and an extended range MSR-903, SG-811 or 1290C.

Resolution:

10 kHz standard
100 Hz (Option 1)

5 MHz REF OSC Stability:

3×10^{-9} /24 Hr. Long-term stability
 1×10^{-10} /Sec. Short-term stability

Phase Noise:

70 dBc at 10 kHz removed from the carrier in a 1 Hz bandwidth (dependent upon companion unit and frequency).

Incidental FM:

<100 Hz rms

Switching Time (Maximum):

<50 ms: Typically less than 5 ms when a band change is not required.

Display:

16 character-16 segment alpha numeric display

Tuning:

Keyboard
IEEE-488 Interface
Parallel BCD (Optional)
Optical Encoder (Optional)

Temperature Range:

5° to 55°C

Power Input:

115/230 VAC $\pm 10\%$, 50-60 Hz

Cooling:

Forced Air

Size:

3 1/2 x 17 x 19 1/2 inches

Weight:

32 pounds

1.3 PRINCIPLES OF OPERATION

Refer to the block diagram, Figure 1-2.

The Frequency Synthesizer, in conjunction with the controlled instrument, forms a closed loop system with digital frequency control. The synthesizer contains two variable frequency sources which are a comb generator and a low frequency synthesizer, both referenced to an oven controlled 5 MHz crystal oscillator. The composite signal from these two sources becomes the reference to which the YIG Oscillator in the controlled instrument is phased-locked.

Input frequency data enters the microprocessor from the keyboard, where it is translated to control signals for the comb generator, low frequency synthesizer and a coarse tune D/A.

The most significant digits of the input data are used to select an appropriate 200 MHz comb line in the frequency

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