

Fastbit

FB2000A Frequency Tunable Carrier/Noise Test System

AEROFLEX
A passion for performance.



Accurate, comprehensive generation of RF channel impairments for the testing of RF communications systems and equipment.

- Windows NT interface
- Generation of Gaussian Noise with selectable channel bandwidths from 6 MHz to wideband
- Frequency tunable noise, selectable for Carrier frequencies in the range between 5 MHz to 2.4 GHz, in one instrument
- Accurate and repeatable setting of Carrier to Noise as well as Interference, such as Co-Channel and Adjacent Channel
- High accuracy, wide dynamic range for testing BER versus SNR (i.e. Eb/No)
- Selectable Burst Noise profiles
- TDMA timing for BER testing and Flat Fading carrier profiles
- C/I setting for up to 4 external Interferers, plus Carrier to Noise

BROADBAND IMPAIRMENT GENERATION PROBLEMS AND SOLUTIONS

The broadband communications age has been created by several factors: advancement in signal processing technology, new radio frequency spectrum allocations, as well as today's insatiable desire for information services. RF communication technology in the CATV, satellite, DTV, MDS, and wireless market spaces has driven the need for accurate, comprehensive generation of RF channel impairments such as noise and interference.

NOISE AND RF INTERFERENCE GENERATION

To meet the requirements of contemporary digital demodulator testing, a noise and interference test set must meet the following criteria.

Carrier to Noise PLUS Interference

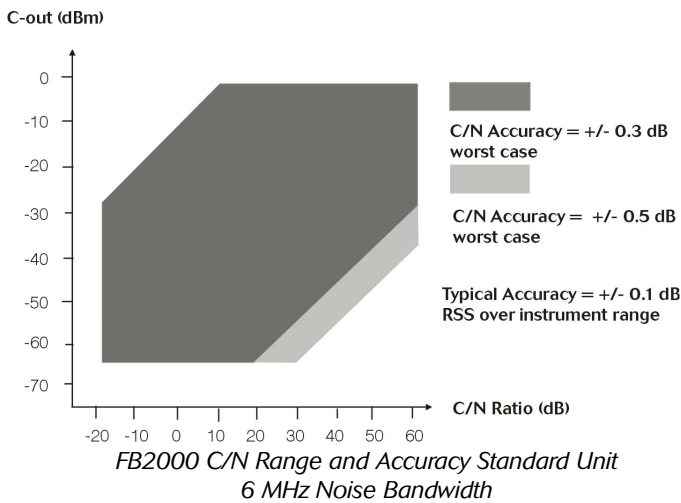
Realistic generation of real-world ambient conditions in the lab requires simultaneous level setting and summing of in-band and out-of-band impairments, along with accurately ratioed carrier and noise. The Fast Bit FB2000A provides this capability with up to four external analog or digital RF impairments. These external interferer signals can be added anywhere in the 5 MHz to 2.4 GHz spectrum, and ratioed to the carrier with 0.1 dB resolution and 0.1 dB typical accuracy thus supporting co-channel, adjacent channel and total interferer power test requirements. Industry standard conformance tests for BER can be run from this instrument without the use of external RF attenuators, combiners or additional test fixtures.

Frequency Tunable Noise

Inherent in the FB2000A architecture is its frequency tunable noise source. The instrument's frequency synthesizer facilitates noise addition in five user-selectable bandwidths at any frequency from 5 MHz to 2.4 GHz. This capability supports current and future demodulator IF and RF input frequencies, without the need for external frequency translation. Demodulator BER test procedures often specify carrier input amplitude, as well as carrier to noise ratio settings. By adding noise directly at RF, the carrier level, as well as C/N ratio, can be set internally to the FB2000A eliminating the need for additional external attenuation. For automated measurements, this simplifies testing considerably. Finally, broadband noise sources are avoided by using a frequency agile approach

For the very latest specifications visit www.aeroflex.com

to achieve wideband frequency coverage. Because narrower and flatter noise filters can be used in the test set, enhanced carrier to noise ratio accuracy is achieved.



MIXED IMPEDANCE OPERATION

Wideband 75 and 50 Ohm dual-inputs ease the test set's use in mixed impedance environments.

HIGH ACCURACY, WIDE RANGE Eb/No, OVER LARGE CARRIER DYNAMIC RANGE

Even at high carrier output power the FB2000A is equipped with ample noise power to set low carrier to noise ratios. By matching noise bandwidths to the bandwidth of the test object, high in-band noise densities are achievable without overloading the test device's front end. In contrast, the instrument's proprietary technology also allows setting of high carrier to noise ratios at carrier power levels as low as -70 dBm, while maintaining the instrument's intrinsic accuracy. This is particularly useful for low data rate applications, e.g. VSAT, cellular, etc.

BURST NOISE

Upstream cable and digital TV transmission require error-free demodulator performance in the presence of burst noise. The FB2000A allows both internal and external setting of burst noise duration and arrival times. The user can also control gating of the noise source by supplying an external TTL signal. For full duplex transmission when noise addition is desired in both the upstream and downstream paths, a two channel configuration of the FB2000A is available.

CARRIER AND INTERFERER FLAT FADING

A receiver's AGC is designed to mitigate rapid carrier power fluctuations caused by rainfall or other path obstructions. To simulate this effect, the FB2000A allows the user to program a desired C/N ratio, and then adjust the carrier path attenuation with sinusoidal or triangle wave profiles while keeping the noise level fixed. Alternatively, interferer or noise signal levels can be varied using the same approach, while keeping the carrier level fixed. This is can be useful for simulating the effects of interference introduced by unknown sources.

SPECIFICATION

CARRIER PATH

Frequency Range

5 MHz to 2.4 GHz (base unit is 5 MHz to 1 GHz)

Attenuation

to -62 dB in 0.1 dB increments

Range of Carrier Input Power (C-in)

-50 dBm to 0 dBm

Range of Carrier Output

C-out max < 0 dBm or C-in, whichever is less

Power (C-out)

C-out min to -70 dBm, depends on C-in power level

Power (C-out, cellular low power option)

C-out min to -130 dBm

C-out Absolute Power

± 1.0 dB

C-in Power Tracking Range

± 5 dB

Input Impedance/Connector

50 Ohm BNC/SMA and 75 Ohm BNC, Selectable

Output Impedance/Connector

50 Ohm BNC/SMA and 75 Ohm BNC, Selectable

Two Tone IP3

+21 dBm, input and output

NOISE PATH

Max Noise Output Power

-10 dBm

Selectable Filtered Noise Bands

6 MHz Flat, NBW approx. 8 MHz

12.5 MHz Flat, NBW approx. 14 MHz

25 MHz Flat, NBW approx. 40 MHz

50 MHz Flat, NBW approx. 80 MHz

100 MHz Flat, NBW approx. 170 MHz

200 MHz Flat, NBW approx. 350 MHz (OP220 replaces 100 MHz)

500 MHz Flat, NBW approx. 870 MHz (OP220 replaces 100 MHz)

5 MHz to 2.4 GHz (base unit is 5 MHz to 1 GHz), wideband noise generator

Noise Spectral Density Flatness

± 0.3 dB, 6 MHz

± 0.3 dB, 12.5 MHz

± 0.4 dB, 25 MHz

± 0.5 dB, 50 MHz

± 0.6 dB, 100 MHz

Noise Power Step Size

0.1 dB

Noise Crest Factor

18 dB minimum

Noise Center Frequency

5 MHz to 2.4 GHz (base unit is 5 MHz to 1 GHz), 100 kHz steps

Accuracy of C/N

0.1 dB RSS, see chart on page 2 for worst case

Noise Out Absolute Power in Noise Source Only Mode

±0.1 dB

INTERFERER PATH (SPECIFICATIONS APPLY TO EACH INTERFERER INPUT)

Frequency Range

5 MHz to 2.4 GHz (base unit is 5 MHz to 1 GHz)

Max Interferer Output Level

0 dBm

Attenuation

0 to -81 dB in 1.0 dB Steps

Interferer Step Size

0.1 dB

Accuracy of C/I

0.1 dB typical

Impedance/Connector

50 ohm BNC/SMA or 75 Ohm BNC at interferer inputs-factory installed selection

Interferer Inputs

2 inputs. Additional option of up to 4 inputs, 2 inputs summed together using a power combiner. Typically used for total power measurements such as that defined in the DOCSIS TP-ATP Downstream BER (PHY07) Section 2.1.7.

BURST NOISE

Duration

(internal) 100 nsec - 500 msec

(external) 100 nsec minimum

Repetition rate

(internal) 1 Hz - 5 MHz

(external) 5 MHz maximum

FLAT FADING

Waveform

Sinusoidal

Sawtooth

Fading Depth

0.1 dB to 20 dB

Period

1 ms to 100 s

COMMUNICATIONS INTERFACES

RS232C (2), IEEE488.2, PARALLEL

PHYSICAL

Weight

18kg (40 lbs)

Size

Height	Width	Depth
210 mm	410 mm	510 mm
8"	16"	20"

VERSIONS AND ACCESSORIES

When ordering please quote the full ordering number information.

Ordering

Numbers

FB2000A

Versions

Base Unit, Frequency Tunable Carrier/Noise Source Test System. 5 MHz to 1.0 GHz. Use Extended Frequency Options to exceed 1.0 GHz ranges.

OPTIONS AND ACCESSORIES

FB2000 OP205

Extended Frequency Range (5 MHz - 2.4 GHz) used with base unit. This is not an additional noise source.

FB2000 OP206

IEEE-448 (GPIB)

FB2000 OP210

*Frequency Tunable Carrier to Noise Module (5 MHz - 1.0 GHz)

FB2000 OP215

*Frequency Tunable Carrier to Noise Module (5 MHz - 2.4 GHz)

* These are additional noise sources. Select any one of these frequency ranges for the second channel noise source.

FB2000 OP220

200 MHz Bandwidth Filter for C/N; replaces the standard 100 MHz filter. Must have OP210 or OP215 installed.

FB2000 OP220A

500 MHz Bandwidth Filter for C/N; replaces the standard 100 MHz filter. Must have OP210 or OP215 installed.

FB2000 OP225

C/I Internal Ratio Setting for two external impairments. Specify for noise source installed.

FB2000 OP225B

Additional two inputs for C/I Ratio external impairments. (Total of 4 inputs - 2 summed pairs). Must have OP225 installed. Specify for each instance of OP225.

FB2000 OP226

75 Ohm BNC Connectors on the Interferer Inputs. The Interferer Input is 50 Ohm standard.

FB2000 OP227

SMA Connectors on the front panel carrier input and carrier to noise output for 1 GHz versions. Normally BNC.

FB2000 OP229

Internal Burst Noise. Burst/Ingress Noise

FB2000 OP229B

External Burst Noise

FB2000 OP230

Broadband Noise Loading. Used to simulate RF front end

FB2000 OP240

Low Power Option. For power as low as -130 dBm. Either OP240 or OP240B may be installed, not both.

- FB2000 OP240B Large Negative SNR Settings Option. Allows the setting of large, negative C/N, C/I ratios. Either OP240 or OP240B may be installed, not both.
- FB2000 OP248 Flat Fading. Interferer, Carrier and Noise Flat Fading
- FB2000 OP249 TDMA. Allows C/N and C/I setting on burst signals and allows C/N or C/I setting on a TDMA signal.

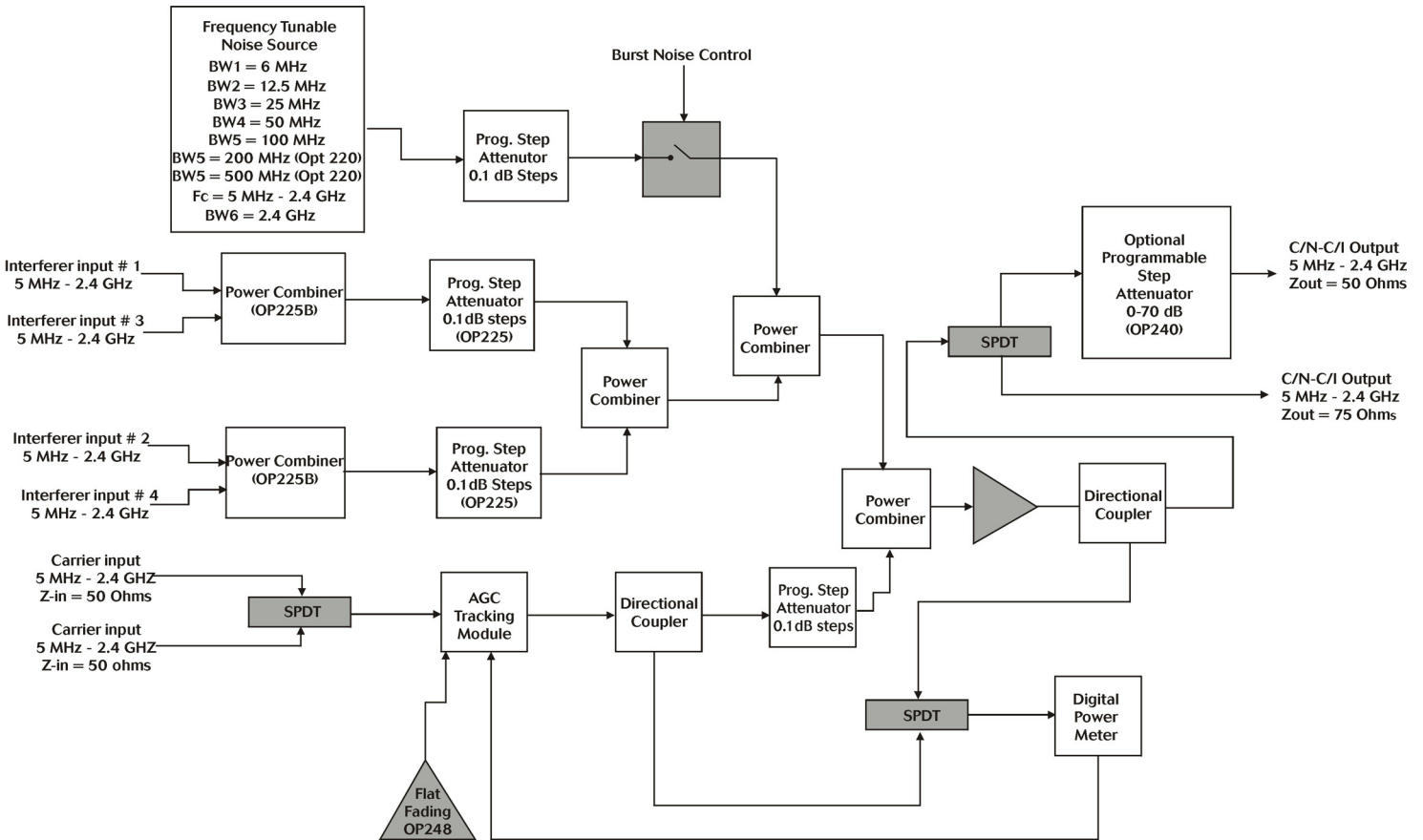
WARRANTY Two years

Operating Manuals

Operating manuals are supplied on CD ROM only.

For printed manuals order the following part number.

FB ACC320 Operating manual for FB2000A



Block Diagram

CHINA Beijing
Tel: [+86] (10) 6539 1166
Fax: [+86] (10) 6539 1778
CHINA Shanghai
Tel: [+86] (21) 5109 5128
Fax: [+86] (21) 5150 6112
FINLAND
Tel: [+358] (9) 2709 5541
Fax: [+358] (9) 804 2441
FRANCE
Tel: [+33] 1 60 79 96 00
Fax: [+33] 1 60 77 69 22

GERMANY
Tel: [+49] 8131 2926-0
Fax: [+49] 8131 2926-130
HONG KONG
Tel: [+852] 2832 7988
Fax: [+852] 2834 5364
INDIA
Tel: [+91] 80 5115 4501
Fax: [+91] 80 5115 4502
KOREA
Tel: [+82] (2) 3424 2719
Fax: [+82] (2) 3424 8620

SCANDINAVIA
Tel: [+45] 9614 0045
Fax: [+45] 9614 0047
SPAIN
Tel: [+34] (91) 640 11 34
Fax: [+34] (91) 640 06 40
UK Burnham
Tel: [+44] (0) 1628 604455
Fax: [+44] (0) 1628 662017
UK Cambridge
Tel: [+44] (0) 1763 262277
Fax: [+44] (0) 1763 285353

UK Stevenage
Tel: [+44] (0) 1438 742200
Fax: [+44] (0) 1438 727601
Freephone: 0800 282388
USA
Tel: [+1] (316) 522 4981
Fax: [+1] (316) 522 1360
Toll Free: 800 835 2352



As we are always seeking to improve our products, the information in this document gives only a general indication of the product capacity, performance and suitability, none of which shall form part of any contract. We reserve the right to make design changes without notice. All trademarks are acknowledged. Parent company Aeroflex, Inc. ©Aeroflex 2006.

www.aeroflex.com
info-test@eroflex.com



Our passion for performance is defined by three attributes represented by these three icons: solution-minded, performance-driven and customer-focused.