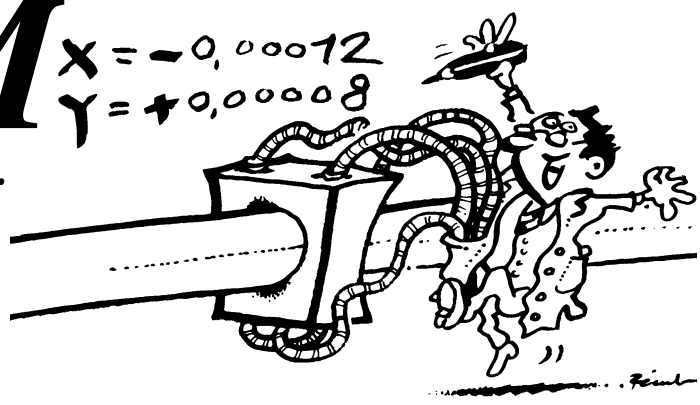


BB-BPM

$$X = -0,00012$$

$$Y = +0,00008$$

BaseBand Beam Position Monitor



- Designed for cancer therapy synchrotrons
- Ideal for heavy ion synchrotrons
- Tracks the beam during the energy ramp

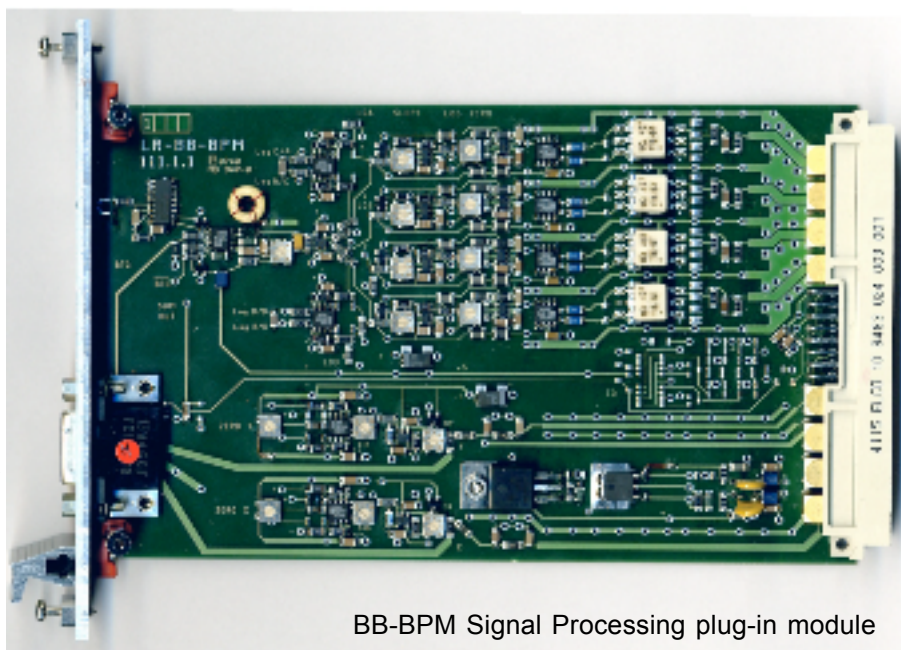
The BaseBand BPM is a beam position monitor with high-impedance front-end amplifiers designed for stripline or shoebox BPM pickups. It operates from 0.7 to 11 MHz.

Output signals are analog voltages:
X&Y narrowband outputs for close orbit measurement: $\pm 2V$

X&Y wideband outputs for machine study, to see orbit changes or instabilities during the ramp: $\pm 2V$

Cable length matching is not required: pickup signals don't need to be in phase.

Front-end amplifiers are powered via the RF signal coaxial cables.



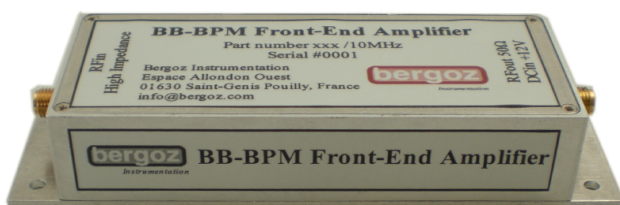
BB-BPM Signal Processing plug-in module

Front-end Filter & Amplifier BB-FEFA

Four BB-FEFA are required for each BB-BPM plug-in module; one per pickup. BB-FEFA was specifically developed to measure low-intensity ion beams. Its high input impedance collects a maximum of signal from stripline or shoebox pickups.

BB-FEFA input consists of parallel FET transistors in cascode with a bipolar transistor. This design features noise equivalent to the thermal noise of 50 ohms at 156°K.

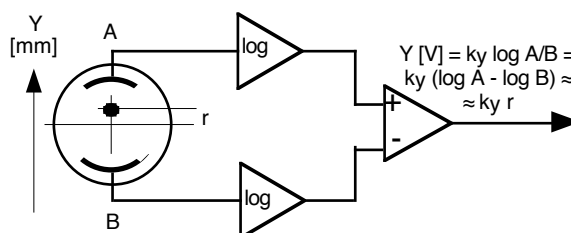
It is powered from the BB-BPM plug-in module via the coaxial cable. It is best to install it close to the pickups.



BB-FEFA Front-end Filter & Amplifier

Operating principle

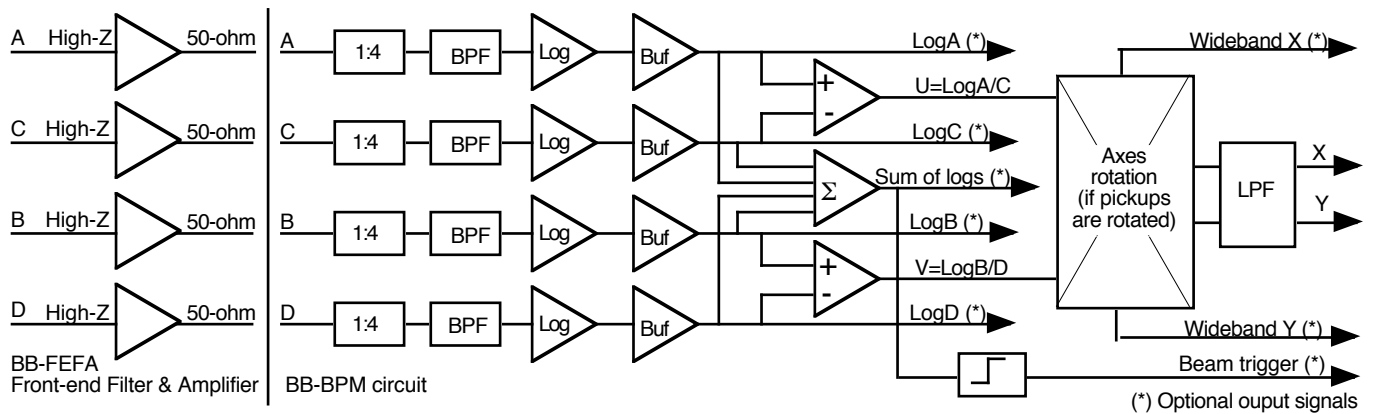
Based on the pioneering work of Robert E. Shafer at Los Alamos Laboratory, the Log-Ratio BPM derives beam position from logarithm of the ratio of opposite pickup signals: $\text{Log}(A/B)$.



Position measured by this method is more linear, over a wider range, than difference-over-sum.

BB-BPM module was developed by Alexander Kalinin and later redesigned by Sebastien Artinian. It is based on Robert E. Shafer original concept.

Block diagram



Specifications

Measures X&Y position of a continuous beam ramped in the 0.7 MHz to 11 MHz range.

Beam intensity range > 110 dB

Frequency range 0.7 to 11 MHz

Input signal -130dBm to -20dBm operating range

Outputs Narrowband X and Y (0...200 Hz):
-2V...0...+2V, 40mA max.,
for high-impedance readout.

Wideband X and Y (0...5MHz):
-2V...0...+2V, 40mA max.,
for 50-ohm readout.

Optional outputs Sum of logs: 0...+2V, 40mA max
LogA, LogB, LogC and LogD
Beam Trigger

X and Y gains 1.5V = 1/2 of radius for orthogonal pickups
1.0V = 1/2 of radius for rotated pickups

Input noise 156°K temperature noise at BB-FEFA input

Output noise Narrowband output: <0.1% of pickup radius
e.g. 100um rms in 100 mm radius.

Wideband output:<1% pickup radius.
e.g. 1mm rms in 100 mm radius.

Temperature drift 300 ppm/K of pickup radius/
e.g. 30u3m/K in 100 mm radius

Power supply +/- 8V, <10W including 4 x BB-FEFA

Dimensions

BB-BPM is 3U-high x 160mm shielded Euromodule, 20-mm wide.
BB-FEFA is a shielded metal box with four 3-mm mounting holes.
BPM-RFC is a 19" x 3U-high chassis.

Ordering information

BB-BPM BB-BPM plug-in module
BB-FEFA Baseband Front-end Filter & Amplifiers
(4 units per BB-BPM are required:
One per pickup).

On-board factory-installed options:

BB-BPM-TRG Beam Trigger
BB-BPM-SUM Sum of log (A,B,C,D)
BB-BPM-ABCD Direct Log(A,B,C,D) wideband outputs

Accessories:

BPM-RFC/xx RF-chassis with xx≤16 stations
19" rack-mountable 3U-high EMI-
RFI-shielded chassis for 100~240V
50~60Hz mains power.
BPM-C/xx Coaxial RF 50-ohm Radox cable
with SMA connectors and common-
mode filter, VNA-tested, xx-meter long
BPM-KIT Tabletop test kit.
Pickup inputs on SMAs.
Outputs on BNCs.
BPM-XTD Module extender card.
BPM-SERV/RF RF service module.
Passive module. Brings the pickup
signals from the back connectors to
front panel BNCs.

Distributors

U.S.A.: GMW Associates
955 Industrial Rd.
San Carlos, CA 94070, U.S.A.
Fax: (650) 802-8298 - Tel.: (650) 802-8292
sales@gmw.com

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28-3 Kita Otsuka 1-Chome
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Instrumentation