Fast filter amplifier

Model **NCB226.**

WARRANTY

NAICAM S.R.L. warrants this product to be free from defects in material and workmanship for a period of 1 year from date of shipment from headquarter in Italy.

NAICAM SRL warrants the following items for one year from the date of shipment: probes, cables, and documentation of specified equipment.

During the warranty period, we will, at our option, either repair or replace any product that proves to be defective.

To exercise this warranty, write or call your local NAICAM SRL representative, or contact NAICAM SRL headquarters in Italy. You will be given prompt assistance and return instructions. Send the product, transportation prepaid, to the indicated service facility. Repairs will be made and the product returned, transportation prepaid. Repaired or replaced products are warranted for the balance of the original warranty period.

LIMITATION OF WARRANTY

This warranty does not apply to defects resulting from product modification without NAICAM SRL express written consent, or misuse of any product or part.

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NAICAM srl, NOR ANY OF ITS EMPLOYEES SHALL BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF ITS INSTRUMENTS AND SOFTWARE EVEN IF NAICAM SRL, HAS BEEN ADVISED IN ADVANCE OF THE POSSIBILITY OF SUCH DAMAGES. SUCH EXCLUDED DAM- AGES SHALL INCLUDE, BUT ARE NOT LIMITED TO: COSTS OF REMOVAL AND INSTALLATION, LOSSES SUSTAINED AS THE RESULT OF INJURY TO ANY PERSON, OR DAMAGE TO PROPERTY.


NAICAM
NCB226
20
50
100
200
500
out
INT. TIME (ns)
FINE GAIN
GAIN X
100
60
40
20
10
200
out
PLR
DIFF. TIME (us)
Pos.
Neg.
INPUT
Vos.
OUT
Fast
Amplifier

1. GENERAL DESCRIPTION.

1.1 DESCRIPTION .

The Module NCB226 Timing filter amplifier is especially designed to shape pulses and permit optimizing the signal to noise ratio for timing measurements. This module can receive input signal directly from the preamplifier output.

The fast rise time, high output drive, and high gain capabilities of the module NCB226 make it useful for other applications utilizing low-gain photomultiplier tubes. The parameters the pole-zero cancellation and the time-invariant baseline restorer (only in optional version NCB226B) permit use this module in energy spectroscopy with scintillation detectors and Si charged particle detectors at ultra-high count rates.

1.2 FUNCTIONAL BLOCK DIAGRAM.

The module has 3 basic circuits low noise input amplifier with differentiation time constant control of the pulse circuit, amplification circuit and integration time constant to control circuit. The base line circuit is optional and can be integrated in NCB226B version.

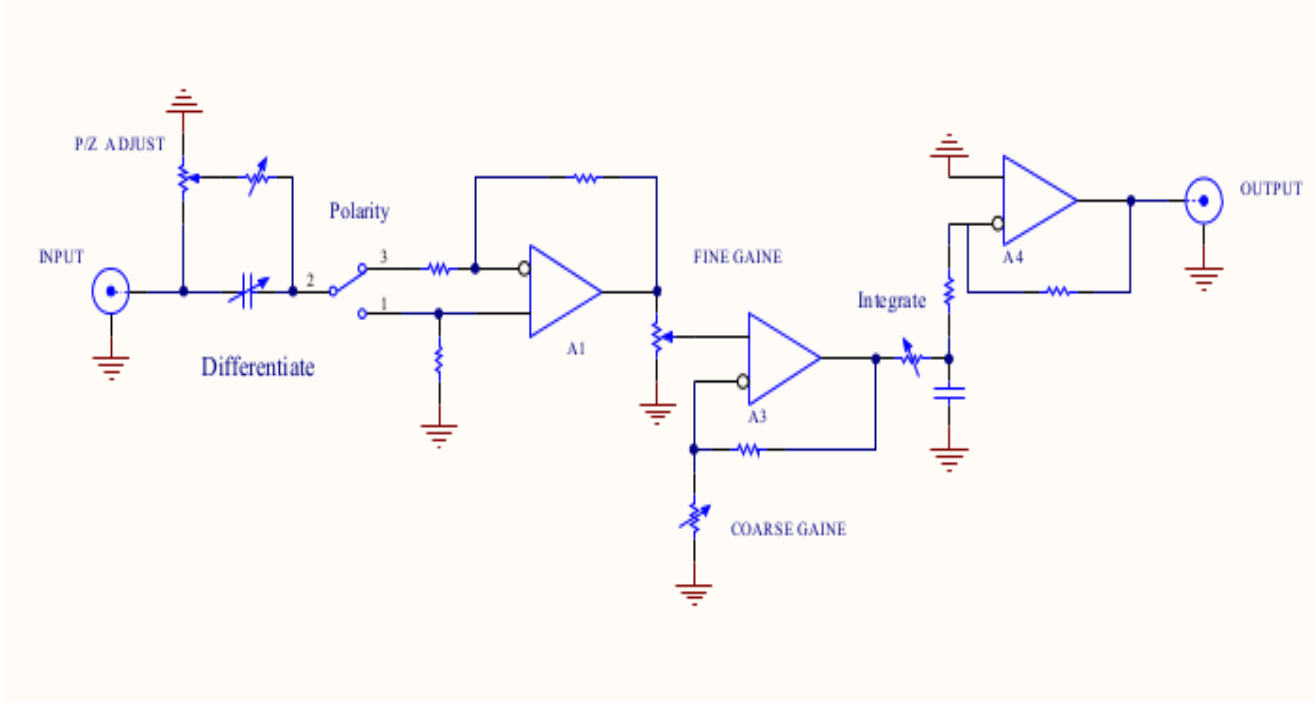

Fig. 1. Block Diagram of the NCB226 Fast-Filter Amplifier.

1.3 PERFORMANCE.

INPUT AMPLITUDE RANGE	0 to ±1 V signal, 0 to ±5 V DC offset; maximum input ±5 V total.
OUTPUT AMPLITUDE RANGE	0 to ±10 V without termination. The output can be terminated to 50-**Ω** load.
NOISE RMS	(maximum gain, with filter out) referred to the input is ≤30 µV; Input RMS noise referred to input with 200 ns integration and differentiation is less then 6 uV (positive switch position), 8 uV (negative switch position)
RISE TIME	≤10 ns with filter Out or x2.2 **τ** for other selections.
NONLINEARITY	≤±0.05% not over ±10 V range. Variation of nonlinearity in over range signal is less then 0,1%.
TEMPERATURE INSTABILITY	DC Level ≤±25 µV/C referred to the output (in range 0 to 50°C).
COARSE GAIN	Front-panel 6-position switch for selection of x10, x20, x40, x60, x100, or x200.
GAIN STABILITY	less then 0,04 %/C in full range.
FINE GAIN	Front-panel single-turn potentiometer, continuous from x0,9 to x2
POLE ZERO ADJ (PLR)	Front-panel screwdriver adjustment to compensate for the preamplifier decay time constant from 25us to ∞.
TIME CONSTANT	Two 6-position switches on front panel: Integrate RC time constants: Out (about 7 ns), 20, 50, 100, 200, and 500 ns. Differentiate RC time constants:

	Out (about 0.2 ms), 20, 50, 100, 200 and 500 ns.
Pos./Neg.	Selects inversion or non inversion of the input signal.
INPUT	Positive or negative polarity selectable by front-panel switch; amplitude 0 to ±1 V; protected to ±6 V DC; impedance 50 **Ω**, DC-coupled; front-panel BNC connector. Accepts a ±5 V DC maximum input signal.
OUTPUT	Front-panel BNC connector. Amplitude 0 to ±10 V (without termination); Output impedance Zo = 100 **Ω**, rise time ≤10 ns for filter out (2.2 **τ** filter selections).
OUTPUT ZERO ADJ (Vos)	Front-panel screwdriver adjustment to compensate output offset in range +/- 100 mV. In optional version this front panel screwdriver adjustment regulate automatic base line restorer threshold (BLZ).
PREAMPLIFIER POWER	Rear-panel standard power connector.

2. TECHNICAL SPECIFICATIONS.

2.1 OPERATING INSTRUCTIONS.

Signal Polarity control.

Pos./Neg Selects inversion or non inversion of the input signal.

Gain control.

COARSE GAIN on the front-panel is 6-position switch for selection of x10, x20, x40, x60, x100, or x200.

FINE GAIN on the front-panel is 10-turn potentiometer, continuous from x0,9 to x2

Time Constant control.

One 6-position switch on front panel control Integrate RC time constants:
Out (about 7 ns), 20, 50, 100, 200, and 500 ns.

One 6-position switch on front panel control Differentiate RC time constants:

Out (about 0.2 ms), 20, 50, 100, 200, and 500 ns.

Front-panel Pole zero control screwdriver adjustment to compensate for the preamplifier decay time constant from 25us to ∞ (PLR).

Buffer output offset control.

Near to Output BNC connector there is screwdriver On the front-panel adjustment to compensate output offset in range +/- 100mV (Vos).
Note: In optional version this front panel screwdriver adjustment regulate automatic base line restorer threshold (BLZ).

2.2. INPUT/OUTPUT CONNECTIONS AND SIGNAL CHARACTERISTICS.

The input impedance of the Model 226 is 50 **Ω** and provides a suitable termination for 50 **Ω** coaxial cable. Output connector can be terminated with a impedance of 50 **Ω** /100 **Ω**.

INPUT has impedance 50 **Ω**, DC-coupled; front-panel BNC

Input amplitude range from 0 to ±1 V signal, 0 to ±5 V DC offset; absolute maximum range of input signal is ±12 V.

OUTPUT AMPLITUDE RANGE 0 to ±5 V with a 50-**Ω** load.

OUTPUT Front-panel BNC connector. Can be terminated to 50 or 100 (93) ohm .

Maximum operation output amplitude 0 to ±10 V (without termination); rise time ≤10 ns for filter out (2.2 **τ** filter selections).

2.3 INTERNAL HARDWARE SETTINGS.

There not are any internal settings in Model NCB226 module.

2.4 POWER REQUIREMENTS.

The NAICAM Model 226 operates only with ±12 V power that must be furnished from a nuclear standard NIM crate with power supply such as the NCB305 or NCB150 series. If the equipment is to be rack mounted, be sure that there is ventilation to prevent any localized heating of the components. The temperature of the equipment mounted in racks could not exceed the limit of 50°C.

P. Voltage (V)	Current (mA)
+12	96
-12	96

Module provide DSUB 9 connector for connection one preamplifier.
Connector has standard pin out and provide +/-24V, +/-12 V.

Power supply pin out:

Pin number	Function
7	+24 Volt
6	-24 Volt
4	+12 Volt
9	-12 Volt
1	Ground
2	Ground

.

Bin/Module Connector Pin Assignments
For Standard Nuclear Instrument
Modules per DOE/ER-0457T.

PIN	Function	PIN	Function
1	+3 V	23	Reserved
2	- 3 V	24	Reserved
3	Spare bus	25	Reserved
4	Reserved bus	26	Spare
5	Coaxial	27	Spare
6	Coaxial	28	+24 V
7	Coaxial	29	- 24 V
8	200 V DC	30	Spare bus
9	Spare	31	Spare
10	+6 V	32	Spare
11	- 6 V	33	117 V AC
12	Reserved bus	34	Power return ground
13	Spare	35	Reset (Scaler)
14	Spare	36	Gate

15	Reserved	37	Reset (Auxiliary)
16	+12 V	38	Coaxial
17	- 12 V	39	Coaxial
18	Spare bus	40	Coaxial
19	Reserved bus	41	117 V AC (neutral)
20	Spare	42	High-quality ground
21	Spare	G	Ground guide pin
22	Reserved		

2.5 Dimensions and weight.

NIM-standard single-width module 3.43 X 22.13 cm.

WEIGHT
0,78 kg.

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