

BM 121N

BM 221N

BM 321N

PRECISION PREAMPLIFIERS

The BM 121 series are precision preamplifiers designed to operate with general purpose operational amplifiers to drastically decrease DC errors. Drift, bias current, common-mode and supply rejection are more than a factor of 50 better than standard op amps alone. Further, the added DC gain of the BM 121 decreases the closed loop gain error. The operating current is programmable from 5 μ A to 200 μ A so bias current, offset current, gain and noise can be optimized for the particular application while still realizing very low drift. Super-gain transistors are used for the input stage so input error currents are much lower than conventional amplifiers at the same operating current. Further, the initial offset voltage is easily nulled to zero.

The extremely low drift of the BM 121 will improve accuracy on almost any precision DC circuit. For example, instrumentation amplifiers, strain gauge amplifiers and thermocouple amplifiers using chopper amplifiers can be made with the BM 121. Low noise, full differential input, high common-mode rejection ratio, low power drain and small size offer substantial advantages over choppers. The devices are directly interchangeable with LM 121, LM 221, LM 321 types.

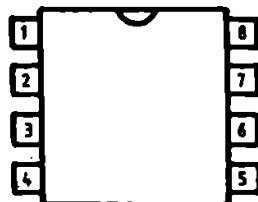
Features

- Operating temperature BM 121N ... -55 ... +125 °C
BM 221N ... -25 ... + 85 °C
BM 321N ... 0 ... + 70 °C
- Input stage op. current, I_{set} 5 ... 200 μ A
(I_{set} = programmable, I_{set} = 600 mV / R_{set})
- Input offset voltage BM 121N, BM 221N ... max. 0.7 mV
(externally adj. to zero) BM 321N ... max. 1.5 mV
- Input bias current typ I_{set}/2000
- Common-mode rejection ratio min. 120 dB
- Supply voltage rejection ratio min. 120 dB
- Supply current typ. 400 μ A
- Input offset voltage drift max. 1uV/oC
(VOS nulled externally)



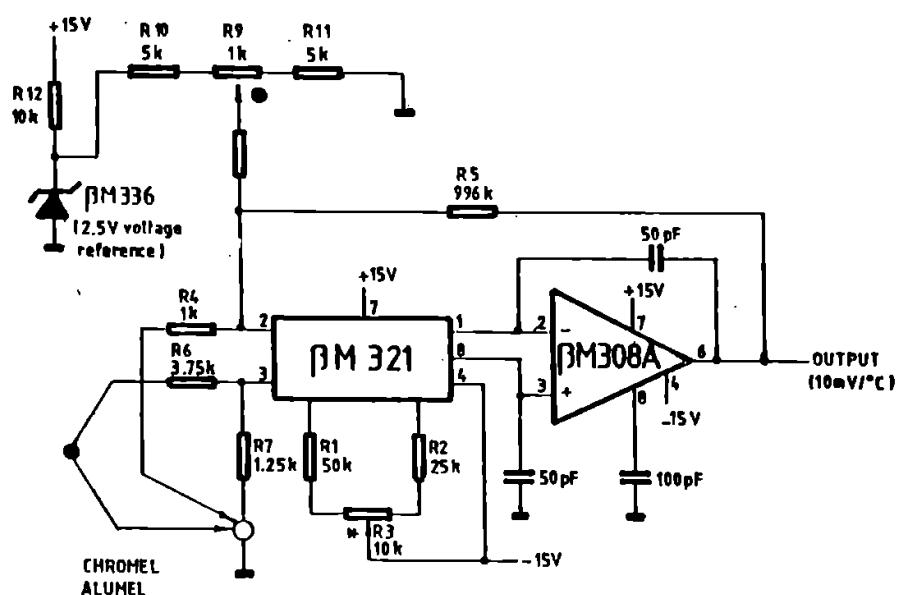
BM 121N ; BM 221N ; BM 321N (cont.)

- 1. Output 2
- 2. Input 1
- 3. Input 2
- 4. V-
- 5. R SET/Balance
- 6. R SET/Balance
- 7. V+
- 8. Output 1



PACKAGE MP-48 / TOP VIEN

Typical application



**THERMOCOUPLE AMPLIFIER WITH
COLD JUNCTION COMPENSATION**

BM 121N ; BM 221N ; BM 321N (cont.)

Calibration procedure :

* Set for T amb [°K] x 10 mV/°K at output with voltage reference (BM 336) shorted (for example, at 25 °C ambient temperature, output should equal 2.98 V).

Adjust for output reading in °C.

Remarks :

1. This is a minimum part count application in which BM 321 performs both signal amplification and cold junction compensation. This is possible due to the theoretical relationship between the offset voltage and drift. When the offset is not nulled to zero. The drift of the amplifier is then used to compensate the thermocouple for ambient variations.

2. The BM 336 provides a temperature stable voltage reference for offsetting the output to read directly in degrees centigrade. It can be replaced by any voltage reference device provided that appropriate changes are made in the resistor voltage divider string R9, R10, R11.

3. Calibration is independent of thermocouple type; however, circuit values are for chromel alumel. R6 and R7 must be changed for different thermocouples.