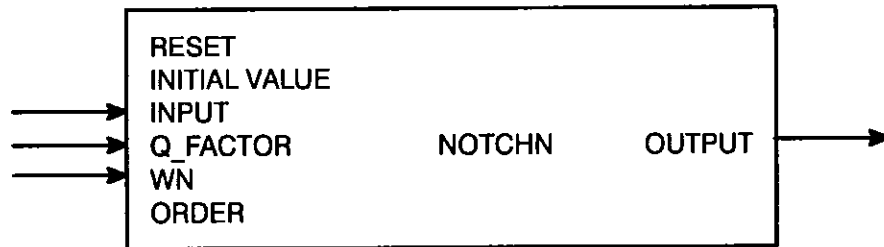


# 48.0 NOTCHN (Nth Order Notch Filter)

This function can be used in UDC Control Block tasks only. It cannot be used in AutoMax Control Block tasks.



## Function

This function provides a notch filter to attenuate input frequencies that are at the notch frequency in UDC tasks. The order parameter can be used to change the sharpness of the notch. The width and depth ratio of the notch can be affected by the Q factor.

$$\text{LAPLACE TRANSFER FUNCTION} = \frac{(s^{**2} + \omega^{**2})^{**i}}{(s^{**2} + s\omega/Q + \omega^{**2})^{**i}}$$

note: for ORDER = 2, 4, i will be 1, 2

## Program Statement

```
CALL NOTCHN( INPUT = input%,           &
             Q_FACTOR = q_factor%,     &
             WN = wn,                  &
             ORDER = 2 or 4            &
             INITIAL_VALUE = initial_value%, &
             RESET = reset@,           &
             OUTPUT = output% )
```

## Inputs

RESET =

BOOLEAN output reset. The default for this parameter is FALSE. This parameter will hold OUTPUT to INITIAL\_VALUE when TRUE.

INITIAL\_VALUE =

INTEGER initial value. The default for this parameter is zero. When RESET = TRUE, OUTPUT will equal INITIAL\_VALUE.

INPUT =

INTEGER signal input. This parameter must be specified. There is no default.

Q\_FACTOR =

REAL filter Q factor. Equal to  $1/(2 * \text{damping factor})$ . This parameter must be specified. The range is 0.5 to 100.0. You must include a decimal point in the actual value.

WN =

REAL notch filter center frequency in radians/second. This parameter must be specified. You must include a decimal point in the actual value.

ORDER =

Order of the filter transfer function. The default for this parameter is 2. If you specify this parameter, it must be a literal value (2 or 4).

## Outputs

OUTPUT =

INTEGER signal output. This parameter must be specified.

### 48.1 NOTCHN $\omega_n$ Limitations

$\omega_n$  low limit depends on the order.

$\omega_n$  must be equal to or less than  $0.999c$  divided by  $T$ .

$$\text{Low Limit} = \begin{array}{cc} \text{2nd Order} & \text{4th Order} \\ \frac{.02}{T} & \frac{.3}{T} \end{array}$$

$$\text{High Limit} = \frac{0.999\pi}{T}$$

where:

$T$  = scan period in seconds

= number of CPU clock ticks times 0.0005 seconds