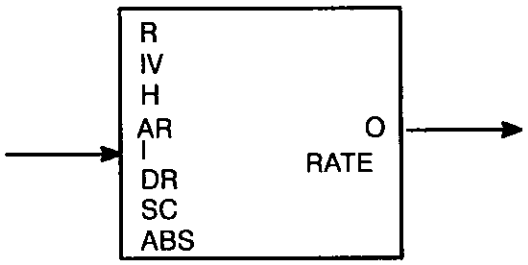
22.0 RAMP

This function can be used in AutoMax Control Block tasks and UDC Control Block tasks.



Function

For a change in INPUT, OUTPUT will ramp toward the new INPUT value. During steady state operation, OUTPUT = INPUT.

Two types of RAMP generators are provided: a normal (algebraic) ramp and an absolute value ramp. For a normal ramp, the accel condition is defined by an input that is becoming more positive, and a decel condition is defined by an input that is becoming more negative. For an absolute value ramp, the accel condition is defined by an input moving away from zero, and a decel condition is defined by an input moving towards zero.

Program Statement

```
CALL RAMP(INPUT = input%,                          &
    ABS_RAMP = TRUE/FALSE,                         &
    RESET = reset@,                                &
    INITIAL_VALUE = initial_value%,                &
    HOLD = hold@,                                  &
    ACCEL_RATE = accel_rate%,                      &
    DECEL_RATE = decel_rate%,                      &
    SCALE = nnnnn,                                 &
    OUTPUT = output%,                              &
    RATE = rate%)
```

Inputs

R (RESET) =

BOOLEAN ramp reset. The default for this parameter is FALSE. This parameter will hold OUTPUT to INITIAL_VALUE when TRUE. The internal ramp register is also reset.

IV (INITIAL_VALUE) =

INTEGER initial ramp value. The default for this parameter is zero. When RESET = TRUE, OUTPUT will equal INITIAL_VALUE.

H (HOLD) =

BOOLEAN ramp hold. The default for this parameter is FALSE. This parameter will hold OUTPUT at its current value. OUTPUT will continue to ramp from that value when HOLD is FALSE.

AR (ACCEL_RATE) =

INTEGER acceleration rate (in units of counts per scan). The absolute value of this input is performed to obtain the acceleration rate. The default for this parameter is 32767.

I (INPUT) =

INTEGER signal input. This parameter must be specified.

DR (DECEL_RATE) =

INTEGER deceleration rate (in units of counts per scan). The absolute value of this input is performed to obtain the deceleration rate. The default for this parameter is 32767.

SC (SCALE) =

INTEGER scale factor for both ACCEL_RATE and DECEL_RATE. The default for this parameter is 1. This parameter must be entered explicitly as a numeric literal and, therefore, cannot be modified while the task is active. This parameter must be positive between 1 and 32767 inclusive.

ABS (ABS_RAMP) =

BOOLEAN ramp type. The default for this parameter is TRUE. If programmed, it must be entered explicitly as a boolean literal and, therefore, cannot be modified while the task is active. If TRUE, the block will function as an absolute value ramp; otherwise, it will function as a normal (algebraic) ramp.

Outputs

O (OUTPUT) =

INTEGER signal output. This parameter must be specified.

RATE (RATE) =

INTEGER internal change in the OUTPUT * SCALE. This parameter is optional. It is computed from the internal 32-bit value as (OUTPUT * SCALE) - (OUTPUT(n-1) * SCALE).

Notes

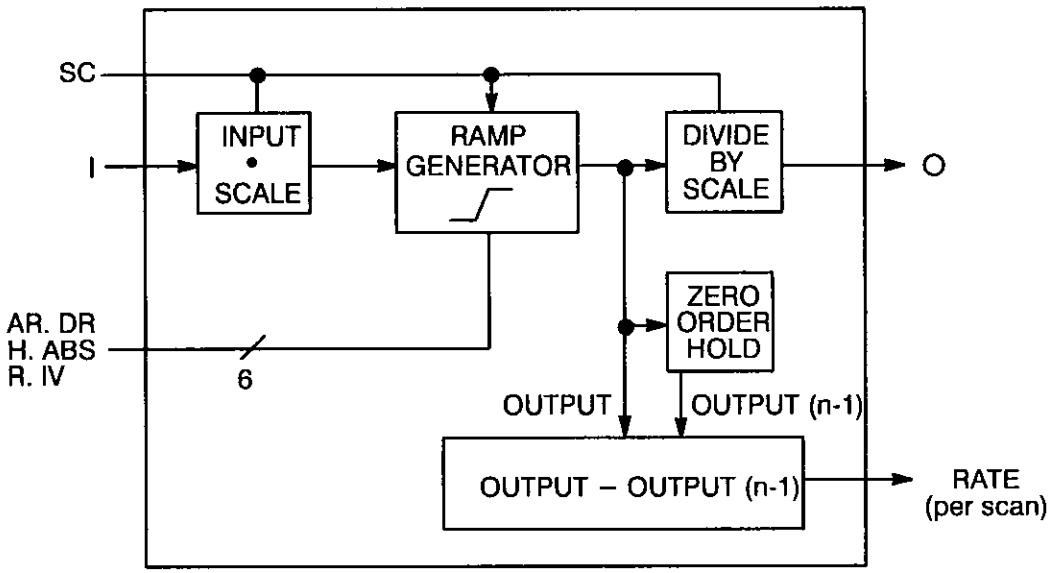
The SCALE input is optional. It is used only to change the units for the two rate inputs (ACCEL_RATE and DECEL_RATE) from per-scan to per-second units. To do this, the SCALE input is set to the number of times the block is executed in one second.

For example, if the RAMP block is used in a UDC task running at 20 ticks, SCALE should be set to 100. On the UDC, 1 tick=0.0005 seconds, so 20 ticks=0.01 seconds. SCALE is then (1/0.01)=100.

In this example, if an accel rate of 500 counts per second is desired, ACCEL_RATE would be set to 500. If the SCALE input was not used

(it defaults to 1), ACCEL_RATE would have to be set to 5 to achieve the desired 500 counts per second.

RAMP Internal Block Diagram



1. When accel rate and/or decel rate is equal to zero (0), the ramp will effectively be held (not permitted to move) in that direction.

2. The actual rate of change of the output is inversely proportional to the scan time. Thus, the actual rates in counts/second can be calculated as:

$$\text{RATE} = \frac{\text{rate \%}}{\text{scale\%}} * \frac{1}{Ts}$$

where:

rate% = accel_rate% or decel_rate%
Ts = scan period in seconds/scan

The slowest rate, therefore, is when rate% is equal to its minimum value (1) and scale% is equal to its maximum value (32767). Similarly, the fastest rate is when rate% is equal to its maximum value (32767) and scale% is equal to its minimum value (1).

For example, when Ts = 5.5 msec:

Min rate = (1 ÷ 32767) ÷ .0055 = .00554882 counts/sec
Max rate = (32767 ÷ 1) ÷ .0055 = 5957636.4 counts/sec