TECHNICAL NOTE TNDA03

COUNTER C DOES NOT EQUAL A-B OR A+B

PRODUCT(S): PAXI, PAXC

Problem Description: When counter C is used to display the sum or difference of counters A & B in the PAXI or PAXC rate/counter meters, the formula C = A – B, or C = A + B is only true if counters A and B have not been reset or all counters (A,B, & C) have been reset simultaneously. When only one or two of the three counters (A,B, & C) are reset, counter C represents an accumulation of counter A & B inputs only and not the true sum or difference of their displayed values.

The PAXI and PAXC literature, PAXC - X, PAXI – X, and PAXICR – X, are misleading when describing the operation of Counter C. The description of Sub Ab states “Counter C counts the incoming pulses from Counter A and B inputs as per Counter A and B modes of operation and subtracts the B counts from the A counts.” However, If both A & B counters are programmed for Count X 1, and counter C is programmed for “Sub Ab” an input to counter A will cause 1 to be added to the value of counter C and an input to counter B will cause a 1 to be subtracted to the value of counter C. If counter C is programmed for “Add Ab”, an input to either the A or B counters will cause 1 to be added to the value of counter C. This is the function of the C counter regardless of the displayed values of counters A & B. If at anytime these counters are reset individually, The value in Counter C will no longer represent the sum or difference of Counter A & B displayed values.

Example 1: Counter C is programmed to Sub Ab (C = A – B). After all three counters are reset to 0 the following sequence is true:

(A)10 – (B)5 = (C)5

(A)10 – (B)6 = (C)4

(A)10 – (B)7 = (C)3

If counters A & B were reset at this point in the sequence, the sequence will continue as follows:

(A)0 – (B)0 = (C)3

(A)1 – (B)0 = (C)4

(A)2 – (B)0 = (C)5

(A)2 – (B)1 = (C)4

(A)2 – (B)2 = (C)3

(A)2– (B)12 = (C) -7

Example 2: Counter C is programmed to Add Ab (C = A + B) After all three counters are reset to 0 the following sequence is true:

(A)1 + (B)0 = (C)1

(A)1 + (B)1 = (C)2

(A)1 + (B)2 = (C)3

If counters A & B were reset at this point in the sequence, the sequence will continue as follows:

(A)0 + (B)0 = (C)3

(A)1 + (B)0 = (C)4

(A)2 + (B)0 = (C)5

(A)2 + (B)1 = (C)6

(A)2 + (B)2 = (C)7

(A)2 + (B)12 = (C) 17

Example 3: Counter C is programmed to Add Ab (C = A + B) After all three counters are reset to 0 the following sequence is true:

(A)1 + (B)0 = (C)1

(A)1 + (B)1 = (C)2

(A)1 + (B)2 = (C)3

If counter B is reset and counters A and C are not, the sequence would continue as follows:

(A)1 + (B)0 = (C)3

(A)1 + (B)1 = (C)4

(A)1 + (B)2 = (C)5

(A)2 + (B)2 = (C)6

(A)3 + (B)2 = (C)7

(A)3 + (B)12 = (C) 17

Example 4: Counter C is programmed to Sub Ab (C = A - B) After all three counters are reset to 0 the following sequence is true:

(A)1 - (B)0 = (C)1

(A)1 - (B)1 = (C)0

(A)2 - (B)1 = (C)1

If counter B is reset and counters A and C are not, the sequence would continue as follows:

(A)2 - (B)0 = (C)1

(A)2 - (B)1 = (C)0

(A)3 - (B)1 = (C)1

(A)3 - (B)2 = (C)0

(A)3 - (B)3 = (C) -1

(A)6 + (B)3 = (C) 2

Cause of the Problem: This is the functionality of all PAXI and PAXC meters.

Corrective Action: This is the way the meter was designed to work. This allows the customer to calculate the sum or difference of the total number of input pulses to counters A and B despite the displayed values of these counters. If the counter C value is to always equal the sum or difference of counters A and B, counters A,B & C must all be reset simultaneously.

Corrective Action Implementation: N/A