7910 Predetermining Counter Option Programming

7910 Predetermining Counter Option Programming   RS422 & RS 232 Interface

Manual Page	Page Code	Key Entry	Display	Function
18	3	0	F0.0000 to F9.9999	Prescaler A (Count A light is on)
18	3	1	F0.0000 to F9.9999	Prescaler B (Count B light is on)
17	4	2	C2-0.00 to C2-9.99	Output 1 Momentary Timer
17	4	3	C3-0.00 to C3-9.99	Output 2 Momentary Timer
16, 17	4	40	C40-00 to C40-15	Pulser Input Mode
16	5	41	C41-00 to C41-15	Channel A Filter Threshold
16	5	42	C42-00 to C42-14	Channel B Filter d Threshold
	6	43	C43-00 to C43-15	Discrete Input Filter Threshold
	7	50	C50--0 to C50--7	Preset Control
18	8	51	C51--0 to C51--7	Counter A Decimal Point
18	8	52	C52--0 to C52--7	Counter B Decimal Point
21	8	53	C53--0 to C53--7	MSD of Serial Address / Printout CTL
21	8	54	C54--0 to C54--7	LSD of Serial Address
19	8	55	C55--0 to C55--7	Kerf Mode Select
19	8	56	C56--0 to C56--7	Power up display
	9	60	C60--0 to C60--3	Output Active State
	9	61	C61--0 to C61--3	Input Active Edge
17	10	62	C62--0 to C62--3	Output 1 Latch Control
17	11	63	C63--0 to C63--3	Output 2 Latch Control
17	12	64	C64--0 to C64--3	Counter A Auto Reset
17	12	65	C65--0 to C65--3	Counter B Auto Reset
	13	66	C66--0 to C66--3	Counter B Mode
21,24	13	67	C67--0 to C67--3	Serial Baud Rate
25	14	68	C68--0 to C68--3	Print Format Control (RS232 only)
25	14	69	C69--0 to C69--3	Print on reset control (RS232 only)
	15	70	C70--0 to C70--1	Magnitude Mode Enable
	15	71	C71--0 to C71--1	Prewarn Mode Enable
	15	72	C72--0 to C72--1	Counter Security Mode
18	15	73	C73--0 to C73--1	Reset A Security
18	15	74	C74--0 to C74--1	Reset B Security
18	15	75	C75--0 to C75--1	Factor Decimal Places
19	15	76	C76--0 to C76--1	Count by eight's
10	16	80	C80-C1	Load Standard Option Program # 0
11	17	81	C81-C1	Load Standard Option Program # 1
12	17	82	C82-C1	Load Standard Option Program # 2
13	18	83	C83-C1	Load Standard Option Program # 3
14			C84-C1	
15			C85-C1	
	19	98	C98-C1	Run Test Program Including I/O
27	20	99	C99-C1	Run Test Program excluding I/O

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COUNTER A or COUNTER B DISPLAY

Press Count A or COUNT B: When either button is pressed the corresponding counter information will be displayed and continuously updated (every 100 msec.), and the LIMIT 1 and LIMIT 2 discrete LED's will indicate the active (lit) or OFF (unlit) status of OUTPUT 1 and OUTPUT 2 respectively. Also the COUNT a or COUNT b discrete LED will be lit to indicate which counter is being displayed.

Counter A Decimal Point and Prescaler A are used when displaying COUNT A.

Counter B Decimal Point and Prescaler B are used when displaying COUNT B.

To change value of COUNT A or COUNT B: The value of Counter A and Counter B may be altered if enabled by the appropriate combination of the Security 1 Input, Security 2 Input, and counter security MODE (C72--0 or C72--1).

If Counter Security Mode 0 (C72--0) is selected, the Counter valued may be changed only if the Security 1 Input is inactive (open).

If Counter Security Mode 1 (C72--1) is selected, the Counter valued may be changed only if the Security 2 Input is inactive (open).

If enabled, the counters may be altered as follows:

Press COUNT A or COUNT B Appropriate counter will displayed as described above.

Press CLEAR (display blinks) The LIMIT 1 and LIMIT 2 Desecrate LED's will go out, the LED for the displayed counter will remain lit, the display will go to all zeros, and the continuous update will cease. None of this will occur if counter alteration is disabled.

Press numbers for desired count value (6 digits) The number will appear on the display. (pressing CLEAR again will zero display again)

Press ENTER (display blinks) The value on the display will be entered into the appropriate count register, the continuous update will commence again and the appropriate LIMIT LED's will light.

The active state of the outputs will not change as a result of numerical entry into the counter except in the Magnitude MODE. In the Coincidence Mode, the new number entered may imply activation of an output if it is on the opposite side of a limit from the original number, but the output will not change until the counter actually crosses the limit in the correct direction under the influence of input pulses. The only way to affect the outputs is to RESET the Counter.

The Counter may be RESET as follows: Press COUNT A or Count B Appropriate counter will be displayed as described above. Press RESET Displayed counter only will be reset as described by preset control Mode (C50).

The Counter may be also reset by actuating the A Reset or B reset discrete input lines. Both the front panel and discrete input reset functions are momentary. The reset will occur and then the counter will began counting again even it the Reset signal is held actuated. A "HOLD" Reset function can be created with the discrete reset inputs if they are connected in parallel with the Count Inhibit Input so that the counting is inhibited during the time the Reset lines are held activated.

LIMIT 1 OR LIMIT 2 DISPLAY

Press limit 1 OR limit 2 all DISCRETE LED's will go off except the one for the limit chosen and the display will show the preset value for that limit. Counter A Decimal point and Prescaler A are always used when displaying LIMIT 1. Counter A decimal point and Prescaler A are used when displaying LIMIT 2 if LM2SRC=0(C50--0 through C50--3). Counter B decimal point and Prescaler B are used when displaying LIMIT 2 if LM2SRC=1(C50--4 through C50--7).

When in the Prewarn mode (C71--1) and with LM2SRC=0, LM2PRE=1, and LM1PRE=1 (C50=--3), the LIMIT 2 display will consist of only 5 digits Preceded by a "P", (P324.65). The value shown is the prewarn and not the actual limit value which is calculated by subtracting this value from LIMIT 1. If this value is greater than LIMIT 1, no prewarn will occur. This value will be displayed using Counter A decimal point, and Prescaler A because LM2SRC=0.

To change value of LIMIT 1 or LIMIT 2: The value of LIMIT 1 or LIMIT 2 may be altered only if the Security 1 Input is inactive (open).

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If enabled, the Limits may be altered as follows:

Press LIMIT 1 or LIMIT 2 — Appropriate limit will be displayed as described above.
Press CLEAR (Display blinks) — Display will go to all zeros. (only if enabled)
Press numbers for desired value (6 digits, except for prewarn which is 5) Numbers appear on the display. (Pressing CLEAR again will zero display)
Press ENTER (display blinks) — The value in the display will be entered into the appropriate LIMIT.

OPTION CODE DISPLAY All Option Code assignments may be inspected as follows:

Press CODE Display will read [-----] At this point there are two choices.

If one individual code is to be inspected, press the number buttons corresponding to the desired function. When sufficient numbers have been entered to identify the desired function, the display will show the preset value assigned to that function.

If all codes are to be examined sequentially, press the ENTER button. This will cause the value for Prescaler A to be displayed (F3.2456, Count A LED lit).

Regardless of which sequence was used to begin with, subsequent pressing of the ENTER button (if not preceded by the CLEAR button) will cause the display to show the next function code in sequence. After displaying Code 72, the display will return to Code 0 (Prescaler A). In order to activate Code 80, Code 98, or Code 99 the actual number buttons must be used.

To change the value of an Option Code: Any of the values may be altered only if the security 2 input is inactive (open).

If enabled, the values are altered as follows.

First obtain the display (by either method described above) for the function desired.
Press CLEAR (display blinks)

The portion of the display which may be changed will go to all zeros. (only if enabled)

Press numbers for the desired value

. Numbers appear on the display (pressing CLEAR again will zero)

Press ENTER (display blinks)

The value on the display will be entered into the appropriate function. The display will not proceed to the next function until the ENTER button is pressed again.

To summarize: If the ENTER button is preceded by the CLEAR button, (regardless of whether number buttons are pressed in the interim) and if the Entry is enabled, then ENTER will alter data and leave the display unchanged.

If the ENTER button is not preceded by the CLEAR button, the ENTER will change the display to the next function.

PRESCALER A: (Code 0) or **PRESCALER B: (Code 1)**

The Prescaler may be changed (only when Security input 2 is inactive) as follows:

Press CODE Display C-----
Press 0 or 1 Display F3.2465 If Code 0 was pressed (prescaler A), Count A LED will be on.
If Code 1 was pressed (prescaler B), Count B LED will be on.
Press CLEAR: (display blinks) Display F0.0000
Press numbers for desired prescaler multiplying factor:(5 digits). The number appears on the display. (Pressing CLEAR again will zero)
Press ENTER: (display blinks)

The value on the display will be entered into the appropriate prescaler register.

An entered value of 0.0000 is converted internally to 10.0000, so that the range of prescaler allowed is from 0.0001 to 10.0000.

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<u>OUTPUT 1 MOMENTARY TIMER:</u> (CODE 2) or **<u>OUTPUT 2 MOMENTARY TIMER:</u> (CODE 3)**

Timers are set to values from 0.00 sec. to 9.99 sec. All entered numbers will be rounded to the nearest 50 mSec. Entry of 9.98 or 9.99 will display as 9.99 but the timer is set to 10 sec.

See Code 62 and Code 63 for more description of timer operation.

<u>PULSER INPUT MODE:</u> (Code 40) Single Counter Mode C66--0, C66--1, or C66--2

Display	Input Pulser effect on Counter A		
C40-00	Quadrature X1	(Active edge of channel A) (Channel B = direction)	
C40-01	Quadrature X2	(Active and Trailing edge of Channel A) (Channel B direction)	
C40-02	Quadrature X3	(Active and Trailing edge of channel A, and Active edge of channel B)	
C40-03	Quadrature X4	(Active and Trailing edge of both channel A and B)	
C40-04	Up/Down	Single Edge	Channel A count, Channel B direction
C40-05	Up/Down	Double Edge	Channel A counts, Channel B direction.
C40-06	Add/Subtract	Single Edge	Channel A increments, Channel B Decrements
C40-07	Add/Subtract	Double Edge	Channel A increments, Channel B Decrements
C40-08	Additive Down	Single Edge	Both channel a and B decrement
C40-09	Additive Down	Double Edge	Both channel a and B decrement
C40-10	Additive Up	Single Edge	Both channel a and B increment
C40-11	Additive Up	Double Edge	Both channel a and B increment
C40-12	Single Channel Down, Single Edge		Channel A counts, Channel B inhibits
C40-13	Single Channel Down, Double Edge		Channel A counts, Channel B inhibits
C40-14	Single Channel up, Single Edge		Channel A counts, Channel B inhibits
C40-15	Single Channel up, Double Edge		Channel A counts, Channel B inhibits

<u>PULSER INPUT MODE:</u> (Code 40)

Dual counter Mode C66--3 (DUALCT=10)

	Channel B into Counter B		Channel A into Counter A					
Display	Direction	Edge	Direction	Edge	BCHNUP	BDUBLE	ACHNUP	ADUBLE
C40-00	down	single	down	single	0	0	0	0
C40-01	down	single	down	double	0	0	0	1
C40-02	down	single	up	single	0	0	1	0
C40-03	down	single	up	double	0	0	1	1
C40-04	down	double	down	single	0	1	0	0
C40-05	down	double	down	double	0	1	0	1
C40-06	down	double	up	single	0	1	1	0
C40-07	down	double	up	double	0	1	1	1
C40-08	up	single	down	single	1	0	0	0
C40-09	up	single	down	double	1	0	0	1
C40-10	up	single	up	single	1	0	1	0
C40-11	up	single	up	double	1	0	1	1
C40-12	up	double	down	single	1	1	0	0
C40-13	up	double	down	double	1	1	0	1
C40-14	up	double	up	single	1	1	1	0
C40-15	up	double	up	double	1	1	1	1

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CHANNEL A FILTER THRESHOLD: **(Code 41)** or
CHANNEL B FILTER THRESHOLD: **(Code 42)**

A Display	B Display	# of samples Required	Minimum Pulse width	Maximum Frequency	Max Recommended Frequency	Max # of Glitches	HEX THRES
C41-00	C42-00	Filter Inactive	16us/33us	37.2K Edge/sec	30.0K Edge/sec	none	
C41-01	C42-01	3	393 usec	1.71 Khz	1.02 Khz (3 0f 5)	1	02
C41-02	C42-02	5	488 usec	1.02 Khz	731 hz (5 0f 7)	1	04
C41-03	C42-03	10	977 usec	512hz	320 hz (10 0f 16)	3	09
C41-04	C42-04	20	1.95 msec	256hz	171 hz (20 0f 30)	5	13
C41-05	C42-05	31	3.0 msec	165hz	109 hz (31 0f 47)	8	1E
C41-06	C42-06	41	4.0 msec	125hz	81.3 hz (41 0f 63)	11	28
C41-07	C42-07	51	5.0 msec	100hz	66.5 hz (51 0f 77)	13	32
C41-08	C42-08	61	6.0 msec	83.9hz	55.7 hz (61 0f 92)	16	3C
C41-09	C42-09	72	7.0 msec	71.1hz	47.4 hz (72 0f 108)	18	47
C41-10	C42-10	82	8.0 msec	62.4hz	41.3 hz (82 0f 124)	21	51
C41-11	C42-11	92	9.0 msec	55.7hz	37.1 hz (92 0f 138)	23	5B
C41-12	C42-12	102	10.0 msec	50.2hz	33.2 hz (102 0f 154)	26	65
C41-13	C42-13	128	12.5 msec	40.0hz	26.7 hz (128 0f 192)	32	7F
C41-14	C42-14	205	20.5 msec	25.0hz	16.7 hz (205 0f 307)	51	CC
C41-15	C42-15	256	25.0 msec	20.0hz	13.3 hz (256 0f 384)	64	FF

PULSE FILTER THRESHOLD NOTES: Code 41 and Code 42

In Single counter Mode, DUALCT=0 (C66--0,C66--1, or C66--2), both Channel A Filter threshold (Code 41) and Channel B Filter Threshold (Code 42) must be non-zero, or else neither filter will be active regardless of what value has been entered. The non-zero values need not be equal to each other except that it would not make sense for them to be different in the four quadrature modes.

In the Dual Counter Mode, DUALCT=1 (C66--3), any combination of Filter Thresholds may be used including One zero value and one non-zero value.

The filter functions by sampling the appropriate pulsar input every 97.7 u Sec. Each time the pulse is found to be high, a counter is incremented until it is equal to the threshold value. Each time the pulser is found to be low, that counter is decremented until it is equal to zero. For example, if the threshold is 3, the pulser must remain high through at least 3 samples periods (293 u Sec.) before being recognized. Therefore the minimum recognizable pulse-width would be 293 u Sec. which is equivalent to an input rate of 1.71 KHz. However, if noise glitches are expected, the detection of each glitch will cause the loss of 2 sample periods (one to detect the glitch and one to recover). So, in the above example, the pulse would have to remain high through at least 5 sample periods (488 u Sec.) which is equivalent to 1.02 KHz. Therefore it is reasonable to recommend an input rate of 1 KHz with a threshold of 3 where it will tolerate 1 glitch without missing a legitimate pulse. As the Threshold values increase, the decision on maximum recommended frequency can be based on the number of noise glitches expected during a normal pulse. The chart is based on a ratio of approximately 2/3 the Max. frequency and shows the maximum number of glitches that could be tolerated.

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DISCRETE INPUT FILTER THRESHOLD: (Code 43)

Display	# 0f Samples required	Minimum Pulse Width	(Maximum Additional delay)
C43-00	1	1.46 mSec	
C43-01	2	2.93 mSec	
C43-02	3	4.39 mSec	
C43-03	4	5.86 mSec	
C43-04	5	7.32 mSec	
C43-05	6	8.79 mSec	
C43-06	7	10.25 mSec	
C43-07	8	11.72 mSec	
C43-08	9	13.18 mSec	
C43-09	10	14.65 mSec	
C43-10	11	16.11 mSec	
C43-11	12	17.58 mSec	
C43-12	13	19.04 mSec	
C43-13	14	20.51 mSec	
C43-14	15	21.97 mSec	
C43-15	16	23.44 mSec	

DISCRETE FILTER THRESHOLD NOTES: C43

The single Discrete Filter Threshold is applied equally to the four actuation inputs (A RESET, B RESET, PRINT, and STOP COUNT). The two Security Inputs are not digitally filtered since they do not cause any action to occur by themselves.

These four filters (each having the same threshold) operate the same way the pulser filters do, except that the sampling rate is once every 1.46 mSec. However in this case , a threshold value of 0 does not turn off the filtering routine. The filter is, however, effectively shut off since any change of state on the inputs that exists at the moment the sample is taken will be acted on immediately since the threshold (which is 0) has been reached. Therefore, if the threshold value is 0, the counter will react to a change of input state within 1.46 mSec. However, in order to guarantee action, an input pulse must therefore have a duration of at least 1.46 mSec. As large thresholds are entered, the minimum pulse width and maximum actuation time increase as shown on the chart.

Again, when choosing the desired filter, glitch tolerance must be taken into account. Any glitch that exists at the instant of sampling will add 2 sample periods (2.93 mSec) to the required pulse width. However, with the threshold set to 0, a glitch will be detected as a legitimate pulse and it will be acted upon. It should be noted that these inputs do have much more significant hardware filters than the pulser inputs.

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PRESET CONTROL: **(Code 50)** Coincidence Mode C70--0

Display	Output 2 Coincidence	Output 1 Counter B Coincidence	Counter A Reset to:	R R R Reset To:	L M 2 S C	L M 2 S E	L M 2 S E
C50--0	Count A< 0	Count A < 0	0	Limit 1	0	0	0
C50--1	Count A < 0	Count A >Lim 1	0	0	0	0	1
*C50--2	Count A>Lim 2 (with C71--0)	Count A < 0	0	Limit 1	0	1	0
C50--3	Count A >Lim 2	Count A >Lim 1	0	0	0	1	1
C50--4	Count B < 0	Count A < 0	Limit 2	Limit 1	1	0	0
C50--5	Count B < 0	Count A >Lim 1	Limit 2	0	1	0	1
C50--6	Count B >Lim2	Count A < 0	0	Limit 1	1	1	0
C50-7	Count B>Lim2	Count A >Lim 1	0	0	1	1	1

LIM1PRE = Limit 1 0/Preset	0 = Coincidence on 0	1 = Coincidence on Limit
LM2PRE = Limit 2 0/Preset	0 = Coincidence on 0	1 = Coincidence on Limit
LM2SRC = Limit 2 Source	0 = Source is Count A	1 = Source is Count B

Coincidence with a limit occurs when the counter increments from a point that is less than the limit to a point that is greater than or equal to the limit.

Coincidence with 0 occurs when the counter decrements from a point that is greater than 0 to a point that is less than or equal to 0.

* Special Case: When in Prewarn mode (C71--1) and (C50--2), Output 2 coincidence will occur when Counter A < Limit 2 which provides a prewarn function of the impending arrival of counter A at 0 for output 1.

PRESET CONTROL: **(Code 50)** Coincidence Mode C70--1

Display	Output 2 Coincidence	Output 1 Counter B Coincidence	Counter A Reset to:	R R R Reset To:	L M 2 S C	L M 2 S E	L M 2 S E
C50--0	Count A< 0	Count A < 0	0	Limit 1	0	0	0
C50--1	Count A < 0	Count A >Lim 1	0	0	0	0	1
C50--2	Count A>Lim 2	Count A < 0	0	Limit 1	0	1	0
C50--3	Count A >Lim 2	Count A >Lim 1	0	0	0	1	1
C50--4	Count B < 0	Count A < 0	Limit 2	Limit 1	1	0	0
C50--5	Count B < 0	Count A >Lim 1	Limit 2	0	1	0	1
C50--6	Count B >Lim2	Count A < 0	0	Limit 1	1	1	0
C50-7	Count B>Lim2	Count A >Lim 1	0	0	1	1	1

LIM1PRE = Limit 1 0/Preset	0 = Active on < or = 0	1 = Active on > or = Limit
LM2PRE = Limit 2 0/Preset	0 = Active on < or = 0	1 = Active on > or = Limit
LM2SRC = Limit 2 Source	0 = Source is Count A	1 = Source is Count B

In Magnitude Mode, the output will remain continuously active when the counter is > or = Limit (or Counter < or = 0), and the Output will remain off when the opposite is true. The auto reset function (Code 64 & 65), Output momentary timers (Code 2 & 3), and output Latch / toggle functions (Code 62 & 63) will be inoperative. Also the batch counter will not function.

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COUNTER A DECIMAL POINT: (Code 51)
or
COUNTER B DECIMAL POINT: (Code 52)

Counter B Display	Counter A Display	Decimal Point Location
C52--0	C51--0	XXXXXX (No Dec. Pt.)
C52--1	C51--1	XXXXXX.
C52--2	C51--2	XXXXX.X
C52--3	C51--3	XXXX.XX
C52--4	C51--4	XXX.XXX
C52--5	C51--5	XX.XXXX
C52--6	C51--6	X.XXXXX
C52--7	C51--7	XXXXXX (No Dec. Pt.)

Counter A decimal point is used when displaying Counter A or LIMIT 1. It is also used when displaying LIMIT 2 if LM2SRC = 0. (C50--0 thru C50--3)

Counter B decimal point is used when displaying Counter B. It is also used when displaying LIMIT 2 if LN2SRC = 1. (C50--4 thru C50--7)

ADDRESS CODE: (Code 53 and 54) RS422 only

Enter a 2-digit address into codes 53 and 54, the range is 00 to 77. The MSD of the address is entered into Code 53 and the LSD of the address is entered into Code 54.

Single Line Printouts Code 53 (-220 only) RS232
When C53 =1 Single Line Printout

C68 =0 Print Count A in response to Print signal (Terminal 12)
C68=1 Print Count B in response to Print
C68=3 Print Count A upon A reset and Count B upon B reset
Printout will occur only if Terminal 12 is connected to common.
(Note: Code 69 still controls print on reset options.)

When C53 = 0, Code 68 is normal print format control.

KERF MODE SELECT: (Code 55)

C55--0 Offset Mode disabled. Counter resets to zero or a limit value.
C55--1 Counter resets to a positive offset
C55--3 Counter resets to a value equal to 1,000,000 minus the offset value.

Power up Display Select Code 56

C56 = 0 or 3 "P-Loss" display
C56 = 1 Count A
C56 = 3 Count B

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OUTPUT ACTIVE STATE: (Code 60)

Display	Relay 2 Active State	Discrete Output 2 Active State	Relay 1 Active State	Discrete Output 1 Active State	OUT2NV	OUT1NV
C60--0	NO is Closed	Low	NO is Closed	Low	0	0
C60--1	NO is Closed	Low	NO is Open	High	0	1
C60--2	NO is Open	High	NO is Closed	Low	0	0
C60--3	NO is Open	High	NO is Open	High	0	1

OUT1NV = Output 1 invert 0= No Invert 1= Invert
OUT2NV = Output 2 invert 0= No Invert 1= Invert

When Power is removed from the Counter the Normally Open (NO) relay contacts will be open and the Normally Closed (NC) relay contacts will be closed.

If OUT1NV or OUT2NV =0 then the output off state will be the same as when power is removed and the ACTIVE state will pull in the relay and close the normally open contacts (and open the normally closed contacts)

If OUT1NV or OUT2NV = 1 then the Output will operate just the opposite.

INPUT ACTIVE EDGE: (Code 61)

Display	Input Channel B Active Edge	Input Channel A Active Edge	BCHINV	ACHINV
C61--0	Closer	Closer	0	0
C61--1	Closer	Open	0	1
C61--2	Open	Closer	1	0
C61--3	Open	Open	1	1

ACH1NV = A Channel Input 0 = No Invert 1 = Invert
ACH1NV = B Channel Input 0 = No Invert 1 = Invert

When the selected Pulse mode is such that only one edge is active, the above chart shows how to select which edge that will be. Closure means that the input terminal input is shorted to ground, and Open means the short is removed. Of course, when both edges are active, then i is immaterial which mode is chosen.

When a quadrature or up/down pulser mode (bi-directional) is chosen, then the count direction can be reversed by inverting just one of the above two bits.

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OUTPUT 1 LATCH CONTROL: (CODE 62) AND **OUTPUT 1 MOMENTARY TIMER: (CODE 2)**

THESE ARE INOPERATIVE IN MAGNITUDE MODE (CODE 70--1)

Display		Output 1 Coincidence	Output 2	Auto Coincidence	Manual	Reset	T G C Reset	TCNS1	LCTO1	ULSR1	
C2-000	C62--0	Latch					Unlatch	0	0	0	
		Output 1				Output 1					
C2-000	C62--1	Latch		Unlatch			Unlatch	0	0	1	
		Output 1	Output 1		Output 1						
C2-000	C62--2	Toggle					Unlatch	0	1	0	
		Output 1				Output 1					
C2-000	C62--3	Toggle		Unlatch			Unlatch	0	1	1	
		Output 1	Output 1		Output 1						
C2-XXX	C62--0	Latch					Momentary	0	0	0	Crop
		Output 1				Output 1					
C2-XXX	C62--1	Latch		Unlatch			Momentary	0	0	1	Crop
		Output 1	Output 1		Output 1						
C2-XXX	C62--2	Momentary					Momentary	0	1	0	Crop
		Output 1				Output 1					
C2-XXX	C62--3	Momentary					Unlatch	0	1	1	
		Output 1				Output 1					

ULSRC1 = Output 1 Unlatch Source	0 = Timer Only (if not 0)	1=Output 2 Coincidence or Timer (if not 0)
LCTOG1 = Output 1 Latch/Toggle	0 = Latch	1 = Toggle or Momentary
TCNST1 = Output 1 Momentary Timer	000 to 255	

The Timer is set as a multiple of 50 mSec. so the range is from 50 mSec (C2-0.05) to 10.0 Sec (C2-9.99)

When an output is Latched, it is in the ACTIVE state as defined by Code 60.

When an output is Unlatched, it is in it's OFF state as defined by Code 60.

A Momentary output will go ACTIVE for the specified time , then OFF.

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OUTPUT 2 LATCH CONTROL: (CODE 63)
AND
OUTPUT2 MOMENTARY TIMER: (CODE 3)

THESE ARE INOPERATIVE IN MAGNITUDE MODE (CODE 70--1)

Display		Output 2 Coincidence	Output 2	Auto Coincidence	Manual	Reset	T G C Reset	TCNS 2	LCTO 2	ULSR 2	
C3-000	C63--0	Latch					Unlatch	0	0	0	
		Output 2				Output 2					
C3-000	C63--1	Latch		Unlatch			Unlatch	0	0	1	
		Output 2	Output 2		Output 2						
C3-000	C63--2	Toggle					Unlatch	0	1	0	
		Output 2				Output 2					
C3-000	C63--3	Toggle		Unlatch			Unlatch	0	1	1	
		Output 2	Output 2		Output 2						
C3-XXX	C63--0	Latch					Momentary	0	0	0	Crop
		Output 2				Output 2					
C3-XXX	C63--1	Latch		Unlatch			Momentary	0	0	1	Crop
		Output 2	Output 2		Output 2						
C3-XXX	C63--2	Momentary					Momentary	0	1	0	Crop
		Output 2				Output 2					
C3-XXX	C63--3	Momentary					Unlatch	0	1	1	
		Output 2				Output 2					

ULSRC1 = Output 2 Unlatch Source	0 = Timer Only (if not 0)	1=Output 2 Coincidence or Timer (if not 0)
LCTOG1 = Output 2 Latch/Toggle	0 = Latch	1 = Toggle or Momentary
TCNST1 = Output 2 Momentary Timer	000 to 255	

The Timer is set as a multiple of 50 mSec. so the range is from 50 mSec (C3-0.05) to 10.0 Sec (C3-9.99)

When an output is Latched, it is in the ACTIVE state as defined by Code 60.

When an output is Unlatched, it is in it's OFF state as defined by Code 60.

A Momentary output will go ACTIVE for the specified time , then OFF.

7910 Predetermining Counter Option Programming

<u>COUNTER A AUTO RESET:</u> (Code 64)

Display	Action	AUTRSA	ARESRC
C64--0	No Auto reset for counter A	0	0
C64--1	No Auto reset for Counter A	0	1
C64--2	Auto reset counter A on Output 1 high spd	1	0
C64--3	Auto reset counter A on output 2 (high speed if LM2SRC -0; otherwise not high speed)	1	1

ARESRC = Counter A Auto reset Source 0 = Out 1 Coinc. 1 = Out 2 Coinc.
AUTRSA = Counter A Auto reset Enable 0 = Disabled 1 = Enabled

<u>COUNTER B AUTO RESET:</u> (Code 65)

Display	Action	AUTRSB	BRESRC
C65--0	No Auto reset for counter B	0	0
C65--1	No Auto reset for Counter B	0	1
C65--2	Auto reset counter B on Output 1 high spd	1	0
C65--3	Auto reset counter B on output 2 (high speed if LM2SRC -0; otherwise not high speed)	1	1

BRESRC = Counter B Auto reset Source 0 = Out 1 Coinc. 1 = Out 2 Coinc.
AUTRSA = Counter B Auto reset Enable 0 = Disabled 1 = Enabled

High speed reset occurs when Counter A hits Output 1 Coincidence or when Counter B hits Output 2 Coincidence (if Limit 2 Source is Counter B) Because a counter is effectively resetting itself. Since there may be extra counts received beyond the limit value, these counts must be stored and applied to the reset value.

When the action of one counter is resting the other, then residual counts aren't defined, and the counter is merely reset to the appropriate value.

7910 Predetermining Counter Option Programming

<u>COUNTER B MODE:</u> (Code 66)

Display	Action	DUALCT	BCHSRC
C66--0	Counter B counts on Output 1 Coincidence	0	0
C66--1	Counter B counts on Output 2 Coincidence	0	1
C66--2	Single Input Dual Count	1	0
C66--3	Counter B counts Channel B input	1	1

BCHSRS = Batch Counter Source   0 = Out 1 Coinc.   1 = Out 2 Coinc.
DUALCT = Dual Counter Mode   0 = Single Counter   1 = Dual Counter

In the Dual Counter Mode, Counter B will be affected only by input counts on channel B and will increment or decrement as described by chosen pulser mode.

In Single Counter Mode, Counter B will count at chosen coincidence point and will always increment unless LM2SRC = 1 and LM2PRE = 0 (C50--4 or C50--5), then it will decrement. Batch Counter will not be active in Magnitude mode since counter actuation points are not defined.

<u>SERIAL BAUD RATE:</u> (Code 67)

Display	Serial Interface Baud Rate	BAUDR1	BAUDR0
C67--0	110 Baud	0	0
C67--1	300 Baud	0	1
C67--2	1200 Baud	1	0
C67--3	2400 Baud	1	1

Serial interface Baud Rate is the same for input and output. Choosing 110 Baud will also select an additional "Stop" bit for use with old style teletypes. Serial transmission always includes even parity and serial reception always requires even parity to be valid before it will recognize input characters.

7910 Predetermining Counter Option Programming

PRINT FORMAT CONTROL: (Code 68) RS 232 Only

Display	Format	PRTLIM	PRTCNT
C68--0	Do not print	0	0
C68--1	Print counters only	0	1
C68--2	Print limits only	1	0
C68--3	Print counters and limits	1	1

PRTCNT = Print Counters 0 = Don't print counters 1 = Print counters
PRTLIM = Print Limits 0 = Don't print limits 1 = Print Limits

The print cycle (serial data output) is activated by the discrete Print Input or the print-on-reset actuation as selected by code 69. The transmitted data will include the counter data or the Limit data as selected above.

When the appropriate Request-for-Print character "?" is received on the serial input, the counter data and the limit data will all be sent, regardless of which option is selected above.

PRINT ON RESET CONTROL: (Code 69)

Display	Action	PRTRSB	PRTRSA
C69--0	Do not print on reset.	0	0
C69--1	Print on reset A only	0	1
C69--2	Print on reset B only	1	0
C69--3	Print on reset A or Reset B1	1	

PRTRSA = Print on reset A 0 = Don't print on reset A 1 = Print on reset A
PRTRSB = Print on reset B 0 = Don't print on reset B 1 = Print on reset B

This control can be used to chose which (if any) Reset cycle will initiate a serial data output. The counter values just prior to reset will be saved and transmitted (as selected by Code 68). Either a manual reset (from the front panel or the discrete inputs), an auto reset, or a serial input reset will have the same effect.
NOTE: At rapid count rates, the actual counter value at the time that coincidence is detected may exceed the limit because of the 1.5 mSec. delay between coincidence comparisons. When High-Speed Auto-Resets occur, these residual counts are applied to the reset value, but the value stored for print-out will include these extra counts. Therefore the print-out will show the precise counter value at the time reset occurs even if it exceeds the set limit value.

7910 Predetermining Counter Option Programming

MAGNITUDE MODE ENABLE: (Code 70)

Display	Mode
C70--0	Coincidence Mode, Outputs actuate on Limit coincidence
C70--1	Magnitude Mode, Outputs actuate on limit magnitude.

PREWARN MODE ENABLE: (Code 71)

Display	Mode
C71--0	Prewarn Mode Disabled
C71--1	Prewarn Mode Enabled

Prewarn Mode will only take effect if LM2SRC = 0 and LM2PRE =1 (C50--2 or C50--3)
Then if LMIPRE = 0 (C50--2), Limit 2 will act as a prewarn for the arrival of counter A at 0.
If LMIPRE = 1 (C50--3), Limit 2 will act as a prewarn for the arrival of Counter A at Limit 1. In this mode, the display of Limit 2 will be the Prewarn value, (not the actual limit value) and the most significant digit will be replaced with a "P". (P342.68). Prescaler A and Decimal Point A will be used since LM2SRC = 0.

COUNTER SECURITY MODE: (Code 72)

Display	Mode
C72--0	COUNT and COUNT B can be altered only when Security input 1 is inactive.
C72--1	COUNT A and COUNT B can be altered only when Security input 2 is inactive.

RESET SECURITY: (Code 73 & 74)

The resetting of values in Count A and B registers via the front panel RESET button may be disabled. This is accomplished by entering the appropriate values in Code 73 and 74 and connecting the Security-1 input to common.

C73 - Count A Reset Enable	0 - Disable front panel reset button
C74 - Count B Reset Enable	1 - Enable front panel reset button

Scale Factor Selection Code 75. (-210, -220, and -230)

C75=0 Factor range is 0.0001 to 9.999.
C75=1 Factor range is 00.01 to 99.99.

Counting by eight's (A only) Code 76
C76 = 0 Normal counting
C76 = 1 Counting by eighths

All programs (80 to 85) set C53 = 0, C68 = 3, C75 = 0, and C76 =0.

7910 Predetermining Counter Option Programming

LOAD "STANDARD" OPTION PROGRAMS: (Code 80, 81, 82, 83)

To load the "Standard" Option program, proceed as follows:

PRESS CODE; 8X (0,1,2,3)		Display reads C8X-C1 (0,1,2,3)
PRESS CLEAR		Display reads C8X-C0 (0,1,2,3)
PRESS ENTER	Display blinks	Display reads C8X-PL (0,1,2,3) and the standard options codes are all entered.

Security Input 2 must be inactive to enable the load function.

The COUNT, LIMIT and PRESCALER values will not be altered by entering any of the "Standard" programs. Their values must all be entered separately.

All four of the :Standard" programs will set the following OPTION CODES to the same value.

Code	Display	Description
41	C41-00	Channel A Filter Threshold = 0 (10 KHz)
42	C42-00	Channel B Filter Threshold = 0 (10KHz)
43	C43-15	Discrete Input Filter Threshold = 23 mSec.
51	C51--0	Counter A Decimal Point = none
52	C52--0	Counter B Decimal Point = none
53	C53--0	Serial address = 00
54	C54--0	Serial address = 00
60	C60--0	Output Active State = normal
61	C61--0	Input Active Edge = Closure for both A and B
67	C67--2	Serial Baud Rate = 1200 Baud
72	C72--1	COUNT alteration enabled only on Security 2 inactive
73	C73--1	Reset A Security 1 => Unsecured
74	C74--1	Reset B Security

CODE 80: will load the other option codes with the following values:

Code	Display	Description
2	C2-0.10	Output 1 Timer = 100 mSec.
3	C3-0.00	Output 2 Timer = 0
40	C40-06	Pulse Mode = Add/Subtract, Single Edge
50	C50--3	LM2SRC -0; LM2PRE=1; LM1PRE = 1
62	C62--3	Output 1 = momentary (unlatched on reset)
63	C63--1	Output 2 = Latch (Unlatch on reset or limit 1 coinc.)
64	C64--2	Auto reset counter A on Output 1 Coincidence
65	C65--0	No auto reset for counter B
66	C66--0	Counter B counts on Output 1 Coincidence
70	C70--0	Coincidence Mode
71	C71--1	Prewarn Mode enabled

Entering this code will provide the following operation features:
Two row Predetermining counter with Batch Totalizer.
Limit 2 (Output 2) is a Prewarn to Limit 1 (Output 1)
Both counters reset to zero.
Output 1 will pulse for 100 mSec when Counter A is greater than or = to Limit 1 & will unlatch on reset.
Output 2 will latch on when counter A is greater than or equal to the value in Limit 1 minus the value in Limit 2 (prewarn) and will unlatch on reset or on output 1 coincidence.
Counter A will Auto reset on output 1 coincidence, and Counter B will not auto reset.
Counter B will increment on output 1 coincidence.

7910 Predetermining Counter Option Programming

<u>CODE 81:</u> will load the other option codes with the following values:

Code	Display	Description
2	C2-0.10	Output 1 timer = 100 mSec
3	C3-0.10	Output 2 Timer = 100 mSec.
40	C40-06	Pulse mode Add/Subtract, single edge
50	C50--7	LM2SRC=1; LM2PRE=1; LM1PRE=1
62	C62--3	Output 1 = Momentary (unlatch on reset)
63	C63--3	Output 2 = Momentary (unlatched at reset)
64	C64--2	Auto reset counter A on output 1 coincidence
65	C65--0	No auto reset for counter B
66	C66--0	Counter B counts on output 1 coincidence
70	C70--0	Coincidence Mode
71	C71--0	Prewarn Mode disabled

Entering the code will provide the following operational features:

One row preset counter will batch to totalize and preset.
Both counters reset to zero
Output 1 will pulse for 100 mSec. when counter a is greater than or equal to Limit 1 and will unlatch on reset.
Output 2 will pulse for 100 mSec. when counter B is greater than or equal to Limit 2 and will unlatch on reset.
Counter A will Auto reset on output 1 coincidence, and counter B will not auto reset.
Counter B will increment on output 1 coincidence.

<u>CODE 82:</u> will load the other option codes with the following values:

Code	Display	Description
2	C2-0.10	Output 1 timer = 100 mSec
3	C3-0.10	Output 2 Timer = 100 mSec.
40	C40-10	Pulser mode dual count A & B up single edge
50	C50--7	LM2SRC=1; LM2PRE=1; LM1PRE=1
62	C62--3	Output 1 = Momentary (unlatch on reset)
63	C63--3	Output 2 = Momentary (unlatched at reset)
64	C64--2	Auto reset counter A on output 1 coincidence
65	C65--3	Auto reset counter B on output 2 coincidence
70	C70--0	Coincidence Mode
71	C71--0	Prewarn Mode disabled

Entering the code will provide the following operational features:

Dual one row preset counters.
Both counters reset to zero.
Output 1 will pulse for 100 mSec. when counter a is greater than or equal to Limit 1 and will unlatch on reset.
Output 2 will pulse for 100 mSec. when counter B is greater than or equal to Limit 2 and will unlatch on reset.
Counter A will auto reset on output 1 coincidence and Counter B will auto reset on output 2 coincidence.
Counter A will increment on channel A closure and counter B will increment on channel B closure.

7910 Predetermining Counter Option Programming

<u>CODE 83:</u> will load the other option codes with the following values:

Code	Display	Description
2	C2-0.0	Output 1 timer = off
3	C3-0.00	Output 2 timer = off
40	C40-00	Pulser Mode Quadrature X1 (bi-directional)
50	C50--3	LM2SRS =0; LM2PRE = 1; LM1PRE =1
62	C62--0	Output 1 = Limit 1 Magnitude
63	C63--0	Output 2 = Limit 2 magnitude
64	C64--0	No auto reset for counter A
65	C65--0	No auto reset for counter B
66	C66--0	Counter B inactive
70	C70--1	Magnitude Mode
71	C71--0	Prewarn Mode disabled.

Entering the code will provide the following operational features:

Two level bi-directional limit controller.
Both counters reset to zero but counter B is inactive.
Output 1 will be on when counter A is greater than or equal to limit 1 and off when counter A is less than Limit 1.
Output 2 will be on when counter A is greater than or equal to limit 2 and off when counter A is less than Limit 2.
Counter A will count bi-directionally based on the levels of channel A and channel B inputs. (Quadrature X1)

7910 Predetermining Counter Option Programming

<u>RUN TEST PROGRAM INCLUDING I/O :</u> (Code 98)

To run the test program, proceed as follows:
PRESS CODE 98 Display reads C98-C1
PRESS CLEAR (Display blinks) Display reads C98-C0
PRESS ENTER (Display blinks) Display goes blank in preparation for displaying discrete inputs and key depressions.
Security input 2 must be inactive initially to enable run function.

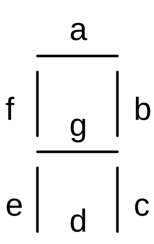
The three least significant digits of the display are used to indicate activation of any of the 18 keys on the front panel. Each key will light it's own individual segment on one of the three digits.

The middle digit of the display is not used for this test.

The second digit from the left is used to indicate the PORT 1 inputs. This includes the six discrete inputs (A RESET, B RESET, STOP COUNT, PRINT, SECURITY 1, AND SECURITY 2) and P1.6 which will blink whenever a CHAN B pulse occurs prior to a CHAN A pulse.

The Most significant digit is used to indicate PORT 3 inputs. This includes the CHAN A input which will light when a pulse occurs on channel A; the CHAN B input which will light when a pulse occurs on channel B; the INI 1 input which will blink when a pulse occurs on either Channel A or B; The INT 0 input which will light when the power-fail detection circuitry is actuated; and TXD & RXD which indicate activity on the Serial Input.

This chart shows the display segments affected by the various inputs and keys during the I/O test:



	(port 3)	(port 1)	Keyboard		
Segment	Digit 6	Digit 5	Digit 3	Digit 2	Digit 1
a		Channel B First blink			
b	CHAN B	Security Input 2	ENTER	0	CLEAR
c	CHAN A	Security Input 1	6	3	2
d	RXD	STOP Count	Count B	Limit 1	Limit 2
e	INT 1 blink	PRINT	9	5	1
f	TXD	RESET B	Count A	RESET	CODE
g	INT 0	RESET A	8	7	4

Note: Digit 4 is not used for the I/O test.

In addition to the display indications; the STOP COUNT input will activate D.C Outputs #1 and relay output #1; The RESET B input will activate D.C. Output #2 and Relay output #2; the RESET a input will activate D.C. Output #3; and the PRINT input will activate D.C. Output #4. Also, any change of state seen on the RXD line (serial input) will be sent back out on the TXD line (serial out)

When no input activity of any kind has been seen for 10 seconds, the counter will exit the I/O test routine and proceed with the Code 99 Test program.

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<u>RUN TEST PROGRAM EXCLUDING I/O :</u> (Code 99)

To run the test program, proceed as follows:
PRESS CODE 99 Display reads C99-C1
PRESS CLEAR (Display blinks) Display reads C99-C0
PRESS ENTER (Display blinks) Display test begins

The following tests are performed:
1. The display test consists of lighting each segment (a through D.P.) on every seven segment display simultaneously (as well as lighting the discrete LED's individually) followed by the numbers 1 through 8, with the decimal points lit every other time.
2. The Checksum routine adds the total contents of the EPROM and compares the result to a stored good value.
3. The Novram routine writes and reads data from the Novram, checking for accuracy. Note; this does not test the non-volatile portion of the memory, only the RAM.
4. The RAM routine write and reads data from the internal processor RAM, checking for accuracy.

If all tests are successful, the display will read: **7910-0** (where the last number indicates the software rev. level)
If any of the tests fail, the display will read **FAIL-2** (where the number indicates which test failed)
1 = checksum failure
2 = Novram failure
4 = RAM failure

7910 Predetermining Counter Option Programming

RS232 SERIAL INTERFACE DESCRIPTION

All functions which can be performed from the front panel of the counter can also be performed via the serial interface. A typical "dumb" terminal such as an ADM-3A with a keyboard and display may be used to control the counter. The counters, limits and option codes may be e examined by transmitting the proper character to the counter from a keyboard and displaying the resulting data sent from the counter on a CRT display or a printer. The count, limit, and option code data may also be altered from a remote keyboard by transmitting the dame sequence of characters that would be input from the counter front panel. The Security 1 and Security 2 discrete inputs have no effect on serial data, so data may be altered remotely even if the counter front panel is disabled by the Security inputs.

The following table shows the acceptable Serial Input codes and their equivalent front panel keys.

Character	Parity	ASCII	Equivalent front panel key
0	0	30	# 0
1	1	31	# 1
2	1	32	# 2
3	0	33	# 3
4	1	34	# 4
5	0	35	# 5
6	0	36	# 6
7	1	37	# 7
8	1	38	# 8
9	0	39	# 9
A	0	41	COUNT A
B	0	42	COUNT B
L	1	4C	LIMIT 1
M	0	4D	LIMIT 2
C	1	43	CODE
R	1	52	RESET
*	1	2A	CLEAR
CR	1	0D	ENTER

In addition to the equivalent front panel function there are five other Serial Input codes which the counter will recognize:

Character	Parity	ASCII	Function
D	0	44	Disable Pulse Input
E	1	45	Enable Pulse Input
?	0	3F	Print counters and limits
X	1	58	Examine all Option Codes (17 Col. X 24 lines)
Y	0	59	Examine all Option Codes (39 Col. X 12 lines)

The counter's highest priority serial function is to transmit data on reset. Since there is limited memory space for buffering, this transmission will over-ride any pending sequence of serial input data. Therefore, if the counter is counting and if the auto-reset, and print-on-reset functions are enabled, it may be difficult to program the counter from a remote serial input because a received key sequence will be forgotten when the print on reset transmission begins. For this reason it is wise to send the character "D" first, to disable the pulse input, before keying in new data.

The pulse input can then be re-enabled in one of two different ways. Sending the character "E" on the serial input, or activating and then releasing the STOP COUNT discrete input will enable the pulse input.

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Two modes of examining the option codes are available. The character "X" will result in a complete print-out of all the option codes in a 17 column by 24 line format. (Note: The ADM-3A can display 24 lines, but the final carriage return / line feed pushes the first code off the top.)

The character "Y" will result in a complete print-out of all Option codes in a 39 column by 12 line format.

7910 Enhancements 8-4-88

New Function Codes

1. Single Line Printouts Code 53 (-220 only)
   When C53 =1 Single Line Printout

   C68 =0 Print Count A in response to Print signal (Terminal 12)
   C68=1 Print Count B in response to Print
   C68=3 Print Count A upon A reset and Count B upon B reset
   Printout will occur only if Terminal 12 is connected to common.
   (Note: Code 69 still controls print on reset options.)

   When C53 = 0, Code 68 is normal print format control.

2. Scale Factor Selection Code 75. (-210, -220, and -230)

   C75=0 Factor range is 0.0001 to 9.999.
   C75=1 Factor range is 00.01 to 99.99.

3. Counting by eight's (A only) Code 76
   C76 = 0 Normal counting
   C76 = 1 Counting by eighths

All programs (80 to 85) set C53 = 0, C68 = 3, C75 = 0, and C76 =0.

Power up Display Select Code 56

C56 = 0 or 3	"P-Loss" display
C56 = 1	Count A
C56 = 3	Count B