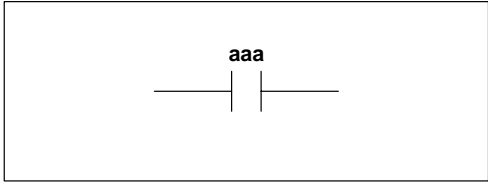


Boolean Instructions

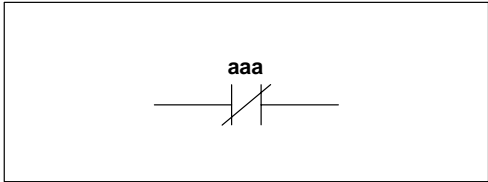
Store (STR)

The Store instruction begins a new rung or additional branch in a rung with a normally open contact. Status of the contact will be the same state as the associated image register point or memory location.



Store Not (STR NOT)

The Store Not instruction begins a new rung or additional branch in a rung with a normally closed contact. Status of the contact will be opposite the state of the associated image register point or memory location.



Data Type	D3-330 Range	D3-340 Range	D3-330P Range
	aaa	aaa	aaa
Inputs / Outputs	000-167 700-767	000-177 700-767	000-167 700-767
Control Relays	160-373	160-373 1000-1067	160-174 200-77
Special Control Relays	374-377 770-777	374-377 770-777 1074-1077	175-177 770-777
Shift Register Bits	400-577	400-577	—

In the following Store example, when input 000 is on, output 010 will energize.

DirectSOFT Display

Handheld Programmer Keystrokes

STR

SHF

0

ENT

OUT

SHF

1

0

ENT

In the following Store Not example, when input 000 is off output 010 will energize.

DirectSOFT Display

Handheld Programmer Keystrokes

STR

NOT

SHF

0

ENT

OUT

SHF

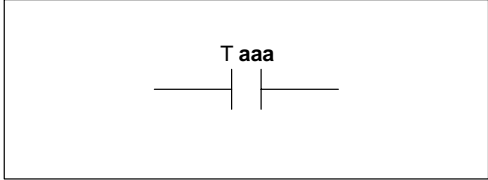
1

0

ENT

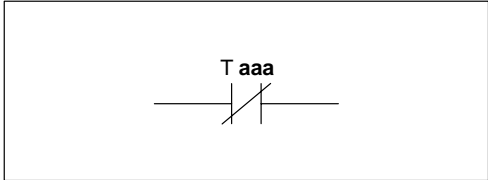
**Store Timer
(STR TMR)
DL330/340 Only**

The Store Timer instruction begins a new rung or additional branch in a rung with a normally open timer contact. The timer contact T aaa will be on when the timer current value is \geq the preset value of the associated timer.



**Store Not Timer
(STR NOT TMR)
DL330/340 Only**

The Store Not Timer instruction begins a new rung or additional branch in a rung with a normally closed timer contact. The timer contact T aaa will be on when the timer current value is $<$ the preset value of the associated timer.



Data Type	D3-330 Range	D3-340 Range	D3-330P Range*
	aaa	aaa	aaa
Timer T	600-677	600-677	—

* See Chapter12 for similar RLL *PLUS* instructions

In the following Store Timer example, when the current value in timer 600 is \geq the preset value output 017 will energize.

DirectSOFT Display



Handheld Programmer Keystrokes

STR TMR SHF 6 0 0 ENT
OUT SHF 1 7 ENT

In the following Store Not Timer example, when the current value in timer 600 is $<$ the preset value output 017 will energize.

DirectSOFT Display

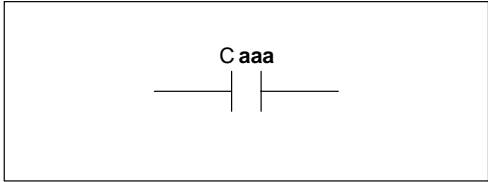


Handheld Programmer Keystrokes

STR NOT TMR SHF 6 0 0 ENT
OUT SHF 1 7 ENT

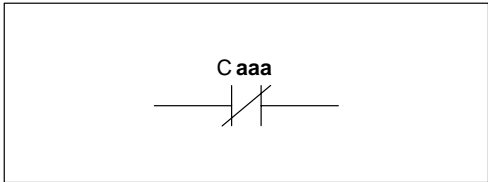
Store Counter
(STR CNT)
DL330/340 Only

The Store Counter instruction begins a new rung or additional branch in a rung with a normally open counter contact. The counter contact C aaa will be on when the counter current value \geq the preset value of the associated counter.



Store Not Counter
(STR NOT CNT)
DL330/340 Only

The Store Not Counter instruction begins a new rung or additional branch in a rung with a normally closed counter contact. The counter contact C aaa will be on when the counter current value is $<$ the preset value of the associated counter.



Data Type	D3-330 Range	D3-340 Range	D3-330P Range*
	aaa	aaa	aaa
Counter C	600-677	600-677	—

* See Chapter 12 for similar RLL^{PLUS} instructions

In the following Store Counter example, when the current value in counter 602 is \geq the preset value output 015 will energize.

DirectSOFT Display

Handheld Programmer Keystrokes

STR	CNT	SHF	6	0	2	ENT
OUT	SHF	1	5	ENT		

In the following Store Not Counter example, when the current value in counter 602 is $<$ the preset value output 015 will energize.

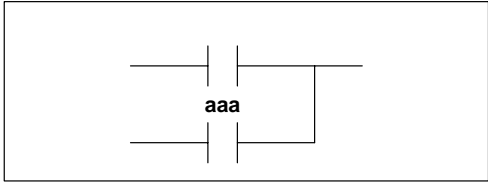
DirectSOFT Display

Handheld Programmer Keystrokes

STR	NOT	CNT	SHF	6	0	2	ENT
OUT	SHF	1	5	ENT			

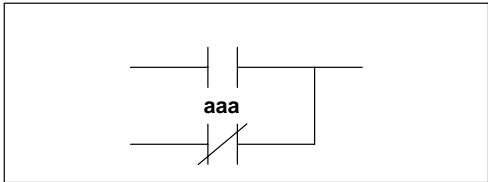
Or
(OR)

The Or instruction logically ors a normally open contact in parallel with another contact in a rung. The status of the contact will be the same state as the associated image register point or memory location.



Or Not
(OR NOT)

The Or Not instruction logically ors a normally closed contact in parallel with another contact in a rung. The status of the contact will be opposite the state of the associated image register point or memory location.



Data Type	D3-330 Range	D3-340 Range	D3-330P Range
	aaa	aaa	aaa
Inputs / Outputs	000-167 700-767	000-177 700-767	000-167 700-767
Control Relays	160-373	160-373 1000-1067	160-174 200-77
Special Control Relays	374-377 770-777	374-377 770-777 1074-1077	175-177 770-777
Shift Register Bits	400-577	400-577	—

In the following Or example, when input 000 or 001 is on output 010 will energize.

DirectSOFT Display



Handheld Programmer Keystrokes

STR	SHF	0	ENT	
OR	SHF	1	ENT	
OUT	SHF	1	0	ENT

In the following Or Not example, when input 000 is on or 001 is off output 010 will energize.

DirectSOFT Display

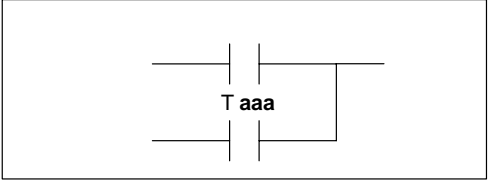


Handheld Programmer Keystrokes

STR	SHF	0	ENT	
OR	NOT	SHF	1	ENT
OUT	SHF	1	0	ENT

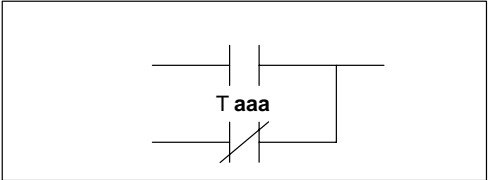
Or Timer
(OR TMR)
DL330/340 Only

The Or Timer instruction logically ors a normally open timer contact in parallel with another contact in a rung. The timer contact T aaa will be on when the timer current value is \geq the preset value of the associated timer.



Or Not Timer
(OR NOT TMR)
DL330/340 Only

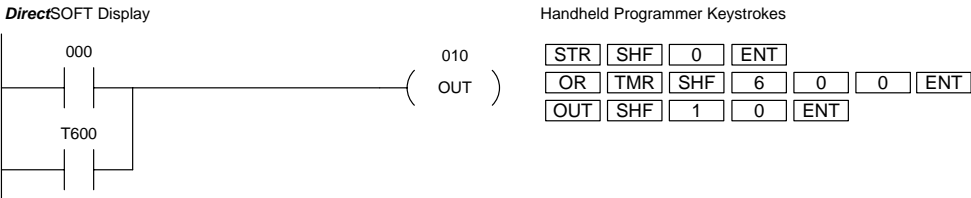
The Or Not Timer instruction logically ors a normally closed timer contact in parallel with another contact in a rung. The timer contact T aaa will be on when the timer current value is $<$ the preset value of the associated timer.



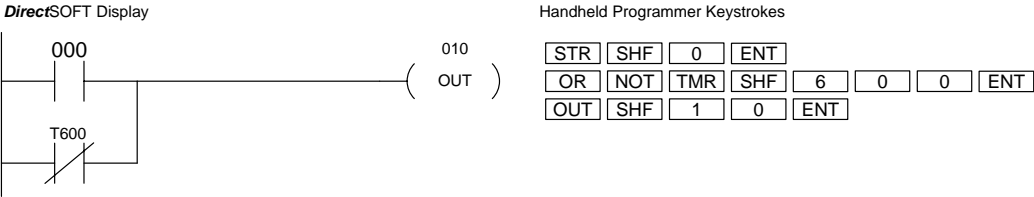
Data Type	D3–330 Range	D3–340 Range	D3–330P Range*
	aaa	aaa	aaa
Timer T	600–677	600–677	—

* See Chapter 12 for similar RLL^{PLUS} instructions

In the following Or Timer example, when input 000 is on or the current value in T600 is \geq the preset value output 010 will energize.

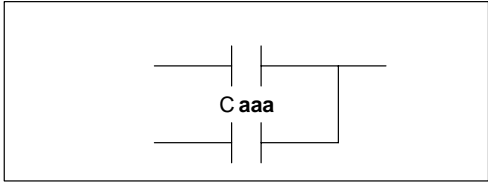


In the following Or Not Timer example, when input 000 is on or the current value in T600 is $<$ the preset value output 010 will energize.



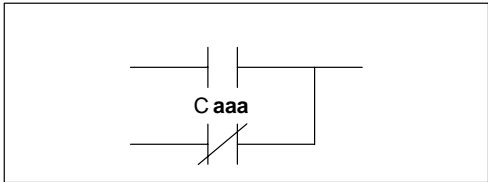
**Or Counter
(OR CNT)
DL330/340 Only**

The Or Counter instruction logically ors a normally open counter contact in parallel with another contact in a rung. The counter contact C aaa will be on when the counter current value is \geq the preset value of the associated counter.



**Or Not Counter
(OR NOT CNT)
DL330/340 Only**

The Or Not Counter instruction logically ors a normally closed counter contact in parallel with another contact in a rung. The counter contact C aaa will be on when the counter current value is $<$ the preset value of the associated counter.

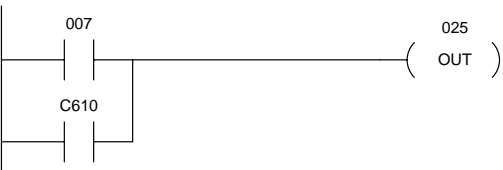


Data Type	D3-330 Range	D3-340 Range	D3-330P Range*
	aaa	aaa	aaa
Counter C	600-677	600-677	—

* See Chapter 12 for similar RLL^{PLUS} instructions

In the following Or Counter example, when input 007 is on or the current value in C610 is \geq the preset value output 025 will energize.

DirectSOFT Display



Handheld Programmer Keystrokes

STR SHF 7 ENT
OR CNT SHF 6 1 0 ENT
OUT SHF 2 5 ENT

In the following Or Not Counter example, when input location 007 is on or the current value in C610 is $<$ the preset value output 025 will energize.

DirectSOFT Display

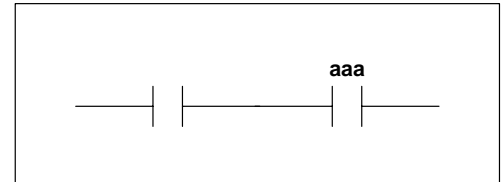


Handheld Programmer Keystrokes

STR SHF 7 ENT
OR NOT CNT SHF 6 1 0 ENT
OUT SHF 2 5 ENT

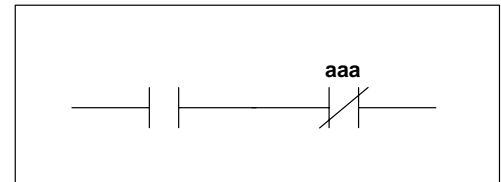
And (AND)

The And instruction logically ands a normally open contact in series with another contact in a rung. The status of the contact will be the same state as the associated image register point or memory location.



And Not (AND NOT)

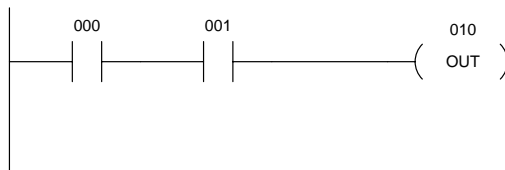
The And Not instruction logically ands a normally closed contact in series with another contact in a rung. The status of the contact will be opposite the state of the associated image register point or memory location.



Data Type	D3-330 Range	D3-340 Range	D3-330P Range
	aaa	aaa	aaa
Inputs / Outputs	000-167 700-767	000-177 700-767	000-167 700-767
Control Relays	160-373	160-373 1000-1067	160-174 200-77
Special Control Relays	374-377 770-777	374-377 770-777 1074-1077	175-177 770-777
Shift Register Bits	400-577	400-577	—

In the following And example, when input 000 and 001 is on output 010 will energize.

DirectSOFT Display

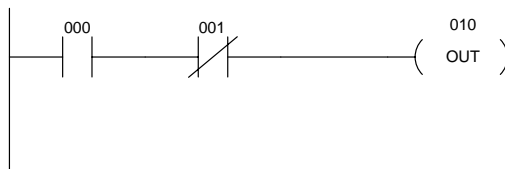


Handheld Programmer Keystrokes

STR SHF 0 ENT
AND SHF 1 ENT
OUT SHF 1 0 ENT

In the following And Not example, when input 000 is on and 001 is off output 010 will energize.

DirectSOFT Display

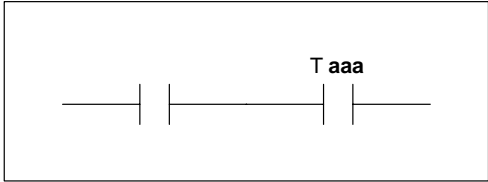


Handheld Programmer Keystrokes

STR SHF 0 ENT
AND NOT SHF 1 ENT
OUT SHF 1 0 ENT

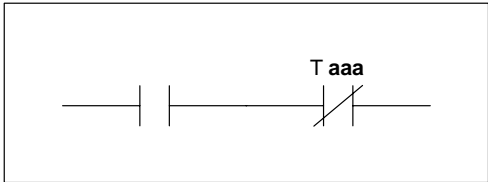
**And Timer
(AND TMR)
DL330/340 Only**

The And Timer instruction logically ands a normally open timer contact in series with another contact in a rung. The timer contact T aaa will be on when the timer current value \geq the preset value of the associated timer.



**And Not Timer
(AND NOT TMR)
DL330/340 Only**

The And Not Timer instruction logically ands a normally closed timer contact in series with another contact in a rung. The timer contact T aaa will be on when the timer current value is $<$ the preset value of the associated timer.

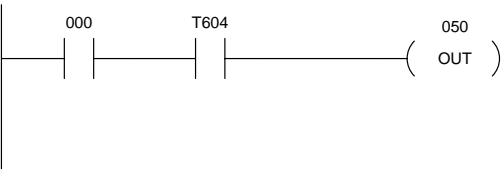


Data Type	D3-330 Range	D3-340 Range	D3-330P Range*
	aaa	aaa	aaa
Timer T	600-677	600-677	—

* See Chapter 12 for similar RLL^{PLUS} instructions

In the following And Timer example, when input 000 is on and the current value in timer 604 is \geq the preset value output 050 will energize.

DirectSOFT Display

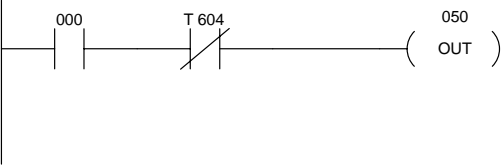


Handheld Programmer Keystrokes

STR SHF 0 ENT
AND TMR SHF 6 0 4 ENT
OUT SHF 5 0 ENT

In the following And Not Timer example, when input 000 is on and the current value in timer 604 is $<$ the preset value output 050 will energize.

DirectSOFT Display

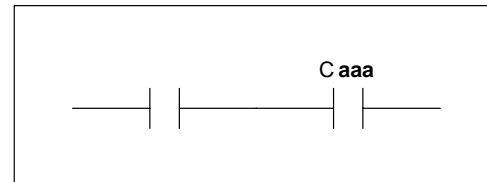


Handheld Programmer Keystrokes

STR SHF 0 ENT
AND NOT TMR SHF 6 0 4 ENT
OUT SHF 5 0 ENT

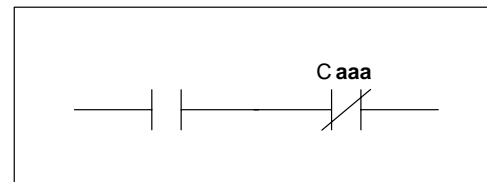
And Counter (AND CNT) DL330/340 Only

The And Counter instruction logically ands a normally open counter contact in series with another contact in a rung. The counter contact C aaa will be on when the counter current value is \geq the preset value of the associated counter.



And Not Counter (AND NOT CNT) DL330/340 Only

The And Not Counter instruction logically ands a normally closed counter contact in series with another contact in a rung. The counter contact C aaa will be on when the counter current value is $<$ the preset value of the associated counter.

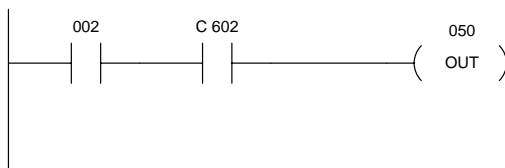


Data Type	D3–330 Range	D3–340 Range	D3–330P Range
	aaa	aaa	aaa
Counter C	600–677	600–677	—

* See Chapter 12 for similar RLL^{PLUS} instructions

In the following And Counter example, when input 002 is on and the current value in counter 602 is \geq the preset value output 050 will energize.

DirectSOFT Display

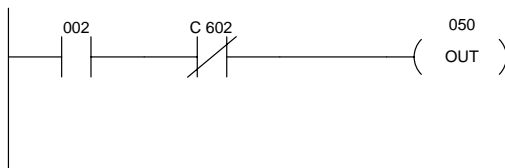


Handheld Programmer Keystrokes

STR SHF 2 ENT
AND CNT SHF 6 0 2 ENT
OUT SHF 5 0 ENT

In the following And Not Counter example, when input 002 is on and the current value in counter 602 is $<$ the preset value output 050 will energize.

DirectSOFT Display

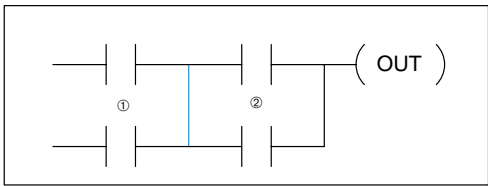


Handheld Programmer Keystrokes

STR SHF 2 ENT
AND NOT TMR SHF 6 0 2 ENT
OUT SHF 5 0 ENT

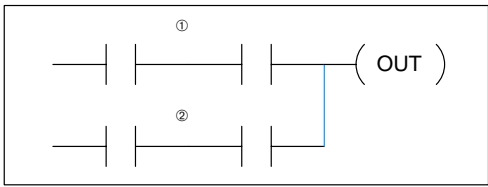
**And Store
(AND STR)**

The And Store instruction logically ands two branches of a rung in series. Both branches must begin with the Store instruction.



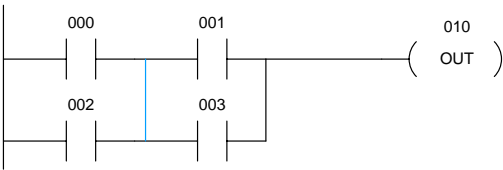
**Or Store
(OR STR)**

The Or Store instruction logically ors two branches of a rung in parallel. Both branches must begin with the Store instruction.



In the following And Store example, the branch consisting of contacts 000 and 002 have been anded with the branch consisting of contacts 001 and 003.

DirectSOFT Display

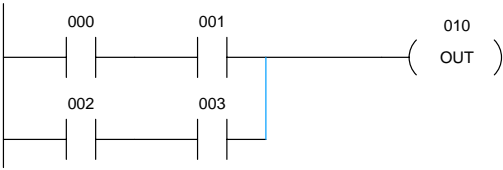


Handheld Programmer Keystrokes

STR	SHF	0	ENT
OR	SHF	2	ENT
STR	SHF	1	ENT
OR	SHF	3	ENT
AND	STR	ENT	
OUT	SHF	1	0 ENT

In the following Or Store example, the branch consisting of 000 and 001 have been ored with the branch consisting of 002 and 003.

DirectSOFT Display

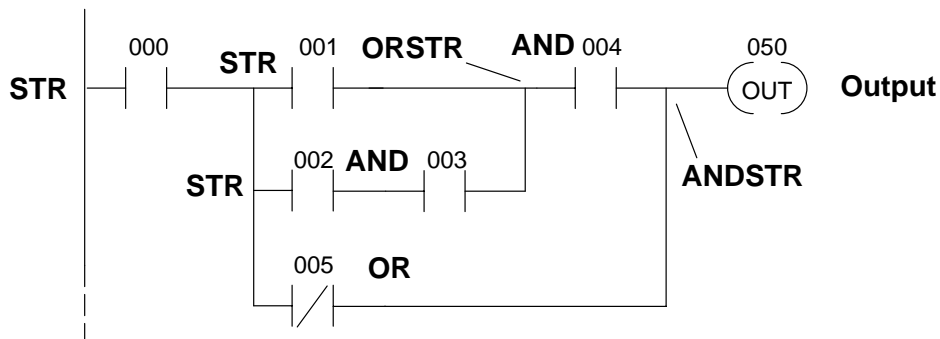


Handheld Programmer Keystrokes

STR	SHF	0	ENT
AND	SHF	1	ENT
STR	SHF	2	ENT
AND	SHF	3	ENT
OR	STR	ENT	
OUT	SHF	1	0 ENT

There are limits to what you can enter with these simple boolean instructions. This is because the DL305 CPUs use an 8-level stack to evaluate the various logic elements. The stack is a temporary storage area that helps solve the logic for the rung. Each time you enter a Store instruction, the instruction is placed on the top of the stack. Any other instructions on the stack are pushed down a level. The And, Or, And Store, and Or Store instructions combine levels of the stack when they are encountered. Since the stack is only eight levels, an error will occur if the CPU encounters a rung that uses more than the eight levels of the stack.

The following example shows how the stack is used to solve simple boolean logic.



1 STR 000

1	STR 000
2	
3	
4	
5	
6	
7	
8	

2 STR 001

1	STR 001
2	STR 000
3	
4	
5	
6	
7	
8	

3 STR 002

1	STR 002
2	STR 001
3	STR 000
4	
5	
6	
7	
8	

4 AND 003

1	002 AND 003
2	STR 001
3	STR 000
4	
5	
6	
7	
8	

5 ORSTR

1	001 OR (002 AND 003)
2	STR 000
3	

:

8	
---	--

6 AND 004

1	004 AND [001 OR (002 AND 003)]
2	STR 000
3	

:

8	
---	--

7 OR 005

1	005 OR 004 AND [001 OR (002 AND 003)]
2	STR 000
3	

:

8	
---	--

8 ANDSTR

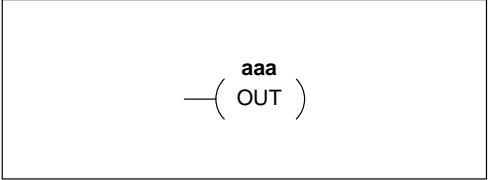
1	000 AND (005 OR 004) AND [001 OR (002 AND 003)]
2	
3	

:

8	
---	--

Out
(OUT)

The Out instruction reflects the status of the rung (on/off) and outputs the discrete (on/off) state to the specified image register point or memory location. Multiple Out instructions referencing the same discrete location should not be used because only the last Out instruction in the program will control the physical output point.



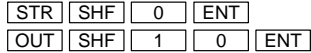
Data Type	D3-330 Range	D3-340 Range	D3-330P Range
	aaa	aaa	aaa
Outputs	000-167 700-767	000-177 700-767	000-167 700-767
Control Relays	160-373	160-373 1000-1067	160-174 200-77
Shift Register Bits	400-577	400-577	—

In the following Out example, when input 000 is on output 010 will energize.

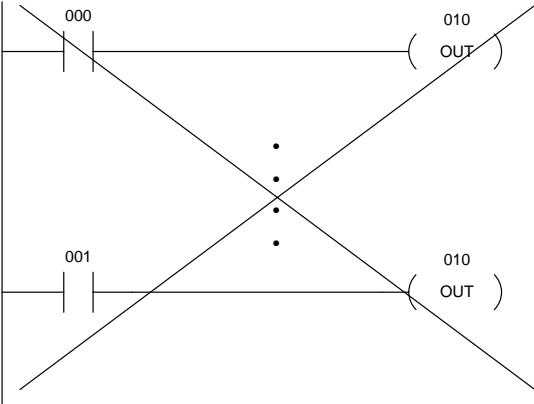
DirectSOFT Display



Handheld Programmer Keystrokes

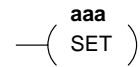


In the following Out example, two Out instructions using output 10 are used in the program. The status of output 010 being controlled by input 001 will override the instance of output 010 being controlled by input 000. The physical output would always be controlled by input 001.



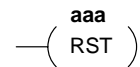
Set (SET) DL330/340 Only

The Set instruction sets or turns on an output. Once the output is set it will remain on until it is reset using the Reset instruction. It is not necessary for the input controlling the Set instruction to remain on. The Set instruction is sometimes known as a latch. The Reset instruction is used to reset the output.



Reset (RST) DL330/340 Only

The Reset instruction resets or turns off an output. Once the output is reset it is not necessary for the input to remain on. The Reset instruction is sometimes known as an unlatch instruction.



Data Type	D3–330 Range	D3–340 Range	D3–330P Range*
	aaa	aaa	aaa
Outputs	000–167 700–767	000–177 700–767	—
Control Relays	160–373	160–373 1000–1067	—
Shift Register Bits	400–577	400–577	—

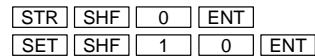
* See Chapter 12 for similar RLL^{PLUS} instructions

In the following Set example, when input 000 is on output 010 will be energized.

DirectSOFT Display



Handheld Programmer Keystrokes

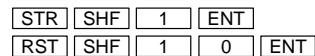


In the following Reset example, when input 001 is on output 010 will de-energize.

DirectSOFT Display

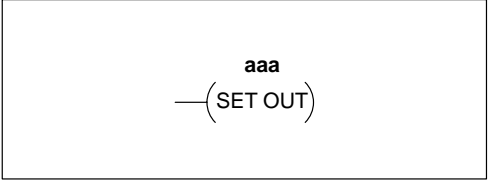


Handheld Programmer Keystrokes



**Set Out
(SET OUT)**

The Set Out instruction reflects the status of the rung (on/off) and outputs the discrete (on/off) state to the specified image register location. This instruction is similar to the Out instruction except the output disable coil (special relay 376) will not override and disable the output. Multiple Set Out instructions referencing the same discrete location should not be used because only the last Set Out instruction in the program will control the physical output point.



Data Type	D3-330 Range	D3-340 Range	D3-330P Range
	aaa	aaa	aaa
Outputs	000-167 700-767	000-177 700-767	000-167 700-767

In the following Set Out example, when input location 000 is on output 020 will energize. The output disable coil (special relay 376) will not override this output coil.

DirectSOFT Display

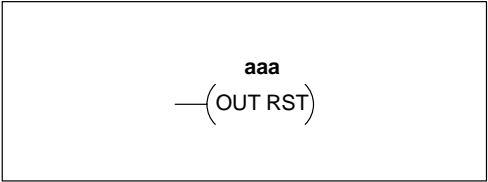


Handheld Programmer Keystrokes



Set Out Reset
(SET OUT RST)

The Set Out Reset instruction is typically known as a one shot. When the input logic produces an off to on transition the output will turn on for one CPU scan.



Data Type	D3–330 Range	D3–340 Range	D3–330P Range
	aaa	aaa	aaa
Outputs	000–167 700–767	000–177 700–767	000–167 700–767
Control Relays	160–373	160–373 1000–1067	160–174 200–77

In the following Set Out Reset example, when input 007 transitions from off to on, control relay 160 will energize for the remainder of the CPU scan.

