Using a Sentinel instrument in a PLC Controlled Machine

SUMMARY

In many applications, a user will integrate the Sentinel leak test instrument into a machine that is controlled by a PLC. This bulletin provides a typical wiring diagram and program listing for a Sentinel I-21/B-21/F-21/C-20 instrument controlled by a SLC 500 PLC.

DISCUSSION

The Sentinel instruments' tooling control capabilities are generally limited to simple functions which will always occur within the leak test sequence. For more extensive control capabilities, users generally have a PLC perform all control functions, including motion control. To provide for this need, the Sentinel instruments have several 110 vac or 24 vdc inputs and outputs that allow the PLC to have complete control of the instrument. The attached sheets serve as an example of a rather simple integration. By using the "part select" and "auto cal" inputs, the PLC can run all of the Sentinel functions, eliminating the operator keypad entirely.
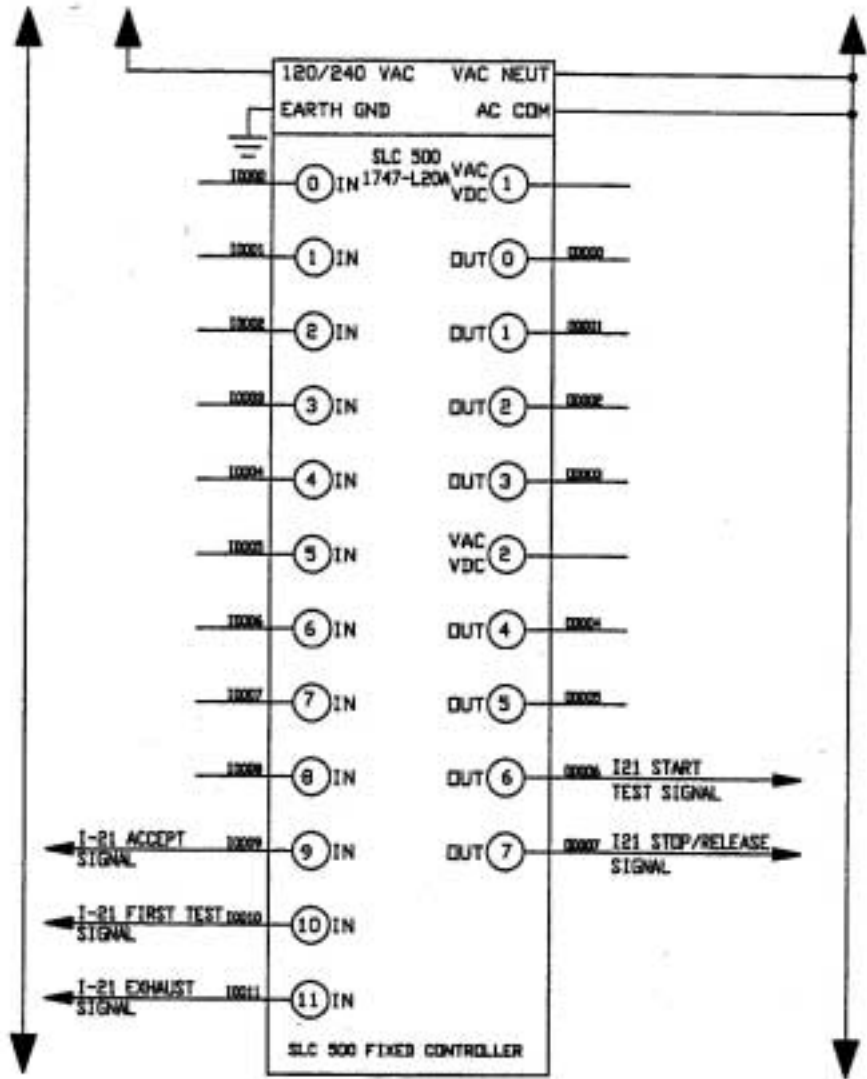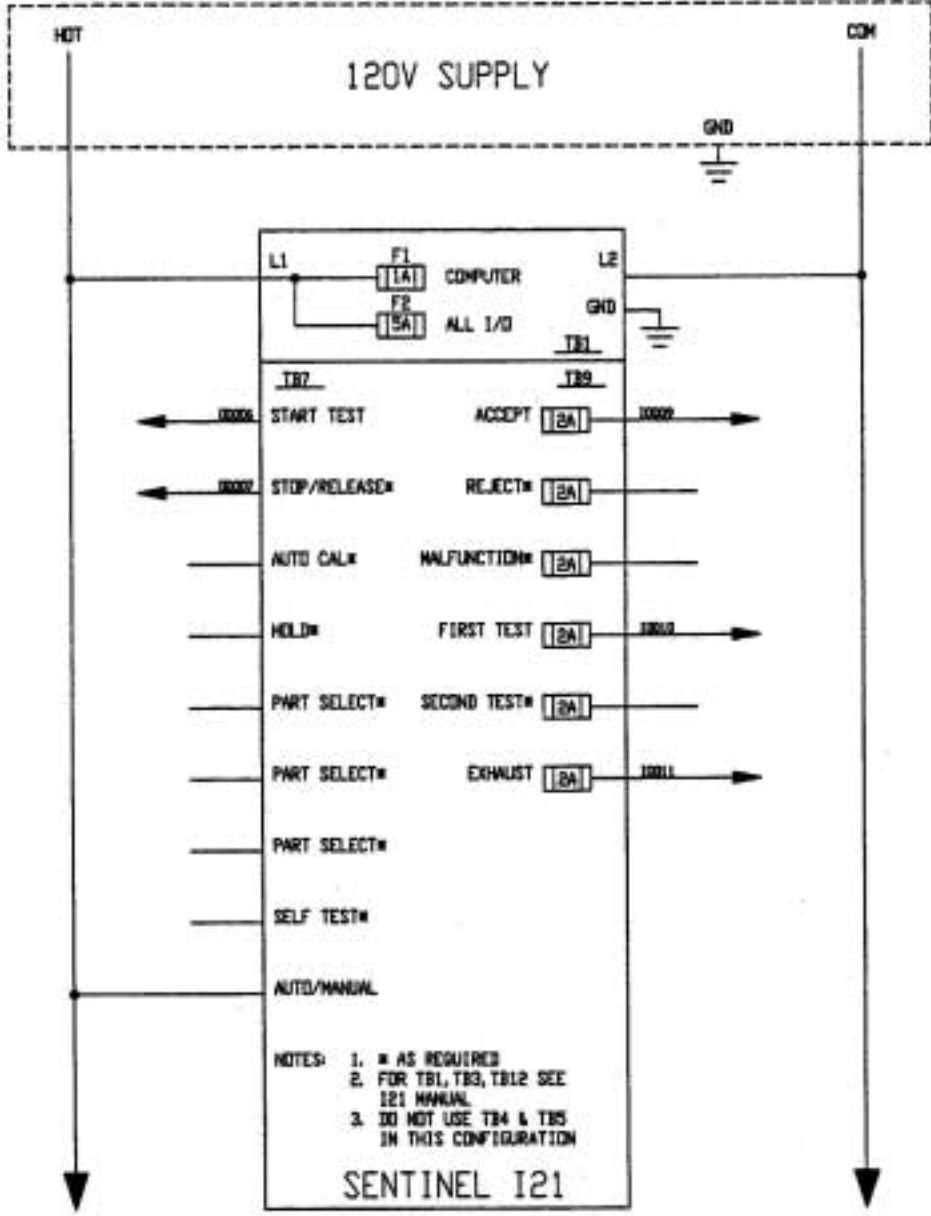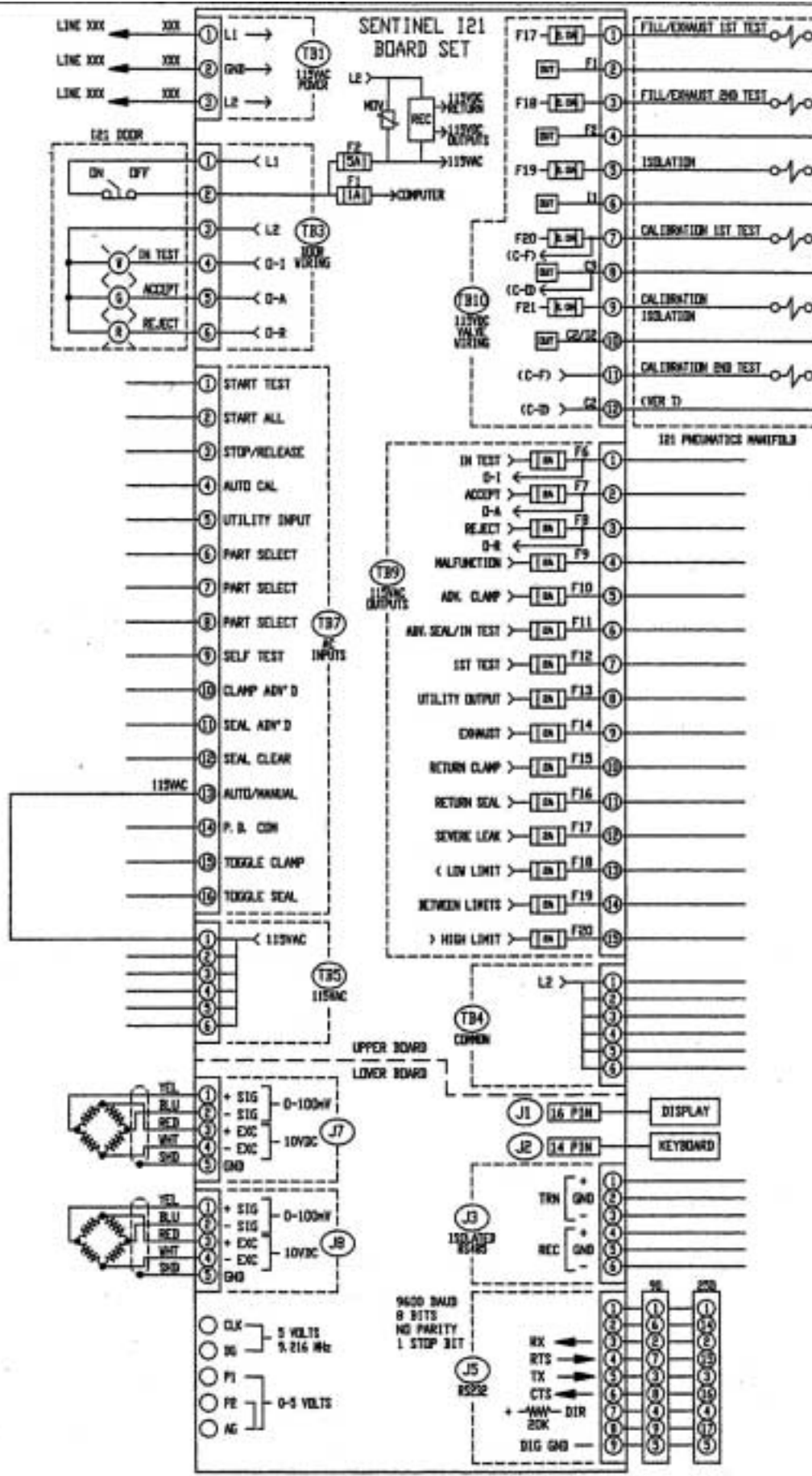
B.B./G.G.
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120V SUPPLY

SENTINEL I21

NOTES: 1. ▪ AS REQUIRED
2. FOR TB1, TB3, TB12 SEE
I21 MANUAL.
3. DO NOT USE TB4 & TB5
IN THIS CONFIGURATION

SENTINEL 121 BOARD SET

4
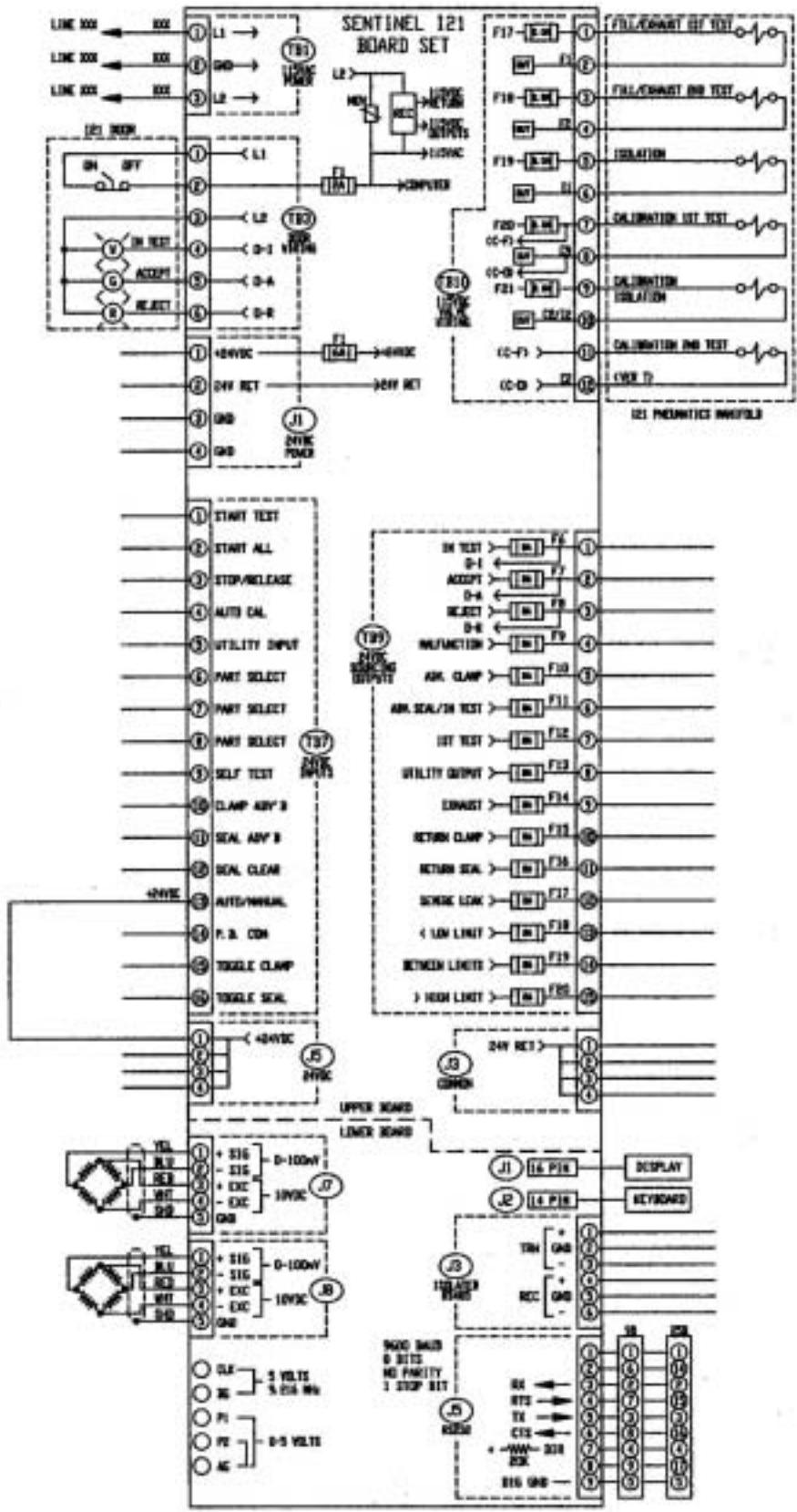
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|This rung is both the completion of the tooling sequence and
|the starting point for the I21.
|The I21 Machine control should be set to "YNP". The clamp and seal
|timers should be set to 0.0
|The Exhaust timer should be set long enough to exhaust the part
|down to a safe level to unseal the part (minimum of .5 seconds).
|                                                                            Tooling Sequenc |
|                                                                            Complete        |
|  Part    Part      Part                                                    Start Leak Test |
|  Sealed  Unsealed  Clamped                                                       B3        |0,1,2,3
|  1:0.0   1:0.0       B3                                                          B3        |
0+-+--] [------]/[---+----] [---------------------------------------------------( )-------+
| :   4         5    |    0                                                         1
| :Tooling Sequenc   |
| :Complete          |
| :Start Leak Test   |
| :     B3           |
| +--------] [-------+
|              1
|This rung latches in when the I21 has started a test.
|Note: check of I/O for accept and exhaust signals to be off.
|                                                             Tooling Sequence
|  In First Test   Accept Signal  Exhaust Signal  Fault - I21 did  Complete         I21 Has Started |
|  Signal From I21 From I21       From I21        Not Start.       Start Leak Test  Testing         |
|     1:0.0           1:0.0          1:0.0           T4:1              B3               B3           |1,/2,/3,4
1+-+-------] [--------------]/[-------------]/[--------------]/[-------+-------] [----------------( )-------+
| :         10          9               11              DN        |        1                2
| :121 Has Started                                               |
| :Testing                                                       |
| :      B3                                                      |
| +--------] [---------------------------------------------------+
|              2
|Fault timer to check if the I21 started a test.
|If the machine is manually loaded, Do not retract tooling and
|indicate an error.
|                  Tooling Sequenc                                   Maximum Start
|  I21 Has Started Complete          I21 Has Started                 Signal To I21
|  Testing         Start Leak Test   Testing                         Fault
|      B3              B3                B3                           +--TON------------+        |T4:1.DN - /
2+-+-------]/[-------+-------] [--------------]/[---------------------------------+Timer On Delay  +-(EN)-+
| :        2         |       1                2                      |TIMER:        T4:1|
| :                  |                                               |BASE (SEC):  0.01+-(DN) |
| :                  |                                               |PRESET:         50|
| :Fault - I21 did   |                                               |ACCUM:           0|
| :Not Start.        |                                               +------------------+
| :      T4:1        |
| +--------] [-------+
|              DN
|Start Signal to the I21
|Tooling Sequenc
|Complete          I21 Has Started  Fault - I21 did                              Start Signal |
|Start Leak Test   Testing          Not Start.                                   to The I21   |
|      B3              B3               T4:1                                        0:0.0      |
3+--------] [--------------]/[--------------]/[---------------------------------------( )------+
|          1               2               DN                                          6
```
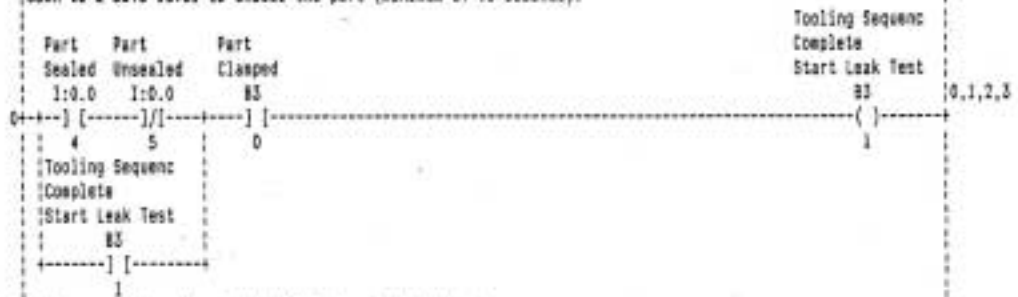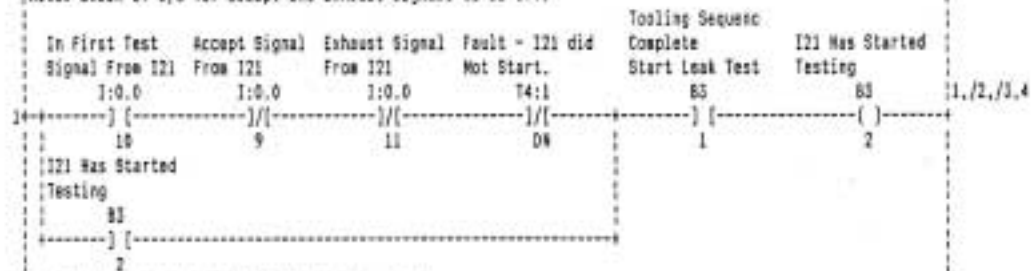
```
:The I21 has completed its test and the exhaust timer is running.
:                                                                          I21 Is
:  Exhaust Signal  In First Test    I21 Has Started                        Exhausting
:  From I21        Signal From I21   Testing                                The Part
:     I:0.0           I:0.0            B3                                      B3      :4,5,6
4+-+-----] [----------------] [-------+--------] [--------------------------------( )-----+
 | |     11              10     |        2                                        3
 | | I21 Is                     |
 | |Exhausting                  |
 | |The Part                    |
 | |   B3                       |
 | +----] [--------------------+
 |     3
:This is the PLC internal I21 reject latch.
:If the machine is manually loaded, use this latch to prevent
:the tooling from unclamping until the reject reset button is
:pushed.
:                                                   I21 Is
:  Exhaust Signal  Accept Signal  I21 Accept      Exhausting                I21 Reject
:  From I21        From I21        Latch           The Part                  Latch
:     I:0.0           I:0.0          B3              B3                         B3      :5,/6,7
5+-+------]/[---------------]/[----------]/[-----+-----] [--------------------------( )-----+
 | |     11              9           5     |       3                               4
 | |I21 Reject                            |
 | |Latch                                 |
 | |   B3                                 |
 | +----] [------------------------------+
 |     4
:This is the PLC internal I21 accept latch
:
:                                                   I21 Is
:  Exhaust Signal  Accept Signal  I21 Reject      Exhausting                I21 Accept
:  From I21        From I21        Latch           The Part                  Latch
:     I:0.0           I:0.0          B3              B3                         B3      :/5,6,7
6+-+------]/[----------------] [------+----]/[---------] [--------------------------( )-----+
 | |     11              9     |        4          3                               5
 | |I21 Accept                |
 | |Latch                     |
 | |   B3                     |
 +----] [----------------------+
 |     5
:I21 sequence complete marker.
:  Fault - I21 did                                                          I21 Sequence
:  Not Start.                                                               Complete
:     T4:1                                                                     B3
7+-+-------] [-----+----------------------------------------------------------------( )-----+
 | |     DN        |                                                               6
 | |I21 Reject     |
 | |Latch          |
 | |   B3          |
 | +----] [--------+
 | |     4        |
 | |I21 Accept    |
 | |Latch         |
 | |   B3         |
 | +----] [-------+
 |     5
8+---------------------------------------------------------------------------------[END]-+
```