Diode Matrix controllers route definitions.   5/30/2019

Notes: (turnout transactions) [route LED's] {diodes} + Group reset

1. **Operational Routes**
   a. **D Yard Auto Return Loop – Route 1 (3) [5] {8} Black**
      i. Set TO 1c, 2t, 3t
      ii. PB/Light 1t
      iii. Reset Lights 2c, 3c, 4c, 5c
   b. **Helix Enter D Yard – Route 2 (3) [5] {8} Blue**
      i. Set TO 1c, 2t, 3c
      ii. PB/Light 2t
      iii. Reset Lights 1c, 3c, 4c, 5c,
   c. **D Yard Exit to Helix – Route 3 (3) [5] {8} Gray**
      i. Set TO 1t, 2t, 3t
      ii. PB/Light 3t
      iii. Reset Lights 1c, 2c, 4c, 5c
   d. **D Yard to D Yard – Route 4 (3) [5] {8} Green**
      i. Set TO 1c, 2t, 3c
      ii. PB/Light 4t
      iii. Reset Lights 1c, 2c, 3c, 5c
   e. **D Yard > C Yard – Route 5 (4) [3] {7} Orange**
      i. Set TO 1t, 2c, 20c, 25c
      ii. PB/Light 5t
      iii. Group reset (1-5, 21-29, 31-39)
      iv. Group reset (40-45)
2. **D Yard Entry Ladder**
   a. **D Yard Track 1 – Route 11 (1) [5] {6} Red**
      i. Set TO 4c
      ii. B/Light 11t
      iii. Reset Lights 12c, 13c, 14c, 15c
   b. **D Yard Track 2 – Route 12 (2) [5] {7} Violet**
      i. Set TO 4t, 5t
      ii. PB/Light 12t
      iii. Reset Lights 11c, 13c, 14c, 15c
   c. **D Yard Track 3 – Route 13 (3) [5] {8} White**
      i. Set TO 4t, 5c, 6t
      ii. PB/Light 13t
      iii. Reset Lights 11c, 12c, 14c, 15c
   d. **D Yard Track 4 – Route 14 (4) [5] {9} Yellow**
      i. Set TO 4t, 5c, 6c, 7t
      ii. PB/Light 14t

        iii. Reset Lights 11c, 12c, 13c, 15c

    e. **D Yard Track 5 – Route 15 (4) [5] {9} Black**

        i. Set TO 4t, 5c, 6c, 7c

        ii. PB/Light 15t

        iii. Reset Lights 11c, 12c, 13c, 14c

3. **D Yard Exit Ladder**

    a. **D Yard Track 1 – Route 16 (3) [4] {7} Blue**

        i. Set TO 8c, 9c, 10c

        ii. PB/Light 16t

        iii. Reset Lights 17c, 18, 19c

    b. **D Yard Track 2 – Route 17 (3) [4] {7} Gray**

        i. Set TO 8t, 9c, 10c

        ii. PB/Light 17t

        iii. Reset Lights 16c, 18c, 19c

    c. **D Yard Track 3 – Route 18 (2) [4] {6} Green**

        i. Set TO 9t, 10c

        ii. PB/Light 18t

        iii. Reset Lights 16c, 17c, 19c

    d. **D Yard Track 4 – Route 19 (1) [4] {5} Orange**

        i. Set TO 10t

        ii. PB/Light 19t

        iii. Reset Lights 16c, 17c, 18c

4. **C Yard Entry Ladder**

    a. **C Yard Track 4 – Route 21 (7) [1] {10} Red**

        i. Set TO 1c, 2c, 20c, 25c, 11c, 18c, 19t

        ii. PB/Light 21t

        iii. GR1 (1-5, 21-29, 31-39)

        iv. GR2 (40-45)

    b. **C Yard Track 5 – Route 22 (7) [1] {10} Violet**

        i. Set TO 1c, 2c, 20c, 25c, 11c, 18c, 19c

        ii. PB/Light 22t

        iii. GR1 (1-5, 21-29, 31-39)

        iv. GR2 (40-45)

    c. **C Yard Track 6 – Route 23 (8) [1] {11} White**

        i. Set TO 1c, 2c, 20c, 25c, 11t, 12t, 16t, 17t

        ii. PB/Light 23t

        iii. GR1 (1-5, 21-29, 31-39)

        iv. GR2 (40-45)

    d. **C Yard Track 7 – Route 24 (8) [1] {11} Yellow**

        i. Set TO 1c, 2c, 20c, 25c, 11t, 12t, 16t, 17c

        ii. PB/Light 24t

        iii. GR1 (1-5, 21-29, 31-39)

        iv. GR2 (40-45)

   e. **C Yard Track 8 – Route 25 (7) [1] {10} Black**
        i. Set TO 1c, 2c, 20c, 25c, 11t, 12t, 16c
        ii. PB/Light 25t
        iii. GR1 (1-5, 21-29, 31-39)
        iv. GR2 (40-45)

   f. **C Yard Track 9 – Route 26 (8) [1] {11} Blue**
        i. Set TO 1c, 2c, 20c, 25c, 11t, 12c, 13t, 15t
        ii. PB/Light 26t
        iii. GR1 (1-5, 21-29, 31-39)
        iv. GR2 (40-45)

   g. **C Yard Track 10 – Route 27 (8) [1] {11} Gray**
        i. Set TO 1c, 2c, 20c, 25c, 11t, 12c, 13t, 15c
        ii. PB/Light 27t
        iii. GR1 (1-5, 21-29, 31-39)
        iv. GR2 (40-45)

   h. **C Yard Track 11 – Route 28 (8) [1] {11} Green**
        i. Set TO 1c, 2c, 20c, 25c, 11t, 12c, 13c, 14t
        ii. PB/Light 28t
        iii. GR1 (1-5, 21-29, 31-39)
        iv. GR2 (40-45)

   i. **C Yard Track 12 – Route 29 (8) [1] {11} Orange**
        i. Set TO 1c, 2c, 20c, 25c, 11t, 12c, 13c, 14c
        ii. PB/Light 29t
        iii. GR1 (1-5, 21-29, 31-39)
        iv. GR2 (40-45)

5. **C Yard Exit Ladder**

   a. **C Yard Track 4 – Route 31 (5) [1] {8} Red**
        i. Set TO 1c, 2c, 20t, 21t, 22c
        ii. PB/Light 31t
        iii. GR1 (1-5, 21-29, 31-39)
        iv. GR2 (40-45)

   b. **C Yard Track 5 – Route 32 (5) [1] {8} Violet**
        i. Set TO 1c, 2c, 20t, 21t, 22t
        ii. PB/Light 32t
        iii. GR1 (1-5, 21-29, 31-39)
        iv. GR2 (40-45)

   c. **C Yard Track 6 – Route 33 (6) [1] {9} White**
        i. Set TO 1c, 2c, 20t, 21c, 23c, 24c
        ii. PB/Light 33t
        iii. GR1 (1-5, 21-29, 31-39)
        iv. GR2 (40-45)

d. **C Yard Track 7 – Route 34 (6) [1] {9} Yellow**
   i. Set TO 1c, 2c, 20t, 21c, 23c, 24t
   ii. PB/Light 34t
   iii. GR1 (1-5, 21-29, 31-39)
   iv. GR2 (40-45)

e. **C Yard Track 8 – Route 35 (5) [1] {8} Black**
   i. Set TO 1c, 2c, 20t, 21c, 23t
   ii. PB/Light 35t
   iii. GR1 (1-5, 21-29, 31-39)
   iv. GR2 (40-45)

f. **C Yard Track 9 – Route 36 (7) [1] {10} Blue**
   i. Set TO 1c, 2c, 20c, 25t, 26c, 27c, 28c
   ii. PB/Light 36t
   iii. GR1 (1-5, 21-29, 31-39)
   iv. GR2 (40-45)

g. **C Yard Track 10 – Route 37 (7) [1] {10} Gray**
   i. Set TO 1c, 2c, 20c, 25t, 26c, 27c, 28t
   ii. PB/Light 37t
   iii. GR1 (1-5, 21-29, 31-39)
   iv. GR2 reset (40-45)

h. **C Yard Track 11 – Route 38 (6) [1] {9} Green**
   i. Set TO 1c, 2c, 21c, 25t, 26c, 27t
   ii. PB/Light 38t
   iii. GR1 (1-5, 21-29, 31-39)
   iv. GR2 (40-45)

i. **C Yard Track 12 – Route 39 (5) [1] {8} Orange**
   i. Set TO 1c, 2c, 20c, 25t, 26t
   ii. PB/Light 39t
   iii. GR1 (1-5, 21-29, 31-39)
   iv. GR2 (40-45)

6. **C Yard Return Loop Sidings**
   a. **C Yard Helix Return Loop Enter Main Line Track 1 – Route 40 (9) [3] {12} Red**
      i. Set TO 1c, 2c, 11c, 18t, 20c, 25c, 29c, 31c, 32t
      ii. PB/Light 40t
      iii. GR1 (1-5, 21-29, 31-39)
      iv. GR2 (40-45)

   b. **C Yard Helix Return Loop Enter Track 2 – Route 41 (8) [3] {11} Violet**
      i. Set TO 1c, 2c, 11c, 18t, 20c, 25c, 29t, 30t
      ii. PB/Light 41t
      iii. GR1 (1-5, 21-29, 31-39)
      iv. GR2 (40-45)

      c. C Yard Helix Return Loop Enter Track 3 – Route 42 (8) [3] {11} White
- i. Set TO 1c, 2c, 11c, 18t, 20c, 25c, 29t, 30c
- ii. PB/Light 42t
- iii. GR1 (1-5, 21-29, 31-39)
- iv. GR2 (40-45)

      d. C Yard Helix Return Loop Exit Main Line Track 1 – Route 43 (4) [3] {7} Yellow
- i. Set TO 1c, 2c, 31c, 32t
- **ii.** PB/Light 43t
- iii. GR1 (1-5, 21-29, 31-39)
- iv. GR2 (40-45)

      e. C Yard Helix Return Loop Exit Track 2 – Route 44 (4) [3] {7} Black
- i. Set TO 1c, 2c, 31t, 32t
- ii. PB/Light 44t
- iii. GR1 (1-5, 21-29, 31-39)
- iv. GR2 (40-45)

      f. C Yard Helix Return Loop Exit Track 3 – Route 45 (3) [3] {6} Blue
- i. Set TO 1c, 2c, 32c
- ii. PB/Light 45t
- iii. GR1 (1-5, 21-29, 31-39)
- iv. GR2 (40-45)

7. GR2 (0) [6] {6} **Gray** (.2uf used for GR2 function)
   - a. GR2 (40-45)
8. GR1 (0) [23] {23} **Green** (.2uf used for GR1 function)
   - a. GR1 (1-5, 21-29, 31-39)
9. PON (39th route, at end of PB connections) **Orange**
   - a. c input to ground
     - i. 38 route latches – Orange
     - ii. 32 tortoise latches
     - iii. PB Reset used for diagnostics
10. Inputs
    - a. PB 1 Route 1
    - b. PB 2 Route 2
    - c. PB 3 Route 3
    - d. PB 4 Route 4
    - e. PB 5 Route 5
    - f. PB 11 Route 11
    - g. PB 12 Route 12
    - h. PB 13 Route 13
    - i. PB 14 Route 14
    - j. PB 15 Route 15
    - k. PB 16 Route 16

     l.   PB 17 Route 17

   m. PB 18 Route 18

    n. PB 19 Route 19

    o. PB 21 Route 21

    p. PB 22 Route 22

    q. PB 23 Route 23

    r. PB 24 Route 24

    s. PB 25 Route 25

    t. PB 26 Route 26

    u. PB 27 Route 27

    v. PB 28 Route 28

   w. PB 29 Route 29

    x. PB 30 Route 31

    y. PB 31 Route 32

    z. PB 33 Route 33

aa. PB 34 Route 34

bb. PB 35 Route 35

cc. PB 36 Route 36

dd. PB 37 Route 37

ee. PB 38 Route 38

ff. PB 39 Route 39

gg. PB 40 Route 40

hh. PB 41 Route 41

ii. PB 42 Route 42

jj. PB 43 Route 43

kk. PB 44 Route 44

ll. PB 45 Route 45

11. Outputs
    a. Turnouts
        1. TO1 1-2
        2. TO2 3-4
        3. TO3 5-6
        4. TO4 7-8
        5. TO5 9-10
        6. TO6 11-12
        7. TO7 13-14
        8. TO8 15-16
        9. TO9 17-18
        10. TO10 19-20
        11. TO12 21-22
        12. TO13 23-24
        13. TO14 25-26

14. TO15 27-28
15. TO16 29-30
16. TO17 31-32
17. TO18 33-34
18. TO19 35-36
19. TO20 37-38
20. TO21 39-40
21. TO22 41-42
22. TO23 43-44
23. TO24 45-46
24. TO25 47-48
25. TO26 49-50
26. TO27 51-52
27. TO28 53-54
28. TO29 55-56
29. TO30 57-58
30. TO31 59-60
31. TO32 61-62
32. TO33 63-64

b. PB
1. PB 1 Route 1
2. PB 2 Route 2
3. PB 3 Route 3
4. PB 4 Route 4
5. PB 5 Route 5
6. PB 11 Route 11
7. PB 12 Route 12
8. PB 13 Route 13
9. PB 14 Route 14
10. PB 15 Route 15
11. PB 16 Route 16
12. PB 17 Route 17
13. PB 18 Route 18
14. PB 19 Route 19
15. PB 21 Route 21
16. PB 22 Route 22
17. PB 23 Route 23
18. PB 24 Route 24
19. PB 25 Route 25
20. PB 26 Route 26
21. PB 27 Route 27
22. PB 28 Route 28

  23. PB 29 Route 29

  24. PB 30 Route 31

  25. PB 31 Route 32

  26. PB 33 Route 33

  27. PB 34 Route 34

  28. PB 35 Route 35

  29. PB 36 Route 36

  30. PB 37 Route 37

  31. PB 38 Route 38

  32. PB 39 Route 39

  33. PB 40 Route 40

  34. PB 41 Route 41

  35. PB 42 Route 42

  36. PB 43 Route 43

  37. PB 44 Route 44

  38. PB 45 Route 45

12. It was decided that rotation of D and C Yard is counter-clockwise.

13. It was decided that the new sidings will be split at the mid-point.

14. It was decided that we will use block indicators on staging tracks.

15. It was decided that each half-track will have a long block followed by a short 2' stop block.

16. Need 41 block detectors (82 blocks).

17. Add two block detectors for mainline tracks entering and leaving the lower helix.

18. Add block detectors to show track on long C Yard arrival track.

19. Add Arduino Mega to made Occupancy lights work correctly.

20. Each staging area will have a DCC power switch.

21. The D Yard Lower Helix has an auto throw turnout via Hare controller. SW address 1.

22. C Yard has an auto throw turnout via custom controller.

23. Staging is always set to arrival priority.

24. IR Detector on arrival track prevents departure track throw request until Arrival train is clear.

25. IR Detector on Departure track prevents reset by an arriving train. Should never happen.

26. Departure track has 30" stop to prevent running into arrival train.

27. How are turnouts numbered?

  a. Turnout 1 - D Yard Arrival Track and Exit Ladder

  b. Turnout 2 – C-Yard/D Yard approach tracks

  c. Turnout 3 – D-Yard Entry/D-Yard departure track

  d. Turnout 4 - D-Yard Entry Track 1

  e. Turnout 5 - D-Yard Entry Track 2

  f. Turnout 6 - D-Yard Entry Track 3

  g. Turnout 7 - D-Yard Entry Track 4/5

  h. Turnout 8 - D-Yard Exit Track 4

  i. Turnout 9 - D-Yard Exit Track 3

  j. Turnout 10 - D-Yard Exit Track 2/1

k.   Turnout 11 - Arrival Track/Departure Track - AT

l.   Turnout 12 - C Yard Entry Ladder

m. Turnout 13 - C-Yard Entry Ladder

n.   Turnout 14 - C-Yard Entry Ladder

o.   Turnout 15 - C-Yard Entry Ladder

p.   Turnout 16 - C-Yard Entry Ladder

q.   Turnout 17 - C-Yard Entry Ladder

r.   Turnout 18 - C-Yard Entry Ladder

s.   Turnout 19 - C-Yard Entry Ladder

t.   Turnout 20 – C-Yard Entry Ladder

u.   Turnout 21 - C Yard Exit Tracks 4-8 to Main

v.   Turnout 22 - C Yard Exit Ladder Tracks 4-8

w. Turnout 23 - C-Yard Exit Ladder Tracks 4-8

x.   Turnout 24 - C Yard Exit Ladder Tracks 4-8

y.   Turnout 25 - C-Yard Exit Ladder Tracks 4-8

z.   Turnout 26 - C Yard Exit Tracks 9-12 to Main

aa. Turnout 27 - C Yard Exit Ladder Tracks 9-12

bb. Turnout 28 - C Yard Exit Ladder Tracks 9-12

cc. Turnout 29 - C Yard Exit Ladder Tracks 9-12

dd. Turnout 30 - C Yard Return Loop Entry Track 2/3

ee. Turnout 31 - C Yard Return Loop Entry Track 2/3

ff. Turnout 32 - C Yard Return Loop Exit Track 2

gg. Turnout 33 - C Yard Return Loop Exit Track 3

hh. Turnout 34 - C Yard return loop - AT