PROTECTED PERMISIVE LEFT TURN FLASHING ARROW
WITH DOUBLE CLEARANCE

MNDOT's Application Statement:

Currently, Minnesota Statute states that a solid yellow arrow is a protected movement.

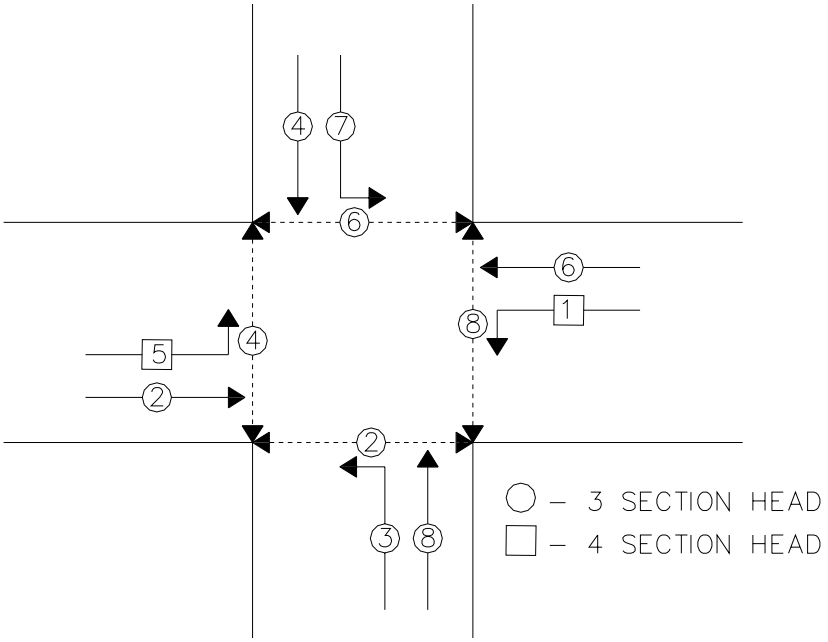
Mn/DOT would like to experiment with a flashing yellow arrow to allow a permissive left turn. In order to terminate this flashing yellow arrow properly, a solid yellow arrow must be displayed. In this flashing arrow operation, there is no sequence to stop the opposing thru traffic prior to the termination of the flashing yellow arrow. A solid yellow arrow would therefore be a permissive movement in this situation, giving a different meaning to the solid yellow arrow.

A solution to this problem may be a double clearance interval that would stop the opposing thru traffic before terminating the flashing yellow arrow.

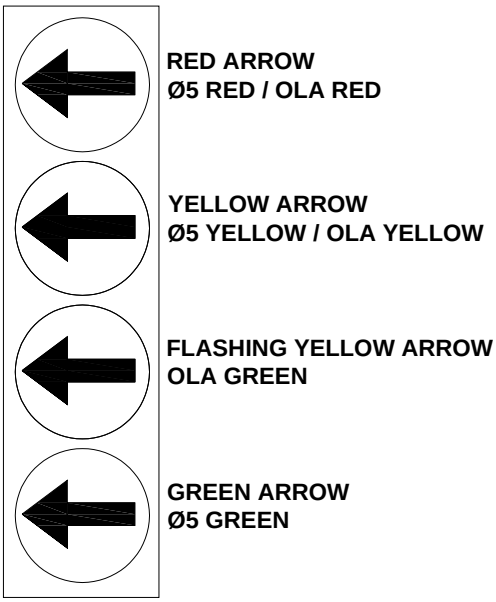
A typical head configuration for an approach would be a 4 section red, yellow, flashing yellow and green arrow (left turn lane head) with a 3 section red, yellow, green ball (thru head).

Operation sequence of concurrent phases terminating the flashing yellow at the same time using double clearance:

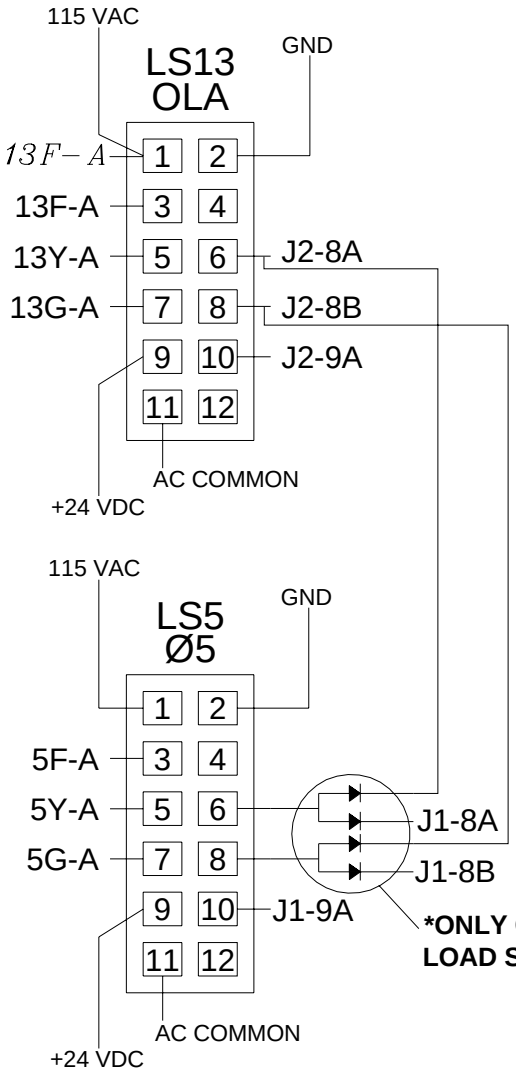
left head:	**thru head:**
← yellow flash	green ball
← yellow flash (second interval)	yellow ball
← solid yellow	red ball
← red	red ball



In this sequence phases 1 & 5 will be 4 section heads. The 4th section will be an additional yellow arrow that will be controlled by an overlap associated with the opposing through movement. The following is the configuration of the head with the cabinet inputs that would control each indication.

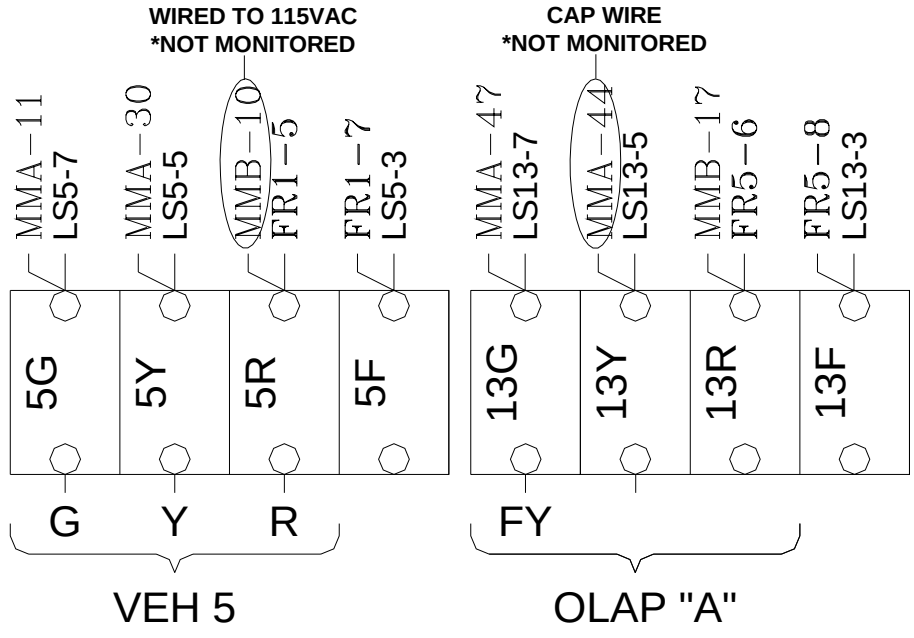


Cabinet Wiring



LOAD SWITCH	
PIN	FUNCTION
1	115 VAC
2	CHASSIS GND
3	RED/DW OUTPUT
4	
5	YEL OUTPUT
6	RED/DW INPUT
7	GRN/W OUTPUT
8	YEL INPUT
9	+24 VDC
10	GRN/W INPUT
11	AC COMMON
12	

***ONLY CHANGE FROM STANDARD LOAD SWITCH WIRING**



Overlap programming as follows:

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          VEHICLE OVERLAP  [A]
        TYPE.....    OTHER (ECPI)
                                1 1 1 1 1 1 1
PHASES   1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . . . . . X . . . . . . . . . .
PROTECT. . . . . . . . . . . . . . . . .
MODIFIER . . . . . . . . . . . . . . . .
PED PRTC . . . . . . . . . . . . . . . .
NOT OLP. . . . . . . . . . . . . . . . .

TRAILING . . . . . X . . . . . . . . . .
LEAD.... . . . . . . . . . . . . . . . .
FLSH GRN . . . . . 1 . . . . . . . . . .
TRAILING GRN  3.0 YELLOW   3.0 RED   1.5

          VEHICLE OVERLAP  [B]
        TYPE.....    OTHER (ECPI)
                                1 1 1 1 1 1 1
PHASES   1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . X . . . . . . . . . . . . . .
PROTECT. . . . . . . . . . . . . . . . .
MODIFIER . . . . . . . . . . . . . . . .
PED PRTC . . . . . . . . . . . . . . . .
NOT OLP. . . . . . . . . . . . . . . . .

TRAILING . X . . . . . . . . . . . . . .
LEAD.... . . . . . . . . . . . . . . . .
FLSH GRN . 1 . . . . . . . . . . . . . .
TRAILING GRN  3.0 YELLOW   3.0 RED   1.5
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The monitoring with the MMU will be as follows:

Channel	Color	Monitoring Status
5	Red	Tied to 120VAC
5	Yellow	Full Monitoring
5	Green	Full Monitoring
13	Green (Flashing Arrow)	Full Monitoring

LOGIC STATEMENT CONTROL

```
            1  2  3  4  5  6  7  8  9 10
LP  1-10    E  E  E  E  .  .  .  .  .  .
LP 11-20    .  .  .  .  .  .  .  .  .  .
LP 21-30    .  .  .  .  .  .  .  .  .  .
LP 31-40    .  .  .  .  .  .  .  .  .  .
LP 41-50    .  .  .  .  .  .  .  .  .  .
LP 51-60    .  .  .  .  .  .  .  .  .  .
LP 61-70    .  .  .  .  .  .  .  .  .  .
LP 71-80    .  .  .  .  .  .  .  .  .  .
LP 81-90    .  .  .  .  .  .  .  .  .  .
LP 91-100   .  .  .  .  .  .  .  .  .  .
     D = DISABLED      E = ENABLED
"." = ENABLED / DISABLED BY OTHER SOURCE


 LOGIC #  1  ACTIVE: Y          MORE   V
             TIMER:    0.0
   IF   OVERLAP               1 IS ON

   THEN SET LDSW RED/DW       5   OFF


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 LOGIC #  2  ACTIVE: Y          MORE   V

   IF   PHASE TIMING          5 IS ON

   THEN SET LDSW RED/DW      13   OFF


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 LOGIC #  3  ACTIVE: Y          MORE   V

   IF   OVERLAP               2 IS ON

   THEN SET LDSW RED/DW       1   OFF


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 LOGIC #  4  ACTIVE: Y          MORE   V

   IF   PHASE TIMING          1 IS ON

   THEN SET LDSW RED/DW      14   OFF
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