



Product Type: OASIS™ 2070 software

Reference: AN2109
Date: 20 February 2009

MUTCD Flashing Yellow Arrow Operation

Purpose

This application note provides instruction for implementing Flashing Yellow Arrow (FYA) operation in the OASIS controller software, with the assumption that an EDI 2010 FYA monitor is being used.

Introduction

The MUTCD¹ now allows left turn signal heads to display an FYA for permissive left turns. The signal head configuration from bottom-to-top (or right-to-left for horizontal heads) is:

1. Solid left green arrow
2. Flashing left yellow arrow
3. Solid left yellow arrow
4. Solid left red arrow

When an opposing (conflicting) through movement is green, a flashing yellow arrow will be displayed on the flashing arrow section.

Applications

The following is a list of the tables that need to be configured in order to get the application to function correctly:

- Overlaps
- Outputs
- Sequencer
- Logic Commands
- Phase Control

NOTE: References to these tables are the same as those on the front panel of the controller and also the way the tables are labeled in *Pyramids™* and *TransLink32™*.

If the tables are set up correctly, both leading and lagging left turns are accounted for, as is protected-only and permissive-only operation.

Features and Benefits

This feature allows an intersection to be more efficient by allowing more time for left turn movements, while increasing safety by eliminating left turn traps.

¹ MUTCD = Manual on Uniform Traffic Control Devices



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Application Programming Steps

For a description of the programming and explanation of reasons, refer to the tables below.

OVERLAP 'A' SETTINGS	phase#:	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	OVERLAP 'A' - ALTERNATE TIMINGS / OUTPUT
Vehicle Overlap Parent Phases		1	Green Extension Time
Green Extension After Phase			Yellow Clearance Time
Omit If Vehicle Phase Active			Red ClearanceTime
Omit If Pedestrian Phase Active			Output As Phase #
Pedestrian Overlap Parent Ped Phases			
OVERLAP 'B' SETTINGS	phase#:	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	OVERLAP 'B' - ALTERNATE TIMINGS / OUTPUT
Vehicle Overlap Parent Phases		1 2	Green Extension Time
Green Extension After Phase			Yellow Clearance Time
Omit If Vehicle Phase Active			Red ClearanceTime
Omit If Pedestrian Phase Active			Output As Phase #
Pedestrian Overlap Parent Ped Phases			
OVERLAP 'C' SETTINGS	phase#:	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	OVERLAP 'C' - ALTERNATE TIMINGS / OUTPUT
Vehicle Overlap Parent Phases		5	Green Extension Time
Green Extension After Phase			Yellow Clearance Time
Omit If Vehicle Phase Active			Red ClearanceTime
Omit If Pedestrian Phase Active			Output As Phase #
Pedestrian Overlap Parent Ped Phases			
OVERLAP 'D' SETTINGS	phase#:	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	OVERLAP 'D' - ALTERNATE TIMINGS / OUTPUT
Vehicle Overlap Parent Phases		5 6	Green Extension Time
Green Extension After Phase			Yellow Clearance Time
Omit If Vehicle Phase Active			Red ClearanceTime
Omit If Pedestrian Phase Active			Output As Phase #
Pedestrian Overlap Parent Ped Phases			
OVERLAP 'E' SETTINGS	phase#:	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	OVERLAP 'E' - ALTERNATE TIMINGS / OUTPUT
Vehicle Overlap Parent Phases		3	Green Extension Time
Green Extension After Phase			Yellow Clearance Time
Omit If Vehicle Phase Active			Red ClearanceTime
Omit If Pedestrian Phase Active			Output As Phase #
Pedestrian Overlap Parent Ped Phases			
OVERLAP 'F' SETTINGS	phase#:	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	OVERLAP 'F' - ALTERNATE TIMINGS / OUTPUT
Vehicle Overlap Parent Phases		3 4	Green Extension Time
Green Extension After Phase			Yellow Clearance Time
Omit If Vehicle Phase Active			Red ClearanceTime
Omit If Pedestrian Phase Active			Output As Phase #
Pedestrian Overlap Parent Ped Phases			
OVERLAP 'G' SETTINGS	phase#:	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	OVERLAP 'G' - ALTERNATE TIMINGS / OUTPUT
Vehicle Overlap Parent Phases		7	Green Extension Time
Green Extension After Phase			Yellow Clearance Time
Omit If Vehicle Phase Active			Red ClearanceTime
Omit If Pedestrian Phase Active			Output As Phase #
Pedestrian Overlap Parent Ped Phases			
OVERLAP 'H' SETTINGS	phase#:	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	OVERLAP 'H' - ALTERNATE TIMINGS / OUTPUT
Vehicle Overlap Parent Phases		7 8	Green Extension Time
Green Extension After Phase			Yellow Clearance Time
Omit If Vehicle Phase Active			Red ClearanceTime
Omit If Pedestrian Phase Active			Output As Phase #
Pedestrian Overlap Parent Ped Phases			

Overlaps: Table 8-1

Each left turn movement requires that you program two overlaps:

- The first overlap is associated with only the left turn movement and is used to provide the actual green indication seen in the bottom left turn green arrow section. Only the overlap green output is used on the output assignments table.
- The second overlap for each left turn is associated with the left turn and the opposing through movement. Additionally, the second overlap requires that the "Output As Phase #" be set to the left turn movement. This will allow the second overlap to take control of the left turn signal head, when the left turn phase is inactive (red rest state).



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The phases are ordered 1/2, 5/6, 3/4, 7/8 since the main arterial is generally where this operation will be most prevalent. Delete the overlaps that are not going to have MUTCD FYA operation.

Output Assignments: Table 6-1

Outputs	Assignment	Value	Pin (?=Help)	Mode	Hertz	Duty %	Outputs	Assignment	Value	Pin (?=Help)	Mode	Hertz	Duty %
1	Pedestrian Phase 4	Don't Walk	2		0	0.0	33	Vehicle Overlap A	Green	35		0	0.0
2	Pedestrian Phase 4	Walk	3		0	0.0	34	Vehicle Overlap C	Green	36		0	0.0
3	Vehicle Phase 4	Red	4		0	0.0	35	Vehicle Overlap E	Green	37		0	0.0
4	Vehicle Phase 4	Yellow	5		0	0.0	36	Vehicle Overlap G	Green	38		0	0.0
5	Vehicle Phase 4	Green	6		0	0.0	37	Not Enabled		83		0	0.0
6	Vehicle Phase 3	Red	7		0	0.0	38	Not Enabled		84		0	0.0
7	Vehicle Phase 3	Yellow	8		0	0.0	39	Vehicle Overlap D	Red	85		0	0.0
8	Vehicle Overlap F	Green	9	1	1.0	50	40	Vehicle Overlap D	Yellow	86		0	0.0
9	Pedestrian Phase 2	Don't Walk	10		0	0.0	41	Not Enabled		87		0	0.0
10	Pedestrian Phase 2	Walk	11		0	0.0	42	Vehicle Overlap C	Red	88		0	0.0
11	Vehicle Phase 2	Red	12		0	0.0	43	Vehicle Overlap C	Yellow	89		0	0.0
12	Vehicle Phase 2	Yellow	13		0	0.0	44	Not Enabled		90		0	0.0
13	Vehicle Phase 2	Green	15		0	0.0	45	Not Enabled		91		0	0.0
14	Vehicle Phase 1	Red	16		0	0.0	46	Not Enabled		93		0	0.0
15	Vehicle Phase 1	Yellow	17		0	0.0	47	Vehicle Overlap B	Red	94		0	0.0
16	Vehicle Overlap B	Green	18	1	1.0	50	48	Vehicle Overlap B	Yellow	95		0	0.0
17	Pedestrian Phase 8	Don't Walk	19		0	0.0	49	Not Enabled		96		0	0.0
18	Pedestrian Phase 8	Walk	20		0	0.0	50	Vehicle Overlap A	Red	97		0	0.0
19	Vehicle Phase 8	Red	21		0	0.0	51	Vehicle Overlap A	Yellow	98		0	0.0
20	Vehicle Phase 8	Yellow	22		0	0.0	52	Not Enabled		99		0	0.0
21	Vehicle Phase 8	Green	23		0	0.0	53	Not Enabled		100		0	0.0
22	Vehicle Phase 7	Red	24		0	0.0	54	Controller Flash		101		0	0.0
23	Vehicle Phase 7	Yellow	25		0	0.0	55	Detector Reset		102		0	0.0
24	Vehicle Overlap H	Green	26	1	1.0	50	56	Watchdog		103	1	10.0	50
25	Pedestrian Phase 6	Don't Walk	27		0	0.0	57	Not Enabled		0		0	0.0
26	Pedestrian Phase 6	Walk	28		0	0.0	58	Not Enabled		0		0	0.0
27	Vehicle Phase 6	Red	29		0	0.0	59	Not Enabled		0		0	0.0
28	Vehicle Phase 6	Yellow	30		0	0.0	60	Not Enabled		0		0	0.0
29	Vehicle Phase 6	Green	31		0	0.0	61	Not Enabled		0		0	0.0
30	Vehicle Phase 5	Red	32		0	0.0	62	Not Enabled		0		0	0.0
31	Vehicle Phase 5	Yellow	33		0	0.0	63	Not Enabled		0		0	0.0
32	Vehicle Overlap D	Green	34	1	1.0	50	64	Not Enabled		0		0	0.0

For the EDI monitor to correctly evaluate the operation, the left turn phase greens must be wired to the ped phase yellows, and the flashing left turn arrows wired to the left turn load switch greens. So, following this logic, reassign all the left turn greens as the second overlap green for that movement.

EXAMPLE: Phase 1 left turn green is now assigned as Overlap B (second overlap for phase 1) green. Repeat for phases 3 (overlap F), 5 (overlap D), and 7 (overlap H).

Next, the left turn greens need to be rewired to the Pedestrian phase yellow load switch outputs. These are associated with outputs 33-36 (or C1 pins 35-38). However, instead of associating them with the actual phase greens, you must use the first overlap green for each phase.

EXAMPLE: Phase 2 ped yellow is now assigned as Overlap A green, which has a parent phase 1 and will be active only when phase 1 is green.



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Phase Sequence: Table 4

Rings	Barrier 1				Barrier 2				Barrier 3				Barrier 4			
1	1	2	0	0	3	4	0	0	0	0	0	0	0	0	0	0
2	5	6	0	0	7	8	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Rings	Barrier 5				Barrier 6				Barrier 7				Barrier 8			
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Regardless of how the intersection is phased, leading or lagging or lead/lag left turns will not be affected. Make sure that a sequence is configured for each combination needed.

Logic Commands: Table 6-3 (Logical I/O Processor)

For each left turn movement, one logic processor command is required. This logic prevents the flashing yellow arrow and the solid green ball to be on at the same time when the second overlap for each left turn phase is serving the left turn.

Four commands are required with the following “if” and “then” statements:

	IF	THEN
1	GREEN 1 ON	SET OUTPUT 16 OFF
2	GREEN 5 ON	SET OUTPUT 32 OFF
3	GREEN 3 ON	SET OUTPUT 8 OFF
4	GREEN 7 ON	SET OUTPUT 24 OFF



