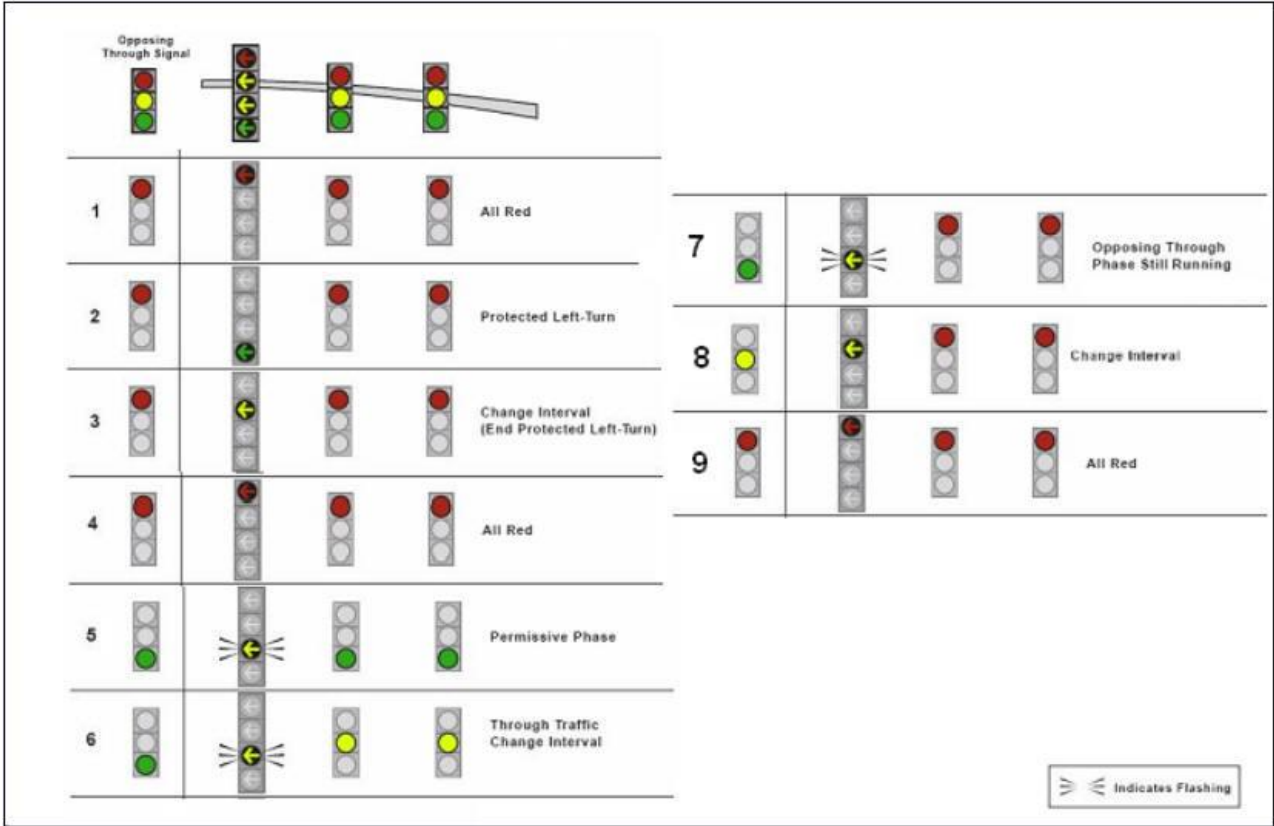


TecNote 1105 - Flashing Yellow Arrows using Overlaps

Agencies may choose to use the flashing yellow arrow method for permissive left turns (see below). This is the implementation discussed in NCHRP Report 493. The Flashing Yellow Arrow was approved as the recommended signal indication for protected/permitted left-turn operation in the 2009 version of the MUTCD (Manual of Uniform Traffic Control Devices).



Version 61.x Flashing Yellow Overlap Programming

Version 61 accomplishes this by using existing pedestrian yellow outputs that are not normally used by the Walk and Don't Walk intervals. This feature allows the Flashing Yellow Arrow (FYA) output from an overlap to be mapped to the yellow output of a pedestrian channel. The yellow output is typically not used and therefore available for FYA use. In other words, the overlap, during the modified phase period of that overlap, drives the pedestrian channel that is mapped to it, to flash the yellow arrow. This feature allows an FYA signal to be implemented without using a second full load switch position or cumbersome cabinet re-wiring. For example, we will change a protected only Phase 1 Left-turn to a Protect-Permissive using a 4-head signal with Flashing Yellow. We will program Overlap B (Overlap 2) that will utilize the Yellow Flash output from Phase 2 Ped Yellow. Please note the user should assign only even-numbered overlaps for the Flashing Yellow Arrow (FYA). Odd-numbered overlaps that are one less than FYA must remain unassigned because the yellow is used as an alternate way to get the FYA output. Also Notice that normal Overlap channels 9-12 are programmed to display All-Red by setting them to unused Overlap 9.

Channels are set up via MM->1->3->1. In this example we will use the default channel setup for a typical TS2 Cabinet.

	Chan.1...2...3...4...5...6...7...8
P/Olp#	2 2 4 4 6 6 8 8
Type	OLP VEH OLP VEH OLP VEH OLP VEH
Flash	RED RED RED RED RED RED RED RED

<	Chan.9..10..11..12..13..14..15..16
P/Olp#	9 9 9 9 2 4 6 8
Type	OLP OLP OLP OLP PED PED PED PED
Flash	RED RED RED RED DRK DRK DRK DRK

First set up overlap # 2 via MM->1->5->2->(olp) 2->1. Make sure you program the type as R-T/OTH and set up the included phase as the protected/permitted phase and the modifier phase as the conflicting through movement.

Ovr1p B	Ps.....
Included Ps	1 0 0 0 0 0 0 0
Modifier Ps	2 0 0 0 0 0 0 0
Type:R-T/OTH Grn:	0 Yel: 3.5 Red: 1.5

Next go to the MM->1->5->2->(olp) 2->2 screen and make sure that you program the Type+ as FIYel-4 for a 4 section head. Note if you have a 3-section head you can program Type+ as FIYel-3.

Ovrlp B	Ps.....
Confl Ps	0 0 0 0 0 0 0 0
Confl Ovrlps	0 0 0 0 0 0 0 0
Confl Peds	0 0 0 0 0 0 0 0
Lead Grn OFF	Delay 0 Type+ FlYel-4

Use the FYA mapping screen (MM->1->5->4) to map FYA outputs of overlaps to Pedestrian Clearance outputs of channels. Assume that Phase 2 Ped is programmed as the default Ped 2 channel, Channel 13.

Fl Yel Arw	#	Olp	Chan	#	Olp	Chan
	1	2	13	2	0	0
	3	0	0	4	0	0

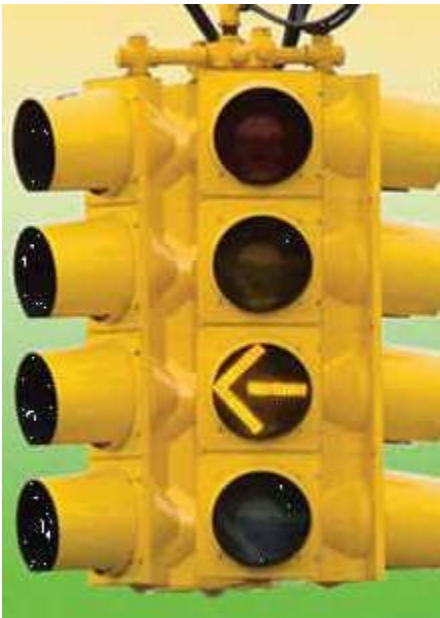
The # columns show which of 4 FYA signals is being programmed. The Olp column shows the overlaps that are programmed as type FlYel-4. Up to four 4-output FYA overlaps may be mapped to Ped Clearance outputs. The first four overlaps that are programmed as type FlYel-4 will be shown in order. The user may enter the number of an output channel that is assigned as type “PED” to use its Ped clearance output. A zero entry means that no mapping takes place and the FYA output will appear as it usually does on the yellow overlap output of the overlap that is one number less than the main FYA overlap.

For example, if overlap 6 is configured as type FlYel-4, its flashing yellow output will appear on the yellow output of overlap 5. If Ped Clearance mapping is set up, it will also appear on the ped clearance output of the channel programmed on this screen.

Note that if a channel assignment is made to a channel that is not assigned as Ped, the FYA mapping does not occur.

Note, too, that the overlap associated with the FYA mapping entry (#) is dependent upon whether it is first, second, etc. of the overlaps configured as FlYel-4. If overlap types are changed such that this order is changed, the Fl Yel Arrow mapping should be reviewed to ensure that the FYA outputs are mapped to the desired Ped Clearance outputs.

Running special operations such as preemption, may affect the output of this arrow such that you may have to “hard code” the clearance times to insure proper hardware monitoring of this channel.



Channels 13-16 Pedestrian Movements Assignment Example

The following is a reprint from the MMU manual which lays out the Ver 61 channel and left turn arrow channel assignments for a standard 16 channel TS2 controller using 4 left turn arrows. Depending on cabinet type, please insure that each Load Switch Flashing Yellow Output lands on the proper field terminal .

FYA Programming
8/30/2007

4 Left Turns, Peds on 13-16

CONTROLLER

Channel	Controller Channel Assignments															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Type	OLP	VEH	OLP	VEH	OLP	VEH	OLP	VEH	OLP	OLP	OLP	OLP	PED	PED	PED	PED
#	2	2	4	4	6	6	8	8	0	0	0	0	2	4	6	8

Controller FYA Overlap Setup							
Overlap	2	4	6	8			
OlP Included	1	3	5	7			
OlP Modifier	2	4	6	8			
FYA out on Chan	13	14	15	16			
OLP Type	R-T/OTH	R-T/OTH	R-T/OTH	R-T/OTH			
OLP Type+	FLYel-4	FLYel-4	FLYel-4	FLYel-4			

Notes

- Assign only Even-numbered overlaps as FYA. Odd-numbered overlaps one less than FYA must remain unassigned b/c the yellow is used as an alternate way to get the FYA output.

MMU-516L

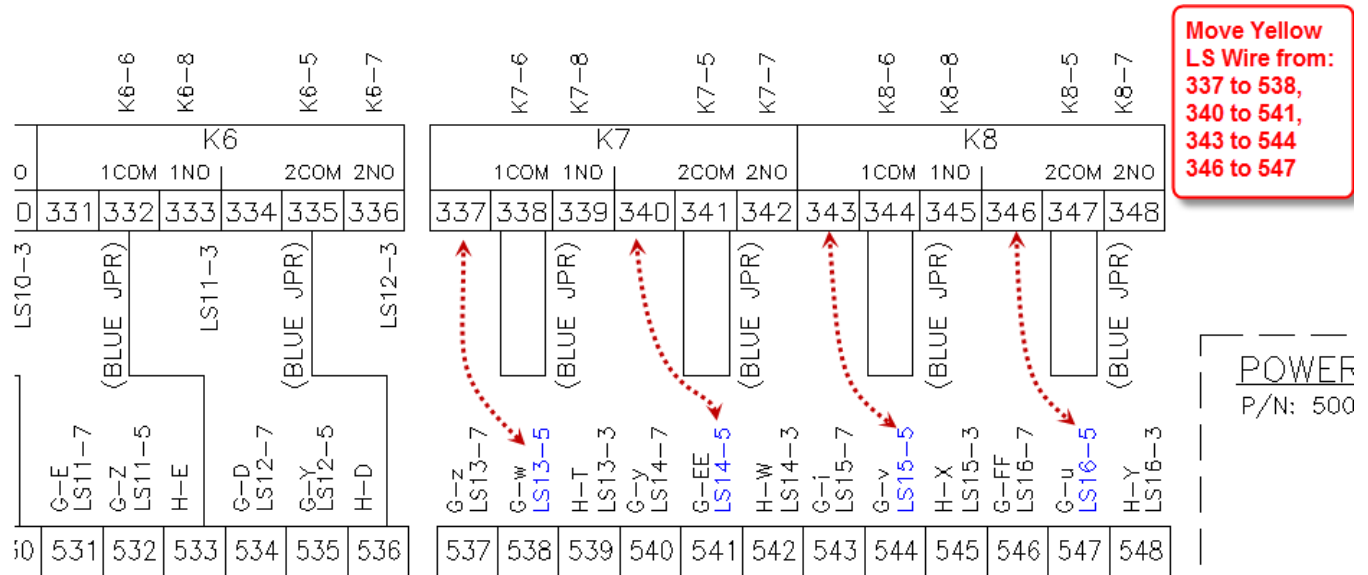
MMU FYA Setup				
FYA #	1	2	3	4
Type	FYA	FYA	FYA	FYA
FYA Channel	1	3	5	7
Yel Input Chan	13	14	15	16
Permissive 1	2	4	6	8
Permissive 2	13	14	15	16

Please note that the Channel numbers in parentheses are not programmed on the Program Card. Their FYA functionality is entered on the FYA Setup Screen as indicated above.

MMU Prog Card

Channel	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1		(2)			5	6							(13)		15	
2					5	6							13		15	
3				(4)			7	8						(14)		16
4							7	8						14		16
5					(6)								13		(15)	
6													13		15	
7								(8)						14		(16)
8														14		16
9																
10																
11																
12																
13															15	
14																16
15																

Verify the Cabinet channel wiring is set properly as per the diagram below:



Version 65.x/ 76.x Flashing Yellow Overlap Programming

Channels are set up via MM->1->3->1. In this example we will use the default channel setup for a typical TS2 Cabinet.

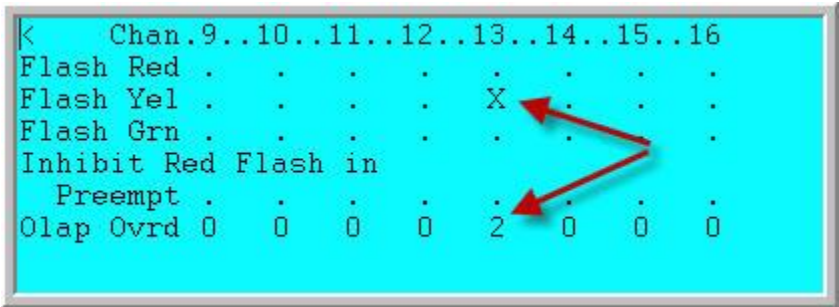
Chan.1...	2...	3...	4...	5...	6...	7...	8		Chan.9...	10...	11...	12...	13...	14...	15...	16
P/Olp#	2	2	4	4	6	6	8	8	9	9	9	9	2	4	6	8
Type	OLP	VEH	OLP	VEH	OLP	VEH	OLP	VEH	OLP	OLP	OLP	OLP	PED	PED	PED	PED
Flash	RED	RED	RED	RED	RED	RED	RED	RED	RED	RED	RED	RED	DRK	DRK	DRK	DRK

Version 65.x and V76.x is much like version 61.x. The difference is that the user can utilize pedestrian yellow outputs as discussed above or the user has the option to only use the existing overlap yellow outputs. Programming the same example above, using Version 65/Version 76, we will change a protected only Phase 1 Left-turn to a Protect-Permissive using a 4-head signal with Flashing Yellow. We will program Overlap B (Overlap 2) that will utilize the Yellow Flash output from Phase 2 Ped Yellow.

First set up the overlap via MM->1->5->2->(olp)2->1. Make sure you program the type as FYA-4 and set up the included phase as the protected/permitted phase and the modifier phase as the conflicting through movement. Notice that normal Overlap channels 9-12 are programmed to display All-Red by setting them to unused Overlap 9.

Ovrlp B-2	Ps.....							
Included Ps	1	0	0	0	0	0	0	0
Modifier Ps	2	0	0	0	0	0	0	0
Type:FYA-4	Grn:	0	Yel:	3.5	Red:	1.5		

Use the Output Channels+ screen (MM->1->8->4) to tell channel 13 that it is having an overlap override applied, whose source is via Overlap B(Overlap 2) and that it is to flash the yellow output. Assume that Phase 2 Ped is programmed as the default Ped 2 channel, Channel 13.



Flashing Yellow Arrow works a little different in Version 65/Version 76, it's a little more flexible. In these versions overlaps have 4 outputs. They have RED, YELLOW, GREEN, and AUX. In the channel+ screen, you tell which channel's yellow output is going to be overridden by the overlap AUX output. Keep in mind that you do not have to use a ped channel, but can use any channel. For ver 65, you can elect to utilize a whole channel for the FYA output, or an existing pedestrian channel.

Four approach example using V65/V76

The next example will show how to set up Flashing Yellow Arrows in all 4 directions. In this example, we will change protected only Left-turns for Phases 1, 3, 5, and 7 to a Protect-Permissive using a 4-head signals with Flashing Yellow.

For our example, our cabinet has been set up as a typical TS2 cabinet that will utilize the MMU using Channels 1,3,5 and 7 to output green for phases 1,3,5, and 7 and will flash the Ped yellows outputs 2, 4, 6 and 8. The channel programming accessed via MM->1->8->1 is shown below.

Chan.1...2...3...4...5...6...7...8	< Chan.9..10..11..12..13..14..15..16
P/Olp# 2 2 4 4 6 6 8 8	P/Olp# 9 9 9 9 2 4 6 8
Type OLP VEH OLP VEH OLP VEH OLP VEH	Type OLP OLP OLP OLP PED PED PED PED
Flash RED RED RED RED RED RED RED RED	Flash RED RED RED RED DRK DRK DRK DRK

First set up the 4 overlaps via MM->1->5->2. Make sure you program the type as FYA-4 and set up the included phase as the protected/permitted phase and the modifier phase as the conflicting through movement. This is shown below:

<div> <div>OLP B-2</div> <div> <div>Ovrlp B-2</div> <div>Ps.....</div> <div>Included Ps</div> <div>Modifier Ps</div> <div>Type:FYA-4</div> <div>Grn: 0</div> <div>Yel: 3.5</div> <div>Red: 1.5</div> </div> </div>	<div> <div>OLP D-4</div> <div> <div>Ovrlp D-4</div> <div>Ps.....</div> <div>Included Ps</div> <div>Modifier Ps</div> <div>Type:FYA-4</div> <div>Grn: 0</div> <div>Yel: 3.5</div> <div>Red: 1.5</div> </div> </div>
<div> <div>OLP F-6</div> <div> <div>Ovrlp F-6</div> <div>Ps.....</div> <div>Included Ps</div> <div>Modifier Ps</div> <div>Type:FYA-4</div> <div>Grn: 0</div> <div>Yel: 3.5</div> <div>Red: 1.5</div> </div> </div>	<div> <div>OLP H-8</div> <div> <div>Ovrlp H-8</div> <div>Ps.....</div> <div>Included Ps</div> <div>Modifier Ps</div> <div>Type:FYA-4</div> <div>Grn: 0</div> <div>Yel: 3.5</div> <div>Red: 1.5</div> </div> </div>

The overlaps are used for driving the flashing yellow arrows whenever the modifier phase is running. The overlaps are not required to be programmed as channel outputs or wired in the cabinet for the flashing yellow arrows to run properly. To flash yellow, you must then choose 4 available yellow outputs that will drive the Flashing yellow arrow for each approach and are wired in the cabinet. In this case we will use Ped 2 (Channel 13) Yellow to drive the phase 1 permissive yellow arrow during phase 2, Ped 4 (Channel 14) Yellow to drive the phase 3 permissive yellow arrow during phase 4, Ped 6 (Channel 15) Yellow to drive the phase 5 permissive yellow arrow during phase 6, and Ped 8 (Channel 16) Yellow to drive to drive the phase 7 permissive yellow arrow during phase 8.

Now we must set up the yellow indications to flash whenever the FYA overlap is being run. This is done by programming the MM->1->8->4 Channels+ screen.

<div> <div>Chan.1...2...3...4...5...6...7...8</div> <div>Flash Red</div> <div>Flash Yel</div> <div>Flash Grn</div> <div>Inhibit Red Flash in</div> <div>Preempt</div> <div>Olap Ovrd</div> </div>	<div> <div>Chan.9..10..11..12..13..14..15..16</div> <div>Flash Red</div> <div>Flash Yel</div> <div>Flash Grn</div> <div>Inhibit Red Flash in</div> <div>Preempt</div> <div>Olap Ovrd</div> </div>
<div> <div>.</div> <div>.</div> <div>.</div> <div>.</div> <div>.</div> <div>.</div> <div>.</div> <div>.</div> </div>	<div> <div>.</div> <div>.</div> <div>.</div> <div>.</div> <div>.</div> <div>.</div> <div>.</div> <div>.</div> </div>
<div> <div>0</div> <div>0</div> <div>0</div> <div>0</div> <div>0</div> <div>0</div> <div>0</div> <div>0</div> </div>	<div> <div>2</div> <div>4</div> <div>6</div> <div>8</div> </div>

The programming will flash the Ped 2 (Channel 13) yellow during phase 2 by utilizing OLP 2, flash the Ped 4 (Channel 14) yellow during phase 4 by utilizing OLP 4, flash the Ped 6 (Channel 15) yellow during phase 6 by utilizing OLP 6, flash the Ped 8 (Channel 16) yellow during phase 8 by utilizing OLP 8.

Programming using V80.x, V85.x/Scout

V80.x, V85.x/Scout programming is much like version 76.x. This version has a new feature to swap Auxiliary colors instead of using unused Ped Yellows.

The programming example below is for Model 332 cabinets that use Caltrans I/O Mode 0 initialization and drive the Flashing Yellow Arrows via Green indications. Trafficware has provided an Auxiliary Green Swap feature to interface with this method.

The FYA overlaps for a STD8 configuration are programmed as follows.

Approach	WB (OL 1)	EB (OL 3)	NB (OL2)	SB (OL4)
Included Phase	1	5	3	7
Modifier Phase	2	6	4	8
Channel	1	7	4	10

These 332 cabinet channel assignments shown below provide FYA overlaps 1-4 in channels 1, 4, 7 and 10 and green arrow outputs from 1, 3, 5 and 7 VEH in channels 13-16.

Chan..1...2...3...4...5...6...7...8>	< Chan.9..10...11..12...13..14..15..16
P/Olp# 1 2 2 2 4 4 3 6	P/Olp# 6 4 8 8 1 3 5 7
Type OLP VEH PED OLP VEH PED OLP VEH	Type PED OLP VEH PED VEH VEH VEH VEH
Flash RED RED DRK RED RED DRK RED RED	Flash DRK RED RED DRK RED RED RED RED
Alt Hz	Alt Hz
Dim Grn	Dim Grn
Dim Yel	Dim Yel
Dim Red	Dim Red
Dim Cyc + + + + +	Dim Cyc + + + + +

Set up Overlaps 1-4 by program the overlap via **MM→1→5→2→(olp)→1**. Make sure you program the type as FYA-4 and set up the included phase as the protected/permitted phase and the modifier phase as the conflicting through movement.

Olp	1	.....	Phases	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Inc	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0
Mod	2	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0
Type:	FYA-4	Grn:	0	Yel:	3.5	Red:	1.5						

Olp	2	Phases											
Inc	3	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0				
Mod	4	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0				
Type:	FYA-4	Grn:	0	Yel:	3.5	Red:	1.5						

Olp	3	.....Phases.....											
Inc	5	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0				
Mod	6	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0				
Type:	FYA-4	Grn:		0	Yel:		3.5	Red:		1.5			

Olp	4	Phases											
Inc	7	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0					
Mod	8	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0					
Type:FYA-4	Grn:	0	Yel:	3.5	Red:	1.5							

Use the Output Channels+ screen (**MM→1→8→4**) to tell channels 13-16 that it is having an overlap override applied, whose source is via Overlap 1-4 and that it is to flash the green output.

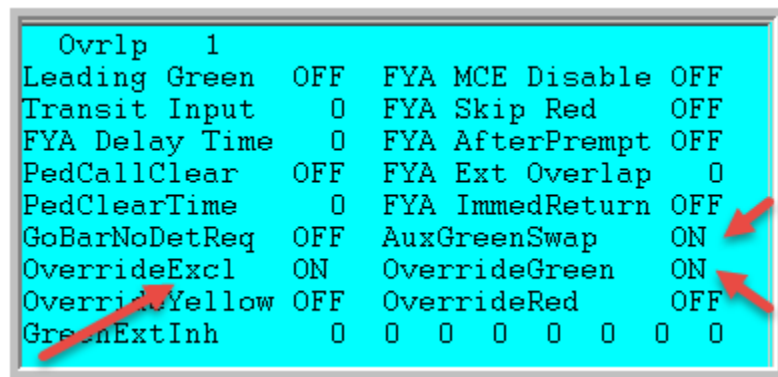
To accomplish this, the Channels+ menu (**MM→1→8→4**) must be programmed as follows:

Chan..1...2...3...4...5...6...7...8>	< Chan..9...10...11...12...13...14...15...16
Flash Red	Flash Red
Flash Yel	Flash Yel
Flash Grn X . . X . X .	Flash Grn X
Inhibit Red Flash in	Inhibit Red Flash in
Preempt	Preempt
Olap Ovrd 0 0 0 0 0 0 0 0	Olap Ovrd 0 0 0 0 1 2 3 4

The FYA-4 overlap provides 4 outputs (green, yellow, red and aux). In this method, under **MM→1→5(olp)→2→3**, use the **AuxGreenSwap** feature to drive the Aux output with the the FYA or green arrow (**AuxGreenSwap = ON**).

AuxGreenSwap = OFF	AuxGreenSwap = ON
Green – green arrow	Green – FYA (flashing yellow arrow)
Yellow – yellow arrow	Yellow – yellow arrow
Red – red arrow/ball	Red – red arrow/ball
Aux – FYA (flashing yellow arrow)	Aux – green arrow

The Final Programming that is necessary is to **set OverrideGreen ON** and **AuxGreenSwap ON** for each FYA overlaps(MM→1→5→(olp)→2→3) to override the green arrow outputs with the Auxilliary output as shown below on the Overlap 1 screen. Setting **OverrideExcl** to **ON** will only output the Auxillary green output on channels 13-16.



Ovrlp	1		
Leading Green	OFF	FYA MCE Disable	OFF
Transit Input	0	FYA Skip Red	OFF
FYA Delay Time	0	FYA AfterPreempt	OFF
PedCallClear	OFF	FYA Ext Overlap	0
PedClearTime	0	FYA ImmedReturn	OFF
GoBarNoDetReq	OFF	AuxGreenSwap	ON
OverrideExcl	ON	OverrideGreen	ON
OverrideYellow	OFF	OverrideRed	OFF
GreenExtInh	0	0	0 0 0 0 0 0 0 0

V80.x, V85.x/Scout Alternate Method for Flashing Yellow Overlap Programming – Unused Ped Yellows

Another way to accomplish a Flashing Yellow Overlap is using existing pedestrian yellows outputs that are not normally used by the Walk and Don't Walk intervals. This feature allows the Flashing Yellow Arrow (FYA) output from an overlap to be mapped to the yellow output of a pedestrian channel. The yellow output is typically not used and therefore available for FYA use. In other words, the Overlap, during the modified phase period of that overlap, drives the pedestrian channel that is mapped to it, to flash the yellow arrow. This feature allows an FYA signal to be implemented without using a second full load switch position or cumbersome cabinet re-wiring. For example, we will change a protected only Phase 1 Left-turn to a Protect-Permissive using a 4-head signal with Flashing Yellow. You may also accomplish a Flashing Yellow Overlap by using an existing overlap yellow or pedestrian yellows outputs. We will change a protected only Phase 1 Left-turn to a Protect-Permissive using a 4-head signal with Flashing Yellow. We will program Overlap A (Overlap 1) that will utilize the Yellow Flash output from Phase 2 Ped Yellow which programmed to be displayed via channel 13 (MM→1→8→1).

First set up the overlap via **MM→1→5→2→(olp)→1**. Make sure you program the type as FYA-4 and set up the included phase as the protected/permitted phase and the modifier phase as the conflicting through movement.

```

Olp  1 ..... Phases.....
Inc  1 0 0 0 0 0 0 0 0 0 0 0
     0 0 0 0 0 0 0 0 0 0 0 0
     0 0 0 0 0 0 0 0 0
Mod  2 0 0 0 0 0 0 0 0 0 0 0
     0 0 0 0 0 0 0 0 0 0 0 0
     0 0 0 0 0 0 0 0
Type:FYA-4   Grn: 10   Yel: 3.5   Red: 1.5

```

Use the Output Channels+ screen (**MM→1→8→4**) to tell channel 13 that it is having an overlap override applied, whose source is via Overlap A (Overlap 1) and that it is to flash the yellow output. Assume that Phase 2 Ped is programmed as the default Ped 2 channel, Channel 13.

```

<   Chan.9..10..11..12..13..14..15..16
Flash Red . . . . .
Flash Yel . . . . X . . .
Flash Grn . . . . . . . .
Inhibit Red Flash in
  Preempt . . . . .
Olup Ovrd 0 0 0 0 1 0 0 0

```

The Final Programming step that is necessary is to set **OverrideYellow ON** for each FYA overlap (**MM→1→5→2→(olp)→3**) to override the Pedestrian Yellow output with the Auxiliary output. Below is this screen for Overlap 1.

```

Ovrp  1
Leading Green  OFF  FYA MCE Disable OFF
Transit Input   0  FYA Skip Red   OFF
FYA Delay Time  0  FYA AfterPreempt OFF
PedCallClear   OFF  FYA Ext Overlap  0
PedClearTime    0  FYA ImmedReturn ON
GoBarNoNext    OFF  AuxGreenSwap  OFF
OverrideExcl   OFF  OverrideGreen  OFF
OverrideYellow ON  OverrideRed    OFF
RestInWalk     OFF  PedRecall     OFF
PedRecycle     OFF  GoBarMinFlash  0
ExInh.....

```

Programming Considerations

Please note the following nuances with the FYA software.

- 1) The yellow arrow will flash for a minimum of 2.0 seconds to insure proper clearances for the cabinet's conflict monitor.
- 2) When the time of day pattern or preempt disables an overlap that is an FYA overlap, the software will finish out the yellow before dropping the overlap.
- 3) Upon power up the controller must cross both barriers before displaying the flashing yellow arrow.
- 4) If FYA overlaps are inhibited during preemption, when the preemption is completed, the controller must cross the barrier before displaying the flashing yellow arrow.
- 5) When time of day or preempt allows an omitted FYA overlap to be reestablished, it will not wait until the overlap is timing green or red.
- 6) Upon controller startup (i.e. controller power up, NEMA Ext. Startup, startup after Flash, etc.) the FYA outputs will be inhibited until all phases are cycled and serviced once.
- 7) Parent Phase Clearance settings under General Overlap programming (MM->1->5->1) must be considered
 - a. Setting Parent Phase Clearances to ON allows the traffic engineer to provide a different yellow + all-red clearance for the green arrow and the FYA which are going to be different following the ITE formulas
 - b. Setting Parent Phase Clearance to OFF forces the yellow + all-red clearance programmed under the the overlap to be applied to clear the green arrow and the FYA.
 - c. Because Parent Phase Clearance is a global setting it is applied to all active overlaps and any FYA-4 in use is going to force the user to turn the setting OFF to conform with the ITE formulas for yellow and all-red clearance.
- 8) Lock Inhibit and Conflict Lock Enable can be programmed ON or OFF when running FYA-4 overlaps. However, Lock Inhibit will not be applied to the FYA yellow clearance (either after a protected arrow, or flashing arrow), if we are moving to (phase next is) an included/modifier phase. Also note that, the user should program Conflict Lock Enable to ON when programming conflicting phases(s) when using a FYA overlap (MM->1->5->2->2).

NOTE: Flashing Yellow Arrow in versions V76_15H, V80.4A or V85.x/Scout or later use the following clearance decision table.

Parent Clearance Selection	Yellow Arrow After Green Arrow	Red Arrow After Green Arrow	Yell Arrow After FYA	Red Arrow After FYA
OFF	Uses Included phase yellow time	Uses Included phase red time	Uses Overlap yellow time	Uses Included phase red time
ON	Uses Included phase yellow time	Uses Included phase red time	Uses Modifier phase yellow time	Uses Included phase red time

Cabinet Hardware Considerations

Please note the following should be considered when interfacing to Trafficware cabinets

- 1) The Green Output on the associated PED has to have a load.
- 2) The Yellow Wire for the Conflict Monitor needs to be moved down to the correct position for the FYA output on the PEDs.

Time of Day Programming Considerations

Overlaps 1-8 can be turned off on a time of day basis using the scheduler. Thus the user can schedule when the FYA overlaps can be displayed to the motorist. Once you program the FYA overlaps they will remain on until they are turned off by the scheduler. The following is an example on how you would turn off overlaps via the scheduler. For our example we will use the 4 approach FYA overlap example above and turn the FYA's off from 2pm till 8pm daily throughout the year. This controller is running free until 2:00 pm when it runs coordination pattern 1 and stays in pattern 1 untill 8:00pm when it reverts back to free operation.

- 1) Program the FYA overlaps as shown above

2) Go to MM->4 Scheduler.

Time Based Scheduler

1.Set Date/Time

4.Day Plan

7.Status

2.Easy Schedule

5.Action Table

8.Resrvd

3.Adv Schedule

6.Parameters

9.More

- 3) Go to the Easy schedule (MM->4-2) or the Advanced Schedule (MM->4->3) menu and program the controller to run Day Plan #1 all year long

#	Day	Mo:From-Thru	DOM:From-Thru	Plan
1	ALL	01-12	01-31	1
2	OFF	00-00	00-00	1
3	OFF	00-00	00-00	1
4	OFF	00-00	00-00	1
5	OFF	00-00	00-00	1
6	OFF	00-00	00-00	1
7	OFF +	00-00	00-00	1

MM->4->2 Easy Scheduler

#	Day	Month	more~
1	SMTWTFS	JFMAMJJASOND	
2	XXXXXXX	XXXXXXXXXXXXX	
3	.....	.....
4	.....	.....
5	#.....	.....
6+	.....	.....

```

I      Date  1      2      3 Day
# 1234567890123456789012345678901 Plan
1 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX 1
2 ..... 1
3 ..... 1
4 ..... 1
5 .....# 1
6+ ..... 1

```

MM->4->3 Advanced scheduler

- 4) Set up the Day plan table - Action 99 is free pattern 254 and action 1 is coordination pattern #1

```

Plan- 1      Evt Time Actn  Evt Time Actn
Link: 0      1 00:00 99    2 14:00 1
           3 20:00 99    4 00:00 0
           5 00:00 0      6 00:00 0
           7 00:00 0      8 00:00 0
           9 00:00 0     10 00:00 0
          11 00:00 0     12 00:00 0
          + 13 00:00 0     14 00:00 0

```

MM->4->4 Day plan table # 1

- 5) Set up the action table for action 1 to run pattern 1 and action 99 to run free

```

Actn Patrnr Aux-123 Spec-12345678 Pre.1.2
1      1      ...      ..... 0 0
2      2      ...      ..... 0 0
3      3      ...      ..... 0 0
4      4      ...      ..... 0 0
5      5      ...      ..... 0 0
6      6      ...      ..... 0 0
7 +    7      ...      ..... 0 0

```

```

Actn Patrnr Aux-123 Spec-12345678 Pre.1.2
94 -    0      ...      ..... 0 0
95      0      ...      ..... 0 0
96      0      ...      ..... 0 0
97      0      ...      ..... 0 0
98      0      ...      ..... 0 0
99     254      ...      ..... 0 0
100    255      ...      ..... 0 0

```

MM->4->5 Action Table

- 6) Now set up pattern # 1 to turn off Overlaps 1,2, 3,and 4 thus turning off the FYA outputs. This is done by accessing Menu item MM->2->6, Alt Tables +

Pat#	Alt:	POpt	PTime	DetGrp	Call/Inh	>
1		0	0	0	0	
2		0	0	0	0	
3		0	0	0	0	
4		0	0	0	0	
5		0	0	0	0	
6		0	0	0	0	
7	+	0	0	0	0	

<Pat#	Ol	p.Off	:12345678	CIC	CNA1	Max2	Dia
1			.X.X.X.X	0	.	.	DFT
2			0	.	.	DFT
3			0	.	.	DFT
4			0	.	.	DFT
5			0	.	.	DFT
6			0	.	.	DFT
7	+		0	.	.	DFT

FYA Inhibit Considerations- General

The FYA is inhibited only when the FYA overlap is not active and is not flashing yellow. This satisfies various state MUTCDs that do not allow Yellow Clearance for flashing yellow to be active while the Modifier phase (which normally conflicts with the left turn movement) is still green. The controller will begin a FYA inhibit only when the FYA overlap is Red and not flashing in two cases:

- 1) Inhibit by Time-of-day and
- 2) Inhibit due to preemption and the "All Red B4 Prmpt" (V76.x) or "PedRedClear" (V80.x and V85.x/Scout) parameter in preemption is set to ON.

This prevents an FYA clearance from occurring asynchronously with the overlap's parent phases. If the FYA is inhibited by time-of-day, inhibits will take affect the next time the overlap is Red. When the FYA is inhibited by preemption with "All Red B4 Prmpt" or "PedRedClear" set, preemption will cause all rings to clear through All Red if any FYA is flashing yellow. This provides an opportunity for the FYA to clear while the conflicting thru phase (FYA modifier phase) is also timing yellow. If "All Red B4 Prmpt" or "PedRedClear" is not set, then the FYA overlap will terminate immediately upon inhibit while the conflicting thru movement may remain green.

FYA Inhibit Considerations using V80.x, V85.x/Scout or versions that are later than V76.13x or later

The FYA will be inhibited only when the FYA overlap is not active and is not flashing yellow. This satisfies various state MUTCDs that do not allow Yellow Clearance for flashing yellow to be active while the Modifier phase (which normally conflicts with the left turn movement) is still green. The controller will begin a FYA inhibit only when the FYA overlap is Red and not flashing in three cases:

- 1) Inhibit by Time-of-day
- 2) Inhibit due to preemption and the "All Red B4 Prmpt" or "PedRedClear" parameter in preemption is set to ON.
- 3) Inhibit if a conflicting Pedestrian or Phase is programmed under MM->1->5->2.

This prevents an FYA clearance from occurring asynchronously with the overlap's parent phases. If the FYA is inhibited by time-of-day, inhibits will take affect the next time the overlap is Red. When the FYA is inhibited by preemption with "All Red B4 Prmpt" or "PedRedClear" set, preemption will cause all rings to clear through All Red if any FYA is flashing yellow. This provides an opportunity for the FYA to clear while the conflicting thru phase (FYA modifier phase) is also timing yellow. If "All Red B4 Prmpt" or "PedRedClear" is not set, then the FYA overlap will terminate immediately upon inhibit while the conflicting thru movement may remain green. When a conflicting Pedestrian or Phase is programmed,

the Overlap will terminate immediately upon inhibit and then run the pedestrian Phase.

Note the following nuances with the FYA software. The yellow arrow will flash for a minimum of 2.0 seconds to insure proper clearances for the cabinet's conflict monitor. Also note, when the time of day pattern or preempt disables an overlap that is an FYA overlap, the software will finish out the yellow before dropping the overlap. If FYA overlaps are inhibited during preemption, when the preemption is completed, the controller must cross the barrier before displaying the flashing yellow arrow. When time of day or preempt allows an omitted FYA overlap to be reestablished, it will not wait until the overlap is timing green or red. When FYA overlaps are inhibited during pedestrian timing, when the pedestrian phase concludes, the controller must leave the FYA phase before displaying the flashing yellow arrow. Finally, when programming Flashing Yellow arrow, upon controller startup (i.e. controller power up, NEMA Ext. Startup, startup after Flash, etc.), the FYA outputs can be programmed to be inhibited or allowed to run immediately by programming `InhFYARedStart` under `MM->2->1`.

The unit parameter Clearance Decide should be set to OFF when programming Flashing Yellow Arrows that use multiple modifier and/or included phases.

A new feature under `MM->1->5->(olp)->2->3` called FYA ImmedReturn has been added. When set to OFF, inhibits work as discussed above. When set to ON, as soon as inhibits are lifted, the Yellow arrow(s) will start. The agency is cautioned that an immediate start of a Yellow arrow could result in less than 2 seconds of FYA time depending on how much time is left in the permissive phase and when the inhibit is lifted.

Finally, When the FYA is inhibited by time-of-day, inhibits will only occur on the Modifier (Permissive Phase) so that the included Phase (protected Phase) will still output Green Yellow and red Left turn arrows.

Summary

Certain agencies have expressed interest in the flashing yellow arrow for permissive left turns. This technote outlines the various ways to accomplish flashing yellow arrows for permissive left turns.