TecNote 1111 – Method for increasing the intensity of LED Street Lights upon activation of Pedestrian Detectors for night safety

The purpose of this TechNote is to assist the user in setting up controller logic that can be used to deactivate the dimming circuit of street lighting during pedestrian activations. This method was first designed by the Florida Department of Transportation (FDOT).

FDOT Requirement

FDOT is requiring an improvement in pedestrian safety at night by increasing the intensity of LED Street Lights upon activation of Pedestrian Detectors at signalized intersections (controlled by existing NEMA or 170 cabinet assemblies).

Below is the initial specification provided by FDOT.

> "The desire is to turn off the dim control at night for LED street lights. At night the LED street lights powered up in a 50% dim mode. The LED dimming circuits are connected to the normally closed contacts of an extra preemption relay panel. Any active Ped calls starts the controller's logic timing which energizes the preemption relay via of an unused overlap driver. The energized preemption relay opens the circuit to dimming control, which brings the LED street lights up to 100%. When the controller's logic timing terminates the relay is de-energized and the LED street lights switches back to 50% dim mode. It is preferred to program the dim state to occur several seconds after the Pedestrian Clearance Interval terminates. Any additional Ped calls should restart the whole sequence, keeping the intersection100 % bright, until all Ped calls have been served."

Sample Logic

Here is an example of the logic statements programmed in MM-1-9-2 for a STD8 controller database in version 76 firmware.

The user should select an unused controller output that can be connected to the dimming circuit, so that when the controller output is ON the dimming circuit is deactivated. For purposes of this example, Channel 24 Red will be used.

This example uses ped phases 2, 4, 6, and 8 output on channels 13, 14, 15, and 16.

Result		Src.Fcn	Op		Src.Fcn	Op	Src.Fcn	>	<TimeOp	Time
I230	+=	0I130			0I 0		0I 0		DLY	0
I231	+=	0I132			0I 0		0I 0		DLY	0
I232	+=	0I134			0I 0		0I 0		DLY	0
I233	+=	0I136			0I 0		0I 0		DLY	0
I234	=	0O 61			0I 0		0I 0		EXT	12
I235	=	0O 62			0I 0		0I 0		EXT	12
I236	=	0O 63			0I 0		0I 0		EXT	12
I237	=	0O 64			0I 0		0I 0		EXT	12
I238	=	0I230	&		0I234	&	0O 13		DLY	1
I239	=	0I231	&		0I235	&	0O 14		DLY	1
I240	=	0I232	&		0I236	&	0O 15		DLY	1
I241	=	0I233	&		0I237	&	0O 16		DLY	1
I230	&=	0I230	&	!	0I238		0I 0		DLY	0
I231	&=	0I231	&	!	0I239		0I 0		DLY	0
I232	&=	0I232	&	!	0I240		0I 0		DLY	0
I233	&=	0I233	&	!	0I241		0I 0		DLY	0
I242	=	0I230	+		0I231		0I 0		DLY	0
O 24	=	0I232	+		0I233	+	0I242		EXT	5

Logic Statement Descriptions

This section describes the purpose for each logic statement. Continue to the next section for instructions on configuring this logic for a specific intersection.

Lines 1-4

I230	+=	0I130			0I 0		0I 0		DLY	0
I231	+=	0I132			0I 0		0I 0		DLY	0
I232	+=	0I134			0I 0		0I 0		DLY	0
I233	+=	0I136			0I 0		0I 0		DLY	0

When a pedestrian call is received, logic statements 1-4 activate a logic function. One logic function is used for each pedestrian phase. Once active, the logic function is latched in the ACTIVE state until another logic statement causes it to deactivate.

Lines 5-8

```
I234   =   0O 61       0I   0       0I   0       EXT      12
I235   =   0O 62       0I   0       0I   0       EXT      12
I236   =   0O 63       0I   0       0I   0       EXT      12
I237   =   0O 64       0I   0       0I   0       EXT      12
```

Logic statements 5-8 are used to confirm that the pedestrian phase was serviced. An additional logic function will be set to ACTIVE when the WALK interval begins for each pedestrian phase.

Lines 9-12

```
I238   =   0I230 &     0I234 &     0O 13       DLY      1
I239   =   0I231 &     0I235 &     0O 14       DLY      1
I240   =   0I232 &     0I236 &     0O 15       DLY      1
I241   =   0I233 &     0I237 &     0O 16       DLY      1
```

Logic statements 9-12 are used to identify the end of the Pedestrian Clearance interval. An additional logic function will be set to ACTIVE at the end of the Pedestrian Clearance interval for each pedestrian phase.

Lines 13-16

```
I230 &=   0I230 &   ! 0I238       0I   0       DLY      0
I231 &=   0I231 &   ! 0I239       0I   0       DLY      0
I232 &=   0I232 &   ! 0I240       0I   0       DLY      0
I233 &=   0I233 &   ! 0I241       0I   0       DLY      0
```

Logic statements 13-16 are used to deactivate logic functions 1-4 after the Pedestrian Clearance interval is has terminated.

Lines 17-18

```
I242   =   0I230 +     0I231       0I   0       DLY      0
O 24   =   0I232 +     0I233 +     0I242       EXT      5
```

The last two logic statements are used to tie together the logic functions and activate the output that will be connected to the dimming circuit. The 5 sec. EXTEND on statement 18 is optional, if you would like to extend the deactivation of the dimming for some length of time beyond the end of the pedestrian clearance interval.

Configuring Logic for a Specific Intersection

Logic statements are programmed in MM>1>9>2. Some of the logic statements can be copied exactly as described above, but others will need to be customized based on the pedestrian phase(s) in use, which channels are assigned to the pedestrian outputs, the length of the pedestrian clearance intervals, and the desired length of dimming deactivation after the end of the pedestrian clearance interval.

This is the same example as shown above, but the items that must be customized are shown in **bold and highlighted**.

Result		Src.Fcn	Op		Src.Fcn	Op	Src.Fcn	>	<TimeOp	Time
I230	+=	0I**130**			0I 0		0I 0		DLY	0
I231	+=	0I**132**			0I 0		0I 0		DLY	0
I232	+=	0I**134**			0I 0		0I 0		DLY	0
I233	+=	0I**136**			0I 0		0I 0		DLY	0
I234	=	0O **61**			0I 0		0I 0		EXT	**12**
I235	=	0O **62**			0I 0		0I 0		EXT	**12**
I236	=	0O **63**			0I 0		0I 0		EXT	**12**
I237	=	0O **64**			0I 0		0I 0		EXT	**12**
I238	=	0I230	&		0I234	&	0O **13**		DLY	1
I239	=	0I231	&		0I235	&	0O **14**		DLY	1
I240	=	0I232	&		0I236	&	0O **15**		DLY	1
I241	=	0I233	&		0I237	&	0O **16**		DLY	1
I230	&=	0I230	&	!	0I238		0I 0		DLY	0
I231	&=	0I231	&	!	0I239		0I 0		DLY	0
I232	&=	0I232	&	!	0I240		0I 0		DLY	0
I233	&=	0I233	&	!	0I241		0I 0		DLY	0
I242	=	0I230	+		0I231		0I 0		DLY	0
O **24**	=	0I232	+		0I233	+	0I242		EXT	**5**

The following input functions are used in this example:

Function	Input
130	Ped Call 2
132	Ped Call 4
134	Ped Call 6
136	Ped Call 8

The following output functions are used in this example:

Function	Output
13	Channel 13 Red
14	Channel 14 Red
15	Channel 15 Red
16	Channel 16 Red
24	Channel 24 Red (connect to dimming circuit)
61	Channel 13 Green
62	Channel 14 Green
63	Channel 15 Green
64	Channel 16 Green

Refer to the User Guide to look up appropriate Input and/or Output functions if you are using different pedestrian phases and/or output channels.

Lines 1-4

```
I230 +=  0I130     0I  0     0I  0     DLY     0
I231 +=  0I132     0I  0     0I  0     DLY     0
I232 +=  0I134     0I  0     0I  0     DLY     0
I233 +=  0I136     0I  0     0I  0     DLY     0
```

Replace `I130`, `I132`, `I134`, and `I136` with the appropriate Ped Call input functions for the pedestrian phases in use. If fewer than four pedestrian phases are used, simply reduce the number of logic statements used.

Lines 5-8

```
I234  =  0O 61     0I  0     0I  0     EXT     12
I235  =  0O 62     0I  0     0I  0     EXT     12
I236  =  0O 63     0I  0     0I  0     EXT     12
I237  =  0O 64     0I  0     0I  0     EXT     12
```

Replace `O61`, `O62`, `O63`, and `O64` with the output functions assigned to the RED of each ped channel. Set the EXTEND time so that it 2 seconds longer than the associated Pedestrian Clearance time. If fewer than four pedestrian phases are used, simply reduce the number of logic statements used.

Lines 9-12

```
I238   =   0I230 &     0I234 &     0O 13          DLY       1
I239   =   0I231 &     0I235 &     0O 14          DLY       1
I240   =   0I232 &     0I236 &     0O 15          DLY       1
I241   =   0I233 &     0I237 &     0O 16          DLY       1
```

Replace O13, O14, O15, and O16 with the output functions assigned to the GREEN of each ped channel. If fewer than four pedestrian phases are used, simply reduce the number of logic statements used.

Lines 13-16

```
I230 &=   0I230 &   ! 0I238       0I   0          DLY       0
I231 &=   0I231 &   ! 0I239       0I   0          DLY       0
I232 &=   0I232 &   ! 0I240       0I   0          DLY       0
I233 &=   0I233 &   ! 0I241       0I   0          DLY       0
```

No changes are needed for logic statements 13-16, but you can omit some logic statements if fewer than four pedestrian phases are used.

Lines 17-18

```
I242   =   0I230 +     0I231       0I   0          DLY       0
O 24   =   0I232 +     0I233 +     0I242          EXT       5
```

No changes are needed to logic statement 17 unless you've omitted some the lines 13-16.
In place of O24, choose an unused output that can be wired to the dimming circuit.
For logic statement 18, set the EXTEND time equal to the amount of time that the dimming should remain deactivated after the end of the pedestrian clearance interval.

Summary

The procedure above demonstrates a way to use I/O Logic and existing hardware outputs to increase the intensity of LED Street Lights upon activation of Pedestrian Detectors for night safety.