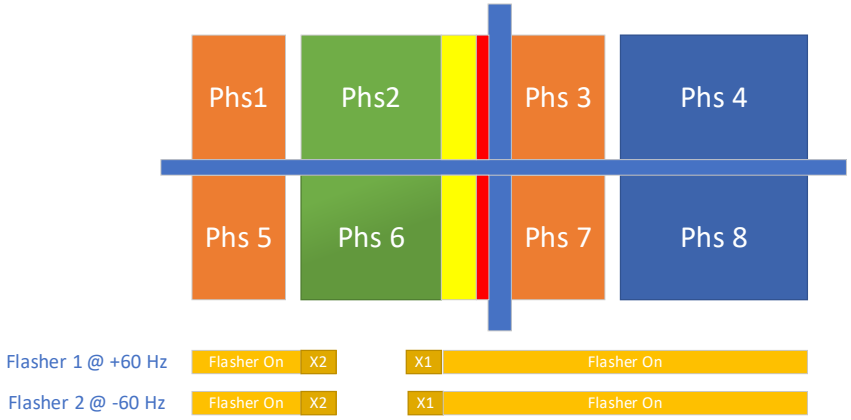
ADVANCE WARNING BEACON (AWB) CONFIGURATION

This document provides instructions to set up an advanced warning beacon for high speed approaches to an intersection.

In this example the following conditions are used:

- TS2 Type 1 cabinet running eX2 controller and Omni 1.11.13
- 8 phase intersection using phases 1 - 8 and are located on channels 1 - 8
- Peds are P2, P4, P6, P8 and are located on channels 13, 14, 15, 16
- Advanced flashers are on channels 9 and 10 and use two outputs per channel to produce a Wig Wag output for the flashers.
- There is an advance flasher for each approach and are configured separately to turn on with their appropriate phase.

Phases 2 and 6 are the high-speed approaches and are the phases used to activate the advance flasher beacons. For this example, the following scenario will be programmed:



X1 is the time before phases 2 and 6 green end that the flashers should start
X2 is the time after phases 2 and 6 green start that the flashers should end

Flasher 1 is associated with Phase 2 and Flasher 2 is associated with Phase 6. For both flashers there are two programmable times, X1 and X2. X1 is the advance start time which can be programmed to turn on some "X" seconds before the end of phase green. X2 is the time after phase green starts that the flasher will turn off.

Notice that the flasher will remain on after Phase green starts allowing the platoon waiting on the green to start moving. The flasher will start again before the phase green ends to ensure that vehicles approaching have advance warning that the light is about to change. The MUTCD has prescribed programmable times and distances from the intersection that AWBs or sometimes called Advance Warning Flashers (AWF) should be placed. This document outlines the steps to program Omni for AWBs, but times will need to be provided from a Traffic Engineer.

Programming the Omni Controller

There are several steps to program the Omni Controller for using Advance Warning Flashers. In order of configuration the user will need to:

1. Set up the phases, channels and cabinet configuration as would normally be done in any configuration setup.

2. Configure the logic to provide the outputs necessary to drive the flasher beacons.
3. Configure the outputs on the selected load switches that will be used for the flasher beacons.
4. Cabinet testing should performed in a test environment prior to installation in the field.

1.1 Configure channels and phase timings

```
1.4              CHANNEL SETUP
                          1111111111222222222233
 CHAN#   12345678901234567890123456789012
TYPE     VVVVVVVVOOOOPPPPVVVVVVVVVVVVVVVV
SOURCE   12345678....1234................
ALT1/2HZ.................................
FLSHRED XXXXXXXX....XXXX.................
FLSHYEL .................................

Press Q to exit
y=YES n=NO x=NEXT
```

As seen here, channels 1 – 8 are set up as vehicles, Peds are located on channels 13 – 16 and there are no assigned outputs for channels 9 – 12. The outputs for the flashers will come out on channels 9 and 10, but will be assigned later in a following step when the I/O mapping is done. This is configured from the Main menu and hitting 1 for Unit and 4 for Channel Setup. For refence M-1-4 will be the format in this text for guidance to the required menu page.

```
2.1          PHASE TIMINGS SET 1          DR
 PHASE#     1   2   3   4   5   6   7   8
MIN GRN     5  10   5   5   5  10   5   5
PASS/10     0   0   0   0   0   0   0   0
MAX 1       7   7   7   7   7   7   7   7
MAX 2       0   0   0   0   0   0   0   0
YEL/10     30  40  30  40  30  40  30  40
RED/10     10  20  10  20  10  20  10  20

Press Q to exit
y=YES n=NO x=NEXT
```

Times will need to be adjusted accordingly. This is done in page M-2-1(1). There are four timing sets, the (1) is the first timing set. Provide timing for all the phases in use as necessary.

```
2.1          PHASE TIMINGS SET 1          U R
 PHASE#     1   2   3   4   5   6   7   8
ALT WALK    0   0   0   0   0   0   0   0
ALT PDCLR   0   0   0   0   0   0   0   0
ADV WALK    0   0   0   0   0   0   0   0
DLY WALK    0   0   0   0   0   0   0   0
ST DLY/10   0   0   0   0   0   0   0   0
GRN CL/10   0  50   0   0   0  50   0   0

Press Q to exit
y=YES n=NO x=NEXT
```

Scroll all the way to the bottom of the page. The "GRN CL/10" will provide one of the times mentioned above, X1. This entry is in 10^{ths} of seconds so the 50 seen here is 5 seconds. This will set the time that the flashers will turn on prior to the end of Phase 2 and Phase 6 green. It will be more apparent in the next several steps on how this function is used.

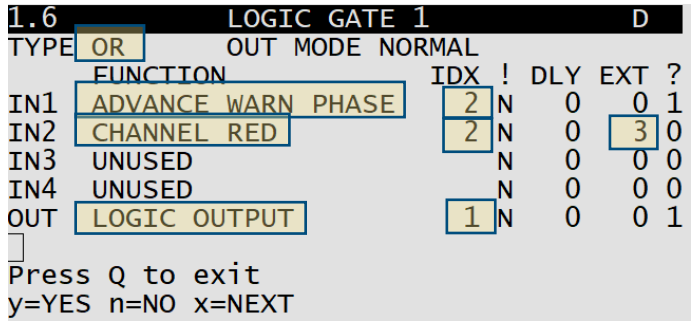
One note on this step: If coordination is being set up, the GRN CL/10 time is added to the min green time and will need to be added to any split time calculation. If the splits are tight, the min green time will need to be reduced accordingly.

1.2 Programming the Logic Gates

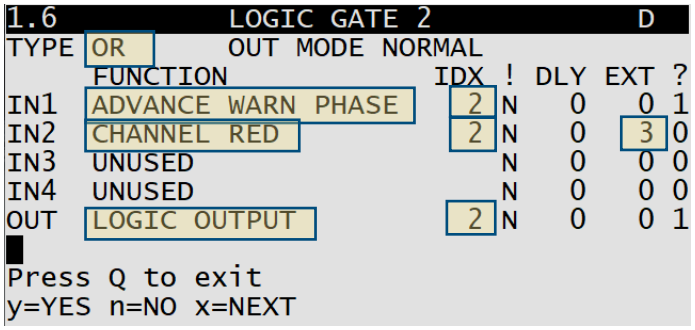
The next steps utilize the ability of the *Omni* eX controller to use logic statements to perform unique operations. For this example, the logic gates will be used to turn the flashers on and off during certain sequences as well as make the flashers "Wig-Wag" to provide more visibility and as required by MUTCD. There will be a total of 8 logic gates programmed. The first 4 set up the outputs necessary to drive the indications on the AWB. The second 4 logic gates are used to make the signal indications "Wig-Wag". Start off by going to M-1-6(1)

There are several items that need to be programmed. In steps 1 – 4 after setting up the illustrated items, scroll down to the bottom of each page and set the "DLY / EXT UNITS to SEC so that the extensions set for IN2 on each page will be for 3 seconds. Default for this function is TENTH or 1/10 of a second.

All logic functions can be selected with cursor and then by using the "+" or "-" keys selections can be made for a list of functions. Hit enter when the selection is found to enter it.

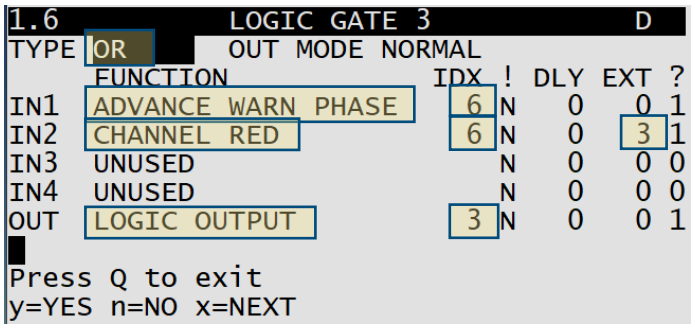


- Type – set to "OR"
- IN1 – set to "ADVANCE WARN PHASE
  - IDX – set to 2 – this selects phase 2
- IN2 – set to "CHANNEL RED"
  - IDX – set to 2 – this selects phase 2 Red
  - EXT – set to the number of seconds required for the AWB to stay on after Phase 2 Green turns on, in the example "3" seconds are programmed
- OUT – set to LOGIC OUTPUT
  - IDX – set to 1 to select the first Logic Ouput.

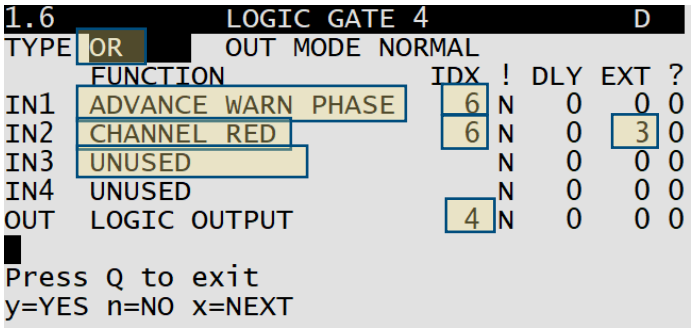


  - This will need to be repeated in M-1-6(2) to provide the second output for the "Wig-Wag" indication for the first flasher. The only change in Logic Gate 2 is:

- OUT – set to LOGIC OUTPUT
  - IDX – set to 2 to select the second Logic Output.

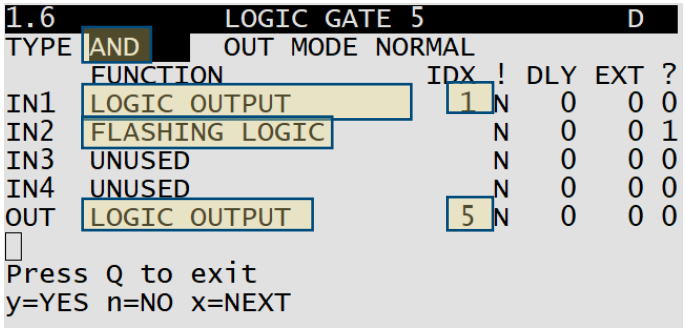


Follow the steps from gates 1 and 2 for gates 3 and 4 (M-1-6(3, 4)). Modify the IDX for Inputs 1 and 2 to be phase 6 and program the LOGIC OUTPUT for gate 3 to be 3 and…



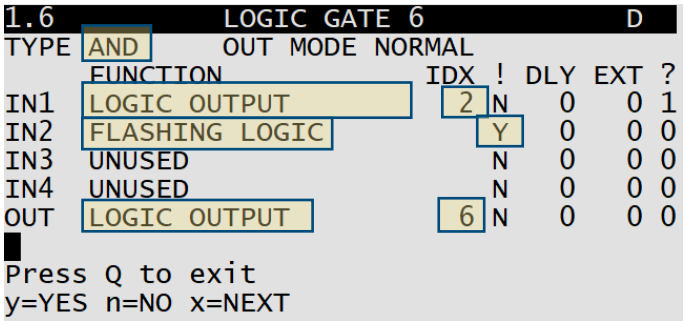
LOGIC OUTPUT for gate 4 to be 4.

Steps 5 through 8 will program the first four logic outputs to become flashing outputs and programmed such that LOGIC OUTPUTS 1 and 2 "WIG-WAG" or alternate on and off and flash based on the controller flashing logic.



In Logic Gate 5 the following will need to be programmed.

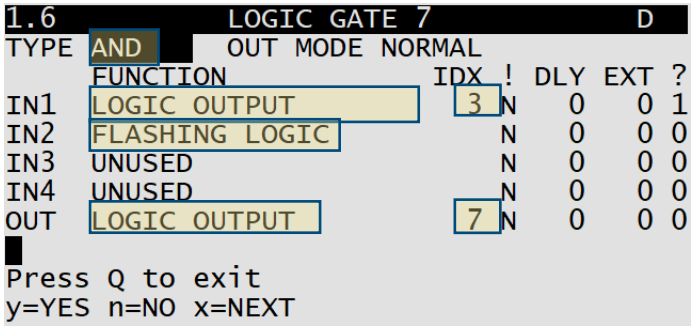
- TYPE – set this to "AND"
- IN1 – set to LOGIC OUTPUT
  - IDX – set this to 1
- IN2 – Set to FLASHING LOGIC
- OUT – set to LOGIC OUTPUT
  - IDX – set this to 5



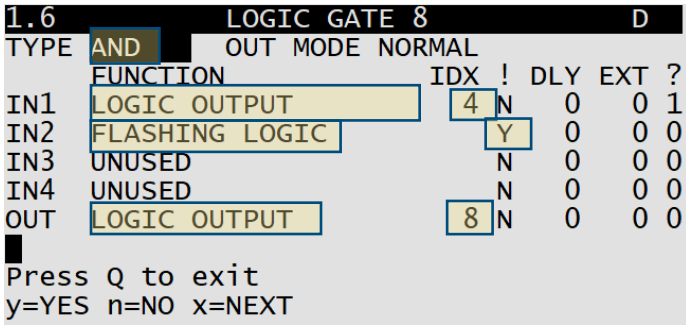
In Logic Gate 6 the following will need to be programmed.

- TYPE – set this to "AND"
- IN1 – set to LOGIC OUTPUT
  - IDX – set this to 2
- IN2 – Set to FLASHING LOGIC
  - ! – set to "Y" – this inverts the flash so that it is off when Logic Gate 5 is on.
- OUT – set to LOGIC OUTPUT
  - IDX – set this to 6

Logic gates 7 and 8 are similar to 5 and 6 except that IN1 and IN2 are set to LOGIC OUTPUTS 3 and 4 instead of 1 and 2. Also the LOGIC OUTPUTS are set to 7 and 8. Everything else is identical.



Logic Gate 7 – setup similar to Logic Gate 5



Logic Gate 8 – setup similar to Logic Gate 6

This is the final Logic Gate that needs to be programmed. In review the first four gates were used to set up outputs that drive the 4 indications two for phase 2 and two for phase 6. The last four gates use the first four outputs along with controller flashing logic to drive the four outputs used to drive the load switches in the next steps.

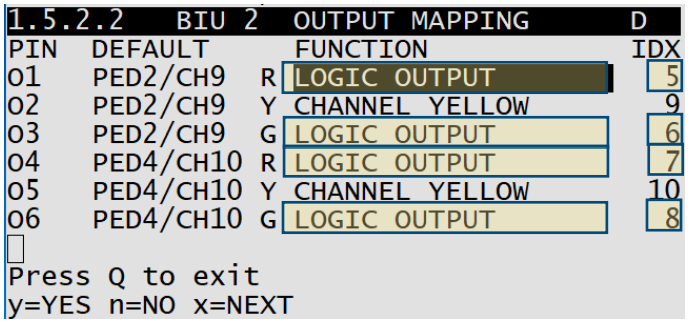
1.3 Mapping the outputs in the cabinet

This next step uses the outputs from Logic Gates 5 – 8 to drive the Red and Green outputs on the load switches 9 and 10. Using the "ESC" key on the keypad, go back to the main menu. From here the I/O mapping can be found with M-1-5. The selections here may vary depending on cabinet type. In this example a TS2 cabinet is used. There are 5 selections.

1. NEMA A, B, C, D – this is a standard TS1 cabinet or TS1 - type 2 hybrid where the load switches are still being driven by the A, B, C and D connectors.
2. NEMA TS2 BIU – this is a standard TS2 cabinet.
3. CALTRANS – C1, C11 – this is used on any 33X style rack mount cabinet
4. ATC / ITS SIU – is used in the original ITS cabinets or the latest ATCC style cabinets.
5. AUX SWITCH – is used to configure the Aux Switch located on the front of 2070 controllers for special functions.

For this example, select 2, then select 2 again for OUTPUTS. In a standard TS2 cabinet BIU's 1 – 4 are the Output BIUs used to drive the load switches. BIU1 is for the first 8 load switches and BIU2 is for the second 8 load switches. Since this example is using load switches 9 and 10, a "2" will be entered next to SELECT A BIU:

M-1-5-2-2(2) will navigate to this page. There are 4 lines that need to be modified. Under Function the default Output is viewed. These can be reassigned by selecting them with the cursor and scrolling up or down to the desired output using the (+) or (-) keys and hitting "ENT" as before.



- PIN 01 Ped2/Ch9 R – select LOGIC OUTPUT
  - IDX – set this to 5
- PIN 03 Ped2/Ch9 R – select LOGIC OUTPUT
  - IDX – set this to 6
- PIN 04 Ped2/Ch9 R – select LOGIC OUTPUT
  - IDX – set this to 7
- PIN 06 Ped2/Ch9 R – select LOGIC OUTPUT
  - IDX – set this to 8

Another suggestion would be to put logic outputs 5, 6, 7, 8 on the unused yellows of the peds if available.

1.4 Testing the configuration

In order to test this configuration, the MMU will need to be programmed to match the controller. This set up requires no additional jumpers to be added. The permissives in the controller and the MMU should be the standard configuration for an 8-phase intersection with peds on 13 - 16. Channels 9 and 10 are not programmed to be phase outputs and the monitor won't monitor them. Since they are not critical to the operations of the intersections the cabinet will not go into flash if any of the indications were to fail in the field.

Wiring up the field wires will be the same as a standard 8 phase intersection. The AWF should be wired as follows:

- Channel 9 is for the phase 2 approach and Channel 10 is for the phase 6 approach.
- The Green outputs on each load switch should be wired to one indication of the AWB and the Red outputs should be wired to the other indication.
- The Wig-Wag affect will be present in the field as the Red and Green outputs will alternate on and off.

1.5 Conclusion of the Setup

This concludes the setup. This can be used for any type of cabinet or number of approaches. For additional approaches additional Logic gates and mapping will be needed. Cabinet configurations will require mapping to each output as needed.

If you have any questions or need help configuring this setup, please call McCain Support at (760) 597-7121 or by email at support@mccain-inc.com.