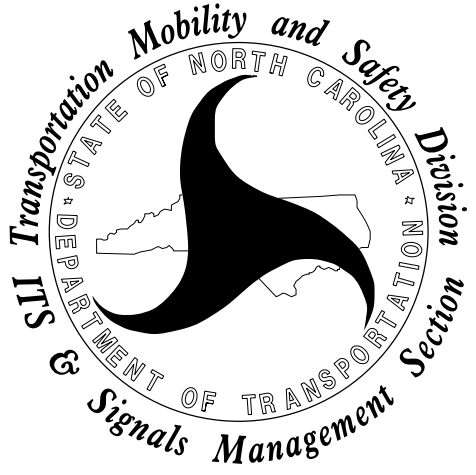
Design Manual

Signals Management



Part 2

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SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

STD. NO.

12-20

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SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Signal Plan I.D. Box

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 11-1001
DESIGNED: June 2017
SEALED: 7/15/2017
REVISED: N/A

Every electrical detail must have a Signal Plan I.D. Box. The purpose of this box is to positively identify the signal plan that the electrical detail is designed to implement. The box has four data fields:

Signal Inventory Number - An inventory number is assigned to each signalized intersection. That number is found in the bottom right corner of the signal plan and should be entered in the first data field.

Design Date - This date is found on the signal plan in the area labeled 'Plan Date'. It should be duplicated in the second data field.

Seal Date - The third data field should contain the date that the signal plan was sealed.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 11-1001
DESIGNED: June 2017
SEALED: 7/15/2017
REVISED: 6/15/2018

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Revision Date - If a signal plan has been revised, the date of the revision is shown in the bottom data field and a revision reference number is shown. If the signal plan has no revisions, the data field should be designaed as 'N/A'. If a signal plan has been revised more than once, the I.D. box should be expanded to show all revision dates and the revision text should be edited to read 'REVISED1', 'REVISED2', as required.

Signal Plan I.D. Box

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1.0
SHEET 1 OF 1

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EQUIPMENT INFORMATION

CONTROLLER.....2070
CABINET 336
SOFTWARE .....ECONOLITE OASIS
CABINET MOUNT.....POLE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S8,S9
PHASES USED.....1,2,2PED,3,4,6,6PED
OVERLAPS.....NONE

EQUIPMENT INFORMATION

CONTROLLER.....2070
CABINET .....332 W/ AUX
SOFTWARE .....ECONOLITE OASIS v3.03.32E
(OR LATEST APPROVED VERSION)
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S4,S5,S7,S8,AUX S1,AUX S2
PHASES USED.....1,2,3,4,5,6
OVERLAP A.....1+4
OVERLAP B.....3+6
OVERLAP C.....NOT USED
OVERLAP D.....NOT USED

Equipment Information

Controller - Gives the controller model.

Cabinet - Gives the cabinet model (332 for a base mount cabinet, or 336 for a pole mount cabinet).

Software - Gives the local software package to be used at a particular location. If the signal design includes railroad preemption, the specific version of the software will be listed.

Cabinet Mount - Specifies whether the traffic signal cabinet is a base mount or pole mount design.

Output File Positions - Lists the number of load switch sockets available in the output file. Also specifies, if applicable, the presence of an auxiliary output file.

Load Switches Used - Indicates which load switches are to be used on the design.

Phases Used - Lists the phases used by the controller, including any phases used for timing only that have no field display.

Overlaps - Lists the parent phases for any overlaps being used.

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SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1		S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	
CMU CHANNEL NO.	1		2	13	3	4	14	5	6	15	7	8	16	Ⓑ
PHASE	1		2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	Ⓒ
SIGNAL HEAD NO.	11	82	21,22 23	P21, P22	NU	41,42	NU	51	61,62 63	P61, P62	NU	81,82	NU	Ⓓ
RED			128			101			134			107		Ⓔ
YELLOW			129			102			135			108		Ⓔ
GREEN			130			103			136			109		Ⓔ
RED ARROW	125							131						Ⓕ
YELLOW ARROW	126	126						132						Ⓕ
GREEN ARROW	127	127						133						Ⓕ
✋				113						119				Ⓖ
🚶				115						121				Ⓖ

NU = NOT USED

Ⓗ

Ⓗ Extra column - if more than one type of signal head is attached to the same load switch, a second column is added to the chart as shown above. In this example, both a 3-section all left arrow head and the arrow portion of a 5-section head are to run on phase 1.

2070 Signal Head Hook-Up Chart

The chart shown at left appears on all 2070 electrical details. Its purpose is to provide a user-friendly reference on connecting the signal heads to the cabinet field terminals.

Features:

Ⓐ Load Switch No. - Displays the load switch designation.

Ⓑ CMU Channel No. - Displays the conflict monitor unit channel number for each corresponding load switch position.

Ⓒ Phase - Lists the function of the load switch. The load switch function can be reassigned in the controller programming. The default settings are shown at left.

Ⓓ Signal Head No. - Lists the signal heads that should have connections made to the field terminals for this load switch. Note that a 4- or 5- section head may appear in two different columns because the red, yellow, and green balls are controlled by one load switch while the arrow indications are controlled by another.

Ⓔ Red, Yellow, Green - Lists the field terminal number to which the red, yellow, and green ball indications for the signal heads listed in the row above should be tied.

Ⓕ Red, Yellow, and Green arrows - Red, yellow, and green arrow indications for the signal heads should be tied to the field terminals that appear in these rows.

Ⓖ Pedestrian Signal Indications - The 'Hand' and the 'Man' indications of the pedestrian signal heads should be connected to the field terminals indicated. If no pedestrian signals are used, these two rows may be removed from the drawing.

(continued on next page)

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	61	21,22	NU	NU	41,42	NU	21	61,62	NU	41	81,82	NU	23,24	63,64	NU	43,44	NU	NU
RED	*	128			101		*	134			107		A121	A124		A114		
YELLOW		129			102			135		*	108		A122	A125		A115		
GREEN		130			103			136			109		A123	A126		A116		
RED ARROW																		
YELLOW ARROW	126						132											
GREEN ARROW	127						133			124								

NU = NOT USED

* Denotes install load resistor. See load resistor installation detail this page.

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Features (cont.):

Ⓘ Load Resistor note - If there is not a field indication for each of the three outputs on a given load switch, a note referring to the load resistor installation detail should appear below the field hook-up chart. An asterisk is to be placed in the chart to show where a load resistor needs to be installed. If only the green and yellow indications of the load switch are used (common with 5-section heads on protected/permissive left turns), an asterisk referring to the note should be placed in the 'red' row. If only the green arrow indication is used, the asterisk should appear in the 'yellow' row. This scenario can occur when a 4-section head is used to display a left turn that is only used during a preemption. See STD. NO. 4.0 for more information.

Ⓙ Auxiliary Output file - If overlaps are used, an auxiliary output file is installed providing additional load switch capacity for up to six overlaps. The default load switch to function relationships for the auxiliary output file are as follows:

AUX S1 ——— OVERLAP A
AUX S2 ——— OVERLAP B
AUX S3 ——— SPARE (OVERLAP E)
AUX S4 ——— OVERLAP C
AUX S5 ——— OVERLAP D
AUX S6 ——— SPARE (OVERLAP F)

2070 Signal Head Hook–Up Chart

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SIGNAL HEAD HOOK-UP CHART FOR 4-SECTION FYA PPLT SIGNAL HEADS USED IN A 332 BASE MOUNTED CABINET

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1		S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1		2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1		2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11★	82	21,22	NU	31★	41,42	NU	51★	61,62	NU	71★	81,82	NU	11★	31★	NU	51★	71★	NU
RED		✳	128			101			134			107							
YELLOW			129		✳	102		✳	135		✳	108							
GREEN			130			103			136			109							
RED ARROW														A121	A124		A114	A101	
YELLOW ARROW		126												A122	A125		A115	A102	
FLASHING YELLOW ARROW														A123	A126		A116	A103	
GREEN ARROW	127	127			118			133			124								

NU = NOT USED

✳ Denotes install load resistor. See load resistor installation detail this page.

★ See pictorial of head wiring in detail below.

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2070 Signal Head Hook-Up Chart

The chart shown at left appears on all 2070 electrical details. Its purpose is to provide a user friendly reference on connecting the signal heads to the cabinet field terminals.

Features:

Ⓐ Auxiliary Output file - The cabinet must be wired such that for each Flashing Yellow Arrow (FYA) approach, the solid green protected arrow is driven by a load switch monitored on channels 1, 3, 5, and 7. The associated solid red arrow, solid yellow arrow, and flashing yellow arrow (overlap phase) must be driven by a load switch monitored on channels 9, 10, 11, and 12 respectively. The signal monitor makes the following associations when FYA monitoring is enabled for each approach:

Channel 1 with 9
Channel 3 with 10
Channel 5 with 11
Channel 7 with 12

Overlaps are used to drive the solid red arrow, solid yellow arrow, and flashing yellow arrow. The display sequence is further controlled by logic statements programmed in the controller.

Ⓑ Any load switch that only drives the solid green arrow on a 4-section FYA head will have a load resistor installed on its associated yellow field terminal on the output file. Additionally, the SSM switch for that channel will remain in the OFF position on the conflict monitor.

Ⓒ In addition to the hook-up information shown in this chart, every electrical plan utilizing FYA heads will have a FYA signal wiring detail showing a pictorial relationship of the signal head to output file wiring.

(continued on next page)

2070 Signal Head Hook–Up Chart For FYA

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SIGNAL HEAD HOOK-UP CHART FOR 4-SECTION FYA PPLT SIGNAL HEADS USED IN A CABINET OPERATING IN COMPACT MODE

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3		S4	S5	S6	S7	S8	S9		S10	S11	S12	
CMU CHANNEL NO.	1	2	9	13	3	4	14	5	6	11	15	7	8	12	16
PHASE	OLA	2	1 GRN	2 PED	3	4	4 PED	OLC	6	5 GRN	6 PED	OLD	8	7 GRN	8 PED
SIGNAL HEAD NO.	11★	21,22	11★	P21, P22	NU	41,42	P41, P42	51★	61,62	51★	NU	71★	81,82	71★	NU
RED		128				101			134				107		
YELLOW		129				102			135				108		
GREEN		130				103			136				109		
RED ARROW	125							131				122			
YELLOW ARROW	126							132				123			
FLASHING YELLOW ARROW	127							133				124			
✋				113			104								
PED YELLOW							✳								
GREEN ARROW			114							120				111	
🚶				115			106				✳				✳

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✳ Denotes install load resistor. See load resistor installation detail this sheet.

★ See pictorial of head wiring in detail below.

NOTE: Load switches S1, S3, S7, S9, S10, and S12 require output remapping. See sheets x through y for details.

Features (cont.):

Ⓓ Load switch outputs that drive the solid red arrow, solid yellow arrow, and flashing yellow arrow will have to be remapped to function as vehicle overlaps.

Unused ped yellow load switch outputs will have to be remapped to drive the left turn green arrows.

Ⓔ FYA operation when using a cabinet in compact mode. The FYA compact mode switch on the conflict monitor must be set to the ON position. Further details are found in STD. NO. 7.0. The cabinet must be wired such that the (unused) ped yellow load switch outputs are wired to the conflict monitor as follows:

2-PY to Channel 9 Green (CMU pin 13, logical Channel 9)
4-PY to Channel 9 Yellow (CMU pin 16, logical Channel 10)
6-PY to Channel 10 Green (CMU pin R, logical Channel 11)
8-PY to Channel 10 Yellow (CMU pin U, logical Channel 12)

For all cabinets, this is accomplished through a keyed plug connection found on the inside panel of the output file. Plug together the two connectors labeled as shown below:

1-2PY	----------	1-CMU-13
2-4PY	----------	2-CMU-16
3-6PY	----------	3-CMU-R
4-8PY	----------	4-CMU-U

Ⓕ Connecting the keyed ped yellow connector in 'E' above connects all ped yellow load switch outputs to the conflict monitor. A ped load switch installed for FYA use that has no ped movement must have a load resistor installed on its Walk output to prevent a conflict. A ped load switch used solely for ped movements must have a load resistor installed on its Ped Yellow output to prevent a conflict.

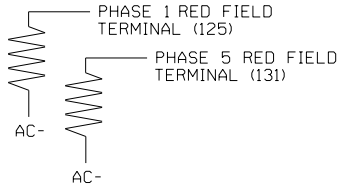
Load Resistor Installation Detail

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

ACCEPTABLE VALUES

VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



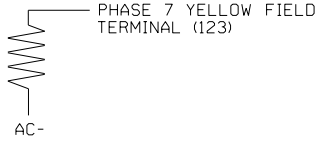
NOTE: The purpose of these resistors is to load the channel red monitor inputs in order for the Signal Sequence Monitor to use the full signal sequence monitoring capability on channels that do not use the red display in the field.

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

ACCEPTABLE VALUES

VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



In all traffic signal installations, the signal head displays are switched 'ON' and 'OFF' by solid state load switches. These load switches take a logic level input from the controller and switch AC power to the signal heads through a triac device. The triac is protected from transient voltages by a snubber circuit. In the 'OFF' condition there is a small leakage current through the snubber circuit. As long as there is a load across the circuit, such as a bulb or LED module, this leakage current goes unnoticed. If there is no load, however, the conflict monitor will see an 'OFF' condition as an active signal, resulting in either a false conflict or a dual indication fault.

If there is not a field indication for each of the three outputs on a given load switch, a load resistor needs to be installed. The load resistor takes the place of a bulb or LED indication and provides a load for the channel red or yellow monitor input preventing the problems with unwarranted faults.

If only the green and yellow indications of the load switch are used (common with 5-section heads on protected/permissive left turns), a resistor needs to be installed on the red field terminal as shown above left.

If only the green arrow indication is used, the resistor should be installed on the yellow field terminal as shown lower left. This situation can occur when a 4-section head is used to display a left turn that is only used during a preemption, or when a 4-section flashing yellow arrow head is used to display a protected left turn. In either case, no resistor is needed on the red terminal as the signal sequence monitoring capability is not used. See STDS. NO. 3.0 and 7.0 for more information.

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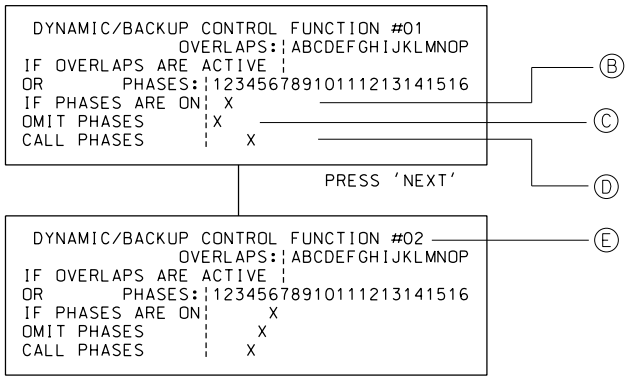
(OPTION #1)

DYNAMIC BACKUP CONTROL PROGRAMMING

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE DYNAMIC/BACKUP CONTROL FUNCTIONS 1 AND 2. — Ⓐ

2. FROM PHASE CONTROL FUNCTIONS MENU PRESS '2' (DYNAMIC/BACKUP CONTROL FUNCTIONS).



BACKUP PROTECTION PROGRAMMING COMPLETE

(OPTION #2)

BACKUP PROTECTION NOTE

(program controller as shown below)

From Main Menu press '2' (Phase Control), then '1' (Phase Control Functions). Program phase 2 for 'Backup Protect'. Make sure the Red Revert times shown on the Signal Design Plans are programmed in the 'Phase Timing' menu.

Oasis Backup Protection Programming Details

When a signal design requires the use of backup protection to eliminate a yellow trap situation, two options are available.

Option #1 uses the Dynamic Backup function. The upper left image is an exact duplication of the dynamic backup programming display found on a 2070 controller running Oasis control software.

The controller accomplishes dynamic backup protection by omitting the left turn phase while the opposite through movement is "ON". Phase "ON" is a controller function that is active during the phase green, yellow change, and red clearance intervals.

Below is a brief explanation of dynamic backup protection features and functionality:

Ⓐ Activation note - This note directs the installer to the phase control page of the controller programming. At the bottom of this page there is a parameter listed called "Dynamic/Backup". The installer is directed to flag the Dynamic/Backup functions that will be in use, otherwise the backup programming will not function. See function number below in note Ⓔ.

Ⓑ Phases On row - Phases selected here determine when an omit is placed during the signal sequence.

Ⓒ Omit Phases row - Phases selected here determine where an omit is placed during the selected phase "ON".

Ⓓ Call Phases row - Phases selected here determine the phase that the omitted phase detectors will call while that phase is omitted. The call placed is a special dynamic call that will be released when the selected phase switches to green. This dynamic call produces a minimum recall type operation (dynamic call will not max out a phase).

Ⓔ Function number - The controller is capable of up to sixteen dynamic functions. For normal backup protection, one function should be used for each left turn that is being omitted. The example shown to the left shows phases 1 and 5 being omitted by phases 2 and 6 respectively. The phase calls will cycle the controller through the side street through movements before serving phases 1 and/or 5. Please note that each left turn omit is accomplished in a separate function.

Option #2 uses the Backup Protect function. This function puts the through phases in All Red before serving the left turns. This function is typically used in conjunction with increased Red Revert times on the concurrent through phase.

2070 OASIS Backup Protection Programming

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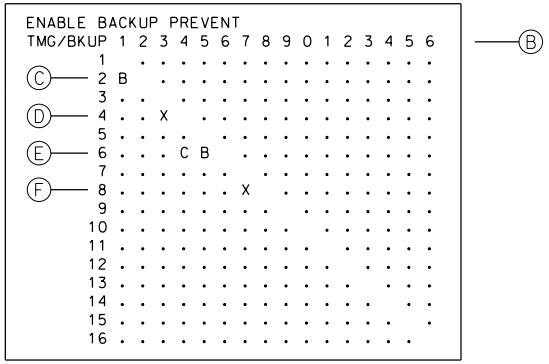
ECONOLITE ASC/3-2070 BACKUP PROTECTION ENABLE PROGRAMMING

(program controller as shown)

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [1. CONTROLLER SEQ]
3. From CONTROLLER SEQUENCE Submenu select [3. BACKUP PREVENT PHASES]

Follow programming as shown below. On the 'ENABLE BACKUP PREVENT' screen move cursor to the appropriate field and press 'YES/NO' on the controller keypad to toggle field value between 'X' ,'B', 'C' and 'OFF'.



NOTES

1. 'B' without a 'C' programmed for the 'TIMING' (row) phase inhibits the controller from servicing the 'BACKUP' (column) phase when the 'TIMING' (row) phase is active, or next, until the controller goes through Red Revert and Red Clear. Make sure the proper Red Revert and Red Clear times shown on the Signal Design plan are programmed in the controller phase timing.
2. 'B' with a 'C' programmed for the 'TIMING' (row) phase places a demand on that 'BACKUP' (column) phase. The controller will then service the called phase and proceed normally.
3. 'X' inhibits the controller from servicing the 'BACKUP' (column) phase when the 'TIMING' (row) phase is active or next.

Econolite ASC/3-2070 Backup Protection Programming Details

When a signal design requires the use of backup protection to eliminate a yellow trap situation, a dynamic approach as well as a red revert approach are both available from one programming screen as shown to the left.

Use the notes shown beneath the screen shot to interpret the backup protection requirements that may be shown on a signal design plan.

Ⓐ TMG Row - Determines the phase when an omit is placed during the signal sequence.

Ⓑ BKUP Column - Determines the phase where an omit is placed while the TMG row phase is "ON". Also used to determine the phase that will be called while the TMG row phase is "ON" and the programmed omit phase has a call.

Ⓒ Example 1: The controller will back up from phase 2 to phase 1 after first going to all Red and timing the Red Revert times programmed in the controller. See Note 1.

Ⓓ Example 2: Omits phase 3 when phase 4 is "ON" (the controller will not back up directly from phase 4 to phase 3). See Note 3.

Ⓔ Example 3: When phase 6 is "ON" and the controller receives a call on phase 5, the controller will omit the phase 5 call and call phase 4. Phase 5 will be served when the controller recrosses the barrier after phase 4 clears. The controller will not back up directly from phase 6 to phase 5. See Note 2.

Ⓕ Example 4: Omits phase 7 when phase 8 is "ON" (the controller will not back up directly from phase 8 to phase 7). See Note 3.

ASC/3–2070 Backup Protection Programming

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SE-PAC2070 BACK-UP PROTECTION PROGRAMMING DETAIL

(program controller as shown below)

From Main Menu, press '3' (Phase Data)

```
EPAC PHASE DATA          PRESS # DESIRED

 1-VEHICLE TIMES         5-V & P RECALLS
 2-DENSITY TIMES         6-N.LOCK & MISC
 3-PEDEST. TIMES         7-SPEC. SEQUENCE
 4-INITIALIZE &          8-SPEC. DETECTOR
   N.A. RESPONSE         9-PHASE COPY

                                F-PRIOR MENU
```

```
PHASE.....1...2...3...4...5...6...7...8
  OMIT     2   0   0   0   6   0   0   0
  -YEL     0   0   0   0   0   0   0   0
  OCAL     0   0   0   0   4   0   0   0
  OMIT:## PHS ON OMITS THIS PHASE
   -YEL:## PHS YEL OMITS THIS PHS YEL
   OCAL: WHEN OMIT, DETS CALL## PHS

A-UP B-DN C-LT D-RT E-ENTER F-PRIOR MENU
```

Special Sequence programming complete.

SE-PAC2070 Backup Protection Programming Details

When a signal design requires the use of backup protection to eliminate a yellow trap situation, dynamic backup protect is available as shown to the left.

Ⓐ PHASE row - Determines the phase where an omit is placed while the programmed OMIT phase is "ON".

Ⓑ OMIT row - Phases programmed here determine when an omit is placed during the signal sequence.

Ⓒ OCAL row - Phases programmed here determine the phase that will be called while the programmed OMIT phase is "ON" and the phase in the PHASE row has a call.

Ⓓ Example 1: Omits phase 1 when phase 2 is "ON" (the controller will not back up directly from phase 2 to phase 1).

Ⓔ Example 2: When phase 6 is "ON" and the controller receives a call on phase 5, the controller will omit the phase 5 call and call phase 4. Phase 5 will be served when the controller recrosses the barrier after phase 4 clears. The controller will not back up directly from phase 6 to phase 5.

Naztec Apogee Backup Protection Programming Details

When a signal design requires the use of backup protection to eliminate a yellow trap situation, dynamic backup protect is available as shown to the left.

NAZTEC APOGEE CALL, INHIBIT, REDIRECT PROGRAMMING DETAIL

(USED FOR BACK-UP PROTECTION)

(program controller as shown below)

From Main Menu press '1' (Controller), then '1' (Phases), then '5' (Call, Inh, Redirect).

```
                          Inhibit Ps 1111111      >
P   ..Call.Ps..  12345678 90123456
1    0  0  0  0  ........ ........
2    0  0  0  0  X....... ........
3    0  0  0  0  ........ ........
4    0  0  0  0  ........ ........
5    0  0  0  0  ........ ........
6    0  0  0  0  ...X.... ........
7    0  0  0  0  ........ ........
8    0  0  0  0  ........ ........
```

(B) (D)

SCROLL TO THE RIGHT TO ACCESS "REDIRECT P CALLS" SCREEN BELOW

```
    <  Redirect P Calls (from P to P)
P    From-To  From-To  From-To  From-To
1      0  0     0  0     0  0     0  0
2      0  0     0  0     0  0     0  0
3      0  0     0  0     0  0     0  0
4      0  0     0  0     0  0     0  0
5      0  0     0  0     0  0     0  0
6      5  4     0  0     0  0     0  0
7      0  0     0  0     0  0     0  0
8      0  0     0  0     0  0     0  0
```

(E)

(A) (C)

OPERATIONAL NOTE

This programming will omit phase 1 when phase 2 is "ON" and omit phase 5 when phase 6 is "ON". Also, calls will be redirected from phase 5 to phase 4 during phase 6.

(A) Phase column - Determines the phase when an inhibit (omit) is placed during the signal sequence.

(B) Inhibit Phase row - Determines the phase where an inhibit (omit) is placed while the phase in the 'Phase' column is "ON".

(C) From-To column - Phase programmed in the 'From' column will have calls redirected to the phase programmed in the 'To' column while the phase in the 'Phase' column is "ON".

(D) Example 1: Call Inhibits - This programming will inhibit (omit) phase 1 when phase 2 is "ON" and will inhibit (omit) phase 5 when phase 6 is "ON". The controller will not back up directly from phase 2 to phase 1 or from phase 6 to phase 5.

(E) Example 2: Call Redirects - A call redirect can work in conjunction with a call inhibit. When phase 6 is on and the controller receives a call on phase 5, the controller will inhibit (omit) the phase 5 call as per Example 1. To serve phase 5, the controller will first redirect phase 5 calls to phase 4 and phase 5 will be served when the controller recrosses the barrier after phase 4 clears. The controller will not back up directly from phase 6 to phase 5.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the signal plans. — Ⓐ
2. Program phases 4 and 8 for Dual Entry. — Ⓑ
3. Enable Simultaneous Gap-Out for all phases. — Ⓒ
4. Program phases 2 and 6 for Variable Initial and Gap Reduction — Ⓓ
5. Program phases 2 and 6 for Startup In Green. — Ⓔ
6. Program phases 2, 4, 6 and 8 for Startup Ped Call. — Ⓕ
7. Program phases 2 and 6 for Yellow Flash, and overlaps 1 and 2 as Wag Overlaps. — Ⓖ
8. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location. — Ⓗ
9. The cabinet and controller are part of the (insert) System. — Ⓘ

Notes

All electrical details have a section of notes. A typical set for an Oasis 2070 design is shown above. Unneeded notes should be removed. Additionally, if there is a need to highlight an unusual setting or feature about the signal design that is not covered elsewhere on the electrical detail, a custom note can be added to this space.

2070 Oasis Notes

Ⓐ Flash setup note - The first sentence, concerning flash color setup on unused load switches, may be omitted if all load switches are used. The second sentence is always used.

Ⓑ Dual Entry note - Directs that the indicated phases be programmed for Dual Entry. The '2070 Timing Chart' on the signal plan will specify which phases require this feature.

Ⓒ Simultaneous Gap-Out note - Directs that all phases be programmed for Simultaneous Gap-Out. This note always appears and never requires modification.

Ⓓ Variable Initial and Gap Reduction note - Directs that the indicated phases be programmed for these timing features. If the '2070 Timing Chart' on the signal plan has timing values for 'Seconds Per Actuation' and 'Max Variable Initial', that phase should be programmed for Variable Initial. If values are shown for 'Time Before Reduction', 'Time To Reduce', and 'Minimum Gap', the phase should be programmed for Gap Reduction.

Ⓔ Controller Start Up note - In general, the controller should be programmed to start up in the phase or phases that flash yellow. If no phases flash yellow, the controller needs to be programmed to start up in a red clearance interval. If this is the case, consult the signal plan designer to see if there is a preference about what phase(s) should be served first.

Ⓕ Startup Ped Call note - Any ped phases that will be in use during normal operation should be listed here.

Ⓖ Yellow Flash note - This ensures phases 2 and 6 flash yellow during controller flash. Wag overlap programming flashes overlap 1 (OLA) and overlap 2 (OLB) concurrently with phases 1 and 3 (typically for FYA applications).

Ⓗ Detector Logging note - Alerts installer to enable detector logging for detectors in use when the cabinet and controller are controlled by Advanced Traffic Management System (ATMS) software. Include on all plans except for those that are part of a City system.

Ⓘ System note - If the signal is part of a closed loop or urban traffic control system, the system type and/or name (if available) is listed here.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans. —Ⓐ
2. Program phases 4 and 8 for Dual Entry. —Ⓑ
3. Program controller to start up in phase 2 Green and 6 Green. —Ⓒ
4. If this signal will be managed by an ATMS software, enable controller and detector logging for all detectors used at this location. —Ⓓ
5. The cabinet and controller are part of the (insert) System. —Ⓔ

ASC/3-2070 Notes

Ⓐ Flash setup note - The first sentence, concerning flash color setup on unused load switches, may be omitted if all load switches are used. The second sentence is always used.

Ⓑ Dual Entry note - Directs that the indicated phases be programmed for Dual Entry. The 'ASC/3-2070 Timing Chart' on the signal plan will specify which phases require this feature.

Ⓒ Controller Start Up note - In general, the controller should be programmed to start up in the phase or phases that flash yellow. If no phases flash yellow, the controller needs to be programmed to start up in a red clearance interval. If this is the case, consult the signal plan designer to see if there is a preference about what phase(s) should be served first. If the the startup phase also has a ped movement, it should be programmed to start in 'Walk' instead of 'Green'.

Ⓓ Detector Logging note - Alerts installer to enable detector logging for detectors in use when the cabinet and controller are controlled by Advanced Traffic Management System (ATMS) software. Include on all plans except for those that are part of a City system.

Ⓔ System note - If the signal is part of a closed loop or urban traffic control system, the system type and/or name (if available) is listed here.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans. — Ⓐ
2. Program controller to start up in phases 2 and 6 green. — Ⓑ
3. Enable simultaneous gap-out feature for all phases. — Ⓒ
4. Program phases 4 and 8 for dual entry. — Ⓓ
5. Program phases 2 and 6 for volume density operation. — Ⓔ
6. The cabinet and controller are part of the (insert) System. — Ⓕ

SE-PAC 2070 Notes

Ⓐ Flash setup note - The first sentence, concerning flash color setup on unused load switches, may be omitted if all load switches are used. The second sentence is always used.

Ⓑ Controller Start Up note - In general, the controller should be programmed to start up in the phase or phases that flash yellow. If no phases flash yellow, the controller needs to be programmed to start up in a red clearance interval. If this is the case, consult the signal plan designer to see if there is a preference about what phase(s) should be served first.

Ⓒ Simultaneous Gap-Out note - Directs that all phases be programmed for Simultaneous Gap-Out. This note always appears and never requires modification.

Ⓓ Dual Entry note - Directs that the indicated phases be programmed for Dual Entry. The 'SE-PAC 2070 Timing Chart' on the signal plan will specify which phases require this feature.

Ⓔ Volume Density Operation note - Directs that the indicated phases be programmed for the following timing features if indicated on the 'SE-PAC 2070 Timing Chart' on the signal plan: 'Added Initial', 'Maximum Initial', 'Time Before Reduction', 'Time To Reduce', 'Minimum Gap'.

Ⓕ System note - If the signal is part of a closed loop or urban traffic control system, the system type and/or name (if available) is listed here.

SE–PAC 2070 Notes

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TRANSPORTATION MOBILITY AND SAFETY DIVISION
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12-20

STD. NO.
6.2
SHEET 1 OF 1

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans. — (A)
2. Initialize database in Naztec 2070 local software (Apogee) as FULL-CALTRANS. This initialization should be done prior to programming controller. — (B)
3. Initialize I/O "C1-C11-ABC IO Mode" to USER (MM 1-8-6). Then set "Init 2A" to MODE 5 (MM 1-8-9-3). — (C)
4. Program phases 2 and 6 for Start Up In Green. — (D)
5. Program "Start Up Flash" for 0 sec. The conflict monitor will govern start-up flash time. — (E)
6. Ensure "Local Flash Start" feature is set to "DRK". — (F)
7. Ensure "InhFYARedSt" feature is set to "ON". — (G)
8. Program controller to provide a 1 second delay on the Flash Sense/Local Flash input. Use the following logic statement to provide this functionality:

FROM MAIN MENU->1->8->7 (I/O LOGIC)

Result	Src.Fcn		TimeOp	Time
I208	=	01208	DLY	1

9. Program phases 2, 4, 6, and 8 for Dual Entry. — (H)
10. The cabinet and controller are part of the (insert) System. — (I)

Apogee Notes

(A) Flash setup note - The first sentence, concerning flash color setup on unused load switches, may be omitted if all load switches are used. The second sentence is always used.

(B) Initialize Database note - loads controller with defaults required to run standard eight phase with CALTRANS I/O mapping.

(C) Initialize I/O - Loads the I/O map with the NCDOT I/O mapping that might not be identical to CALTRANS I/O mapping.

(D) Controller Start Up note - In general, the controller should be programmed to start up in the phase or phases that flash yellow. If no phases flash yellow, the controller needs to be programmed to start up in a red clearance interval. If this is the case, consult the signal plan designer to see if there is a preference about what phase(s) should be served first. If the the startup phase also has a ped movement, it should be programmed to start in 'Walk' instead of 'Green'.

(E) Start Up Flash - Determines how long a controller will remain in flash following a power interruption.

(F) Local Flash Start - Set to 'DRK' in a 170 type cabinet so the controller indications initialize in the DRK state when the controller resets and the flash transfer relays are energized.

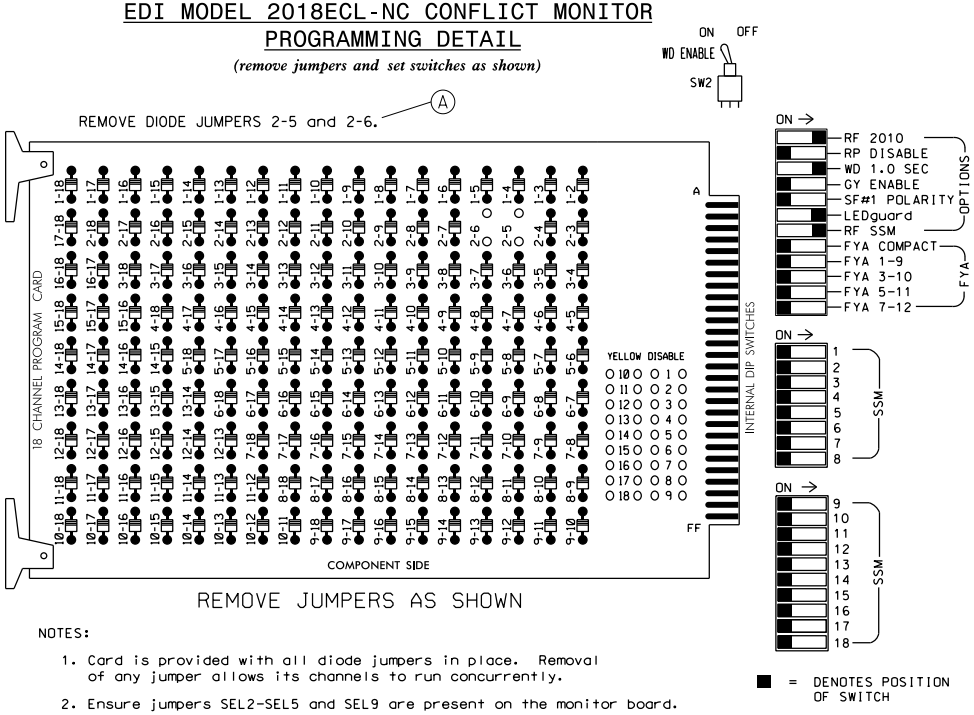
(G) InhFYARedSt - FYA's can be programmed to be inhibited or allowed to run immediately following controller startup by programming this feature.

(H) Dual Entry note - Directs that the indicated phases be programmed for Dual Entry. The Controller Timing Chart on the signal plan will specify which phases require this feature.

(I) System note - If the signal is part of a closed loop or urban traffic control system, the system type and/or name (if available) is listed here.

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

2018 Conflict Monitor Programming

The conflict monitor typically used in all NCDOT 2070 installations is the EDI model 2018ECL-NC. (See note Ⓘ on sheet 2) The representation at the left is found in the top left corner on all the 2070 start drawings.

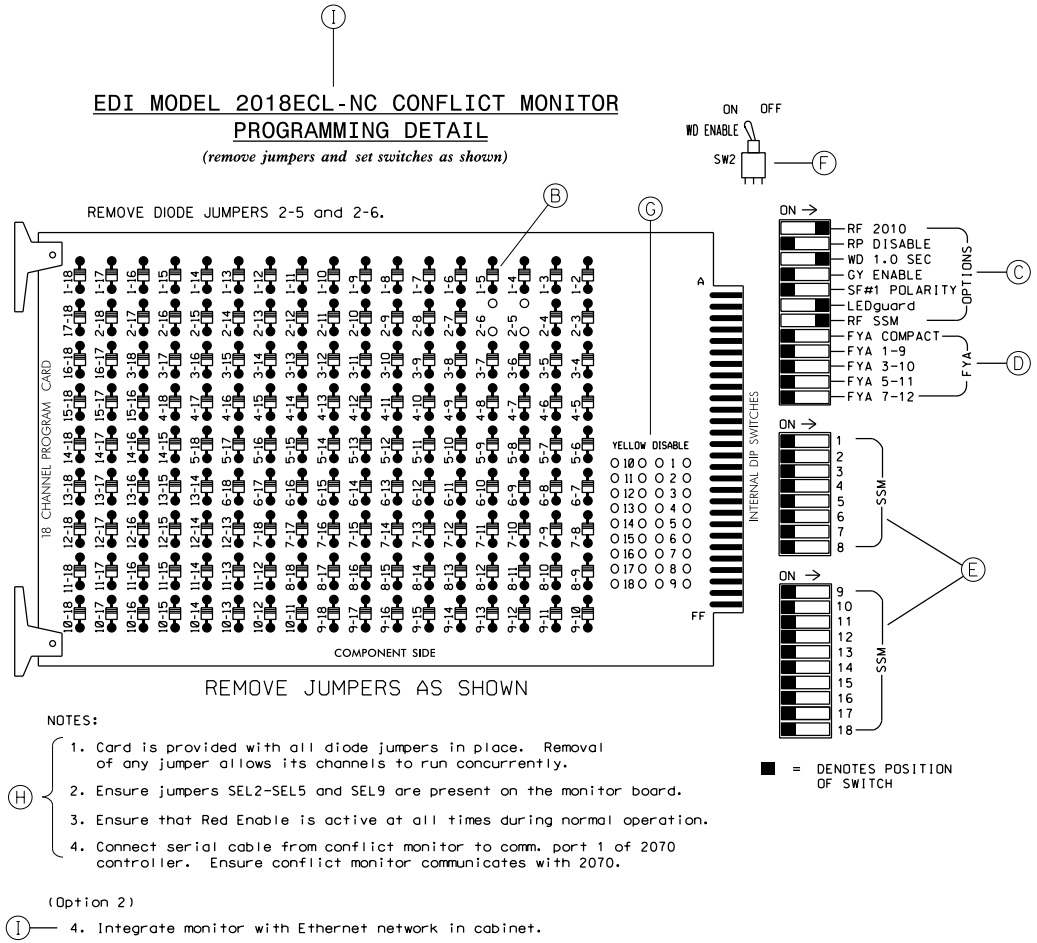
The 2018ECL-NC has 18 monitor channels. The default channel to load switch to function relationships are as follows:

Channel 1	S1	Phase 1
Channel 2	S2	Phase 2
Channel 3	S4	Phase 3
Channel 4	S5	Phase 4
Channel 5	S7	Phase 5
Channel 6	S8	Phase 6
Channel 7	S10	Phase 7
Channel 8	S11	Phase 8
Channel 9	AUX S1	Overlap A
Channel 10	AUX S2	Overlap B
Channel 11	AUX S4	Overlap C
Channel 12	AUX S5	Overlap D
Channel 13	S3	Phase 2 PED
Channel 14	S6	Phase 4 PED
Channel 15	S9	Phase 6 PED
Channel 16	S12	Phase 8 PED
Channel 17	AUX S3	Spare (Overlap E)
Channel 18	AUX S6	Spare (Overlap F)

The channel to load switch relationship is fixed in the cabinet hardware. The load switch function can be changed in the controller software. Load switches AUX S1-AUX S6 are on the auxiliary output file.

Features:

Ⓐ Remove diode jumper note - For any two movements to be allowed to run concurrently, the corresponding diode jumper must be removed on the monitor card. This includes not only phases that can run concurrently, but also any ped or overlap that can run concurrently. Any permissible combination that does not have the corresponding jumper removed will result in an unwarranted conflict fault and place the intersection in flash. Conversely, removing a jumper representing a movement that should not be allowed creates a dangerous scenario where a true conflict can go undetected. This note lists the jumpers that should be removed on the monitor card.



NOTES:

H
1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

(Option 2)

I 4. Integrate monitor with Ethernet network in cabinet.

Ⓘ For signal systems using Ethernet communications, use Note 4 (Option 2) and change the monitor model to "2018ECLip-NC".

Features (cont.):

Ⓑ Monitor card programming - The electrical detail provides a graphic representation of the monitor card after the appropriate diode jumpers have been removed as described above. This drawing should always match the remove diode jumper note directly above.

Ⓒ Option switches - These dip switches control a variety of optional settings for the 2018ECL-NC monitor. The settings shown at left should be used for all electrical details. For more information on these options, refer to the manufacturer's operations manual.

Ⓓ FYA switches - These switches are used to enable flashing yellow arrow monitoring for 3-section and 4-section FYA's using overlaps. Refer to the manufacturer's operations manual for more information on these switches.

Ⓔ SSM switches - These switches are used to enable dual indication, red fail, and minimum yellow clearance monitoring on individual monitor channels. In general, any channel that has both a green and a yellow indication in the field should have its SSM switch set to the 'ON' position. Channels used to monitor pedestrian movements, or the green arrow exclusively for a four-section head or four-section FYA head, should be set to the 'OFF' position.

Ⓕ Watchdog enable - Enables the controller watchdog monitoring feature. If the monitor fails to sense the logic level signal being toggled by the controller, a 'WDT Error' fault will be triggered. Should always be shown in the 'ON' position.

Ⓖ Yellow disable jumpers - This feature allows the minimum yellow change monitoring to be disabled for a channel being used for a pedestrian movement. Since NCDOT also does not monitor dual indication for peds, the SSM switches for those channels should be set to 'OFF', making the use of the yellow disable jumpers unnecessary.

Ⓗ Notes - These notes should appear with the conflict monitor programming detail on all 2070 electrical details. For more information on these options and conflict monitor functionality, refer to the manufacturer's operations manual.

2018 Conflict Monitor Programming

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10-18

STD. NO.
7.0
SHEET 2 OF 2

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø 1 1A	Ø 2 2A	Ø 2 2C	Ø 2 2E	Ø 3 3A	Ø 4 4A	Ø 4 4C	Ø 4 4E	SYS. DET. S1	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L	NOT USED	Ø 2 2B	Ø 2 2D	NOT USED	NOT USED	Ø 4 4B	Ø 4 4D	NOT USED	SYS. DET. S2			Ø4 PED DC ISOLATOR	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	Ø 6 6A	Ø 6 6C	Ø 6 6E	Ø 7 7A	Ø 8 8A	Ø 8 8C	Ø 8 8E	SYS. DET. S3	SLOT EMPTY	SLOT EMPTY	PRE3 DC ISOLATOR	PRE4 DC ISOLATOR	PRE1 AC ISOLATOR
	L	NOT USED	Ø 6 6B	Ø 6 6D	NOT USED	NOT USED	Ø 8 8B	Ø 8 8D	NOT USED	SYS. DET. S4			PRE5 DC ISOLATOR	PRE6 DC ISOLATOR	PRE2 AC ISOLATOR

EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME
PRE = PREEMPT

INPUT FILE POSITION LAYOUT

(front view)

Ⓐ

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø 1 1A	Ø 2 2A	Ø 2 2C	SLOT EMPTY	Ø 3 3A	Ø 4 4A	Ø 4 4C	SLOT EMPTY	SYS. DET. S1	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L	NOT USED	Ø 2 2B	Ø 2 2D		NOT USED	Ø 4 4B	NOT USED		SYS. DET. S2			NOT USED	NOT USED	ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	Ø 6 6A	Ø6/SYS 6C/S3	SLOT EMPTY	Ø 7 7A	Ø 8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	PRE1 AC ISOLATOR
	L	Ø 5 5B	Ø 6 6B	Ø6/SYS 6D/S4		NOT USED	Ø 8 8B								NOT USED

EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME
PRE = PREEMPT

2070 Input File Layout (332)

NCDOT uses 2070 controllers in type 170 cabinets. The base mounted 332 cabinet has two input files labeled 'I' and 'J' that accept inputs for traffic detection, pedestrian push buttons, preempt calls or other functions deemed necessary.

Each input file has 14 slots. Each slot can hold a 2-channel inductive loop detector, AC isolator or DC isolator. Each slot has two input terminals, but not every input terminal is independently connected to the controller. Slots 1, 4, 5 and 8 have the two input pins jumpered together and wired to a single controller harness pin. Neither of the input pins for slot 10 are connected to the controller.

Two examples of the input file layout for the base mounted 332 cabinet are shown left. The upper example shows how the rack is represented on the start drawings. The functions shown for slots 1-8 and 12-14 correspond to the default input assignments in the Econolite Oasis software. The controller detectors for slot 9 are assigned as local detectors by default but NCDOT reserves them for system detectors instead. Slot 10 is not wired to the controller and is therefore unused. The upper and lower channels of slot 11 in the I-File are assigned to Manual Advance and Manual Control Enable, respectively. The upper channel of slot 11 in the J-File is a spare and the lower slot is the Door Ajar input to the controller.

Features:

Ⓐ Inductive Loop Detectors - Input file slots 1-9 are set up for inductive loop detector cards. Each card has two channels. Each channel is represented on the electrical detail by a block in the layouts shown on the left. For each channel, the function of the loop is shown in the upper half of the block while the loop name is shown in the lower half. A channel can be assigned to a local detector, a system detector, or both. While the default phase settings should be followed as much as practical, controller detectors can be easily reassigned as needed.

(continued on next page)

2070 Input File Layout – 332

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TRANSPORTATION MOBILITY AND SAFETY DIVISION
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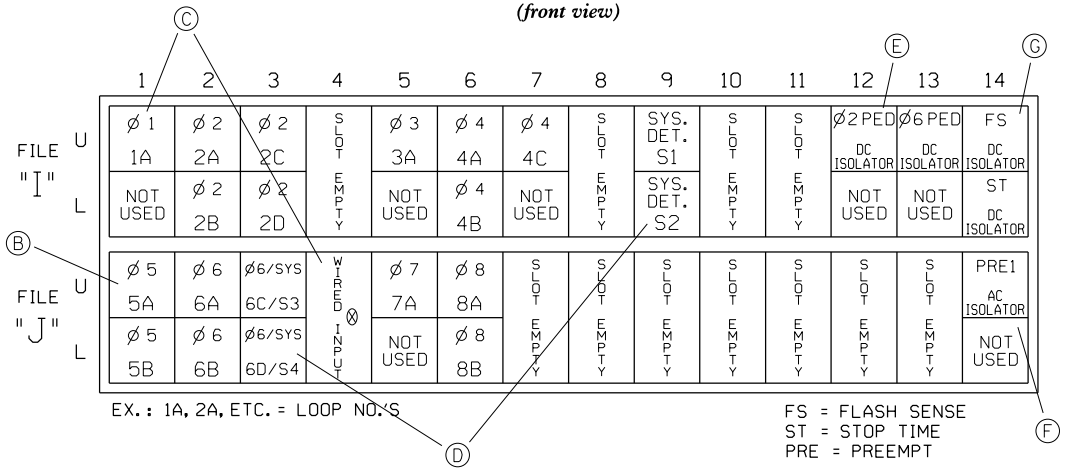
10-18

STD. NO.
8.0
SHEET 1 OF 2

INPUT FILE POSITION LAYOUT

(front view)



⊗ Wired Input - Do not populate slot with detector card

Features (cont.):

Ⓑ Slots 1, 4, 5 and 8 have only one controller input pin. The lower channel is normally unused. However, the lower channel of these slots may be used if neither the loop on the upper channel nor the loop proposed for use on the lower channel have any associated delay timing and all other settings for both loops are identical. The controller will view the two loops as if they are one.

Ⓒ Loops That Call Two Phases - Sometimes a left turn loop will call both the left turn phase and the adjacent through movement with different timings or attributes for each. In this case, two detector channels are needed for the single loop. Utilize the default programmed detector settings. Populate the turn phase detector slot with a detector card. Then jumper the turn phase controller input pin to the through movement controller input pin that is associated with slot(s) 4 or 8. The through movement slot is not populated with a detector card as shown in the example at left.

Ⓓ System Detectors - Detector cards for system loops are normally placed in slots I9 and J9. If more than four dedicated system loops are needed, an unused channel from slots 1-8 may be used. A detector may also serve as both a local and a system detector, as shown in slot J3 in the example at left.

Ⓔ Ped Detectors - Pedestrian push buttons interface to the controller through DC isolator cards in slots I12 and I13.

Ⓕ Preempt Inputs - The default setup can accommodate six preempt inputs. Preempts 1 and 2 interface the controller through an AC isolator card in slot J14. Preempt 1 is normally reserved for railroad preemption, while preempt 2 can be used for a second railroad preempt or (more commonly) for push button style emergency vehicle preemption. Preempts 3-6 are normally reserved for vehicle initiated EV preemptions and interface the controller through DC isolator cards. For more information on preemption see STD. No. 9.0.

Ⓖ Slot I14 is reserved for flash sense and stop time. This DC isolator card is equipped from the factory and this slot always appears on electrical details without modification.

✳ Using any of these slots for purposes other than those shown here may require reassignment of inputs in the controller software and/or modification of the surge protection on the cabinet input panel.

Ⓗ Detector Test Switches - There are eight detector test switches in the cabinet labeled 1-8 that can be used to test eight different phase approaches. They are wired, in order, to the controller C1 pin for slots 1,4,5, and 8 of the "I" file and the "J" file. When any of the aforementioned slots are used for detector inputs, it is recommended that the assigned phase match the default phase of the slot so a test switch activation will place a call to the correct phase.

2070 Input File Layout – 332

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10-18

STD. NO.
8.0
SHEET 2 OF 2

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A[1]	TB2-1,2	I1U	56	18	1	1	Y	Y			15
	-	J4U	48	10	26	6	Y	Y	Y		3
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
2B	TB2-7,8	I2L	43	5	12	2	Y	Y			
2C	TB2-9,10	I3U	63	25	32	2	Y	Y			
2D	TB2-11,12	I3L	76	38	42	2	Y	Y			
3A	TB4-5,6	I5U	58	20	3	3	Y	Y			3
4A	TB4-9,10	I6U	41	3	4	4		Y		2.8	
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			15
4C	TB6-1,2	I7U	65	27	34	4	Y	Y			15
* S1	TB6-9,10	I9U	60	22	11	SYS					
* S2	TB6-11,12	I9L	62	24	13	SYS					
5A	TB3-1,2	J1U	55	17	5	5	Y	Y			
5B	TB3-3,4	J1L	55	17	5	5	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
6B	TB3-7,8	J2L	44	6	16	6	Y	Y			
6C/S3	TB3-9,10	J3U	64	26	36	6/SYS	Y	Y			
6D/S4	TB3-11,12	J3L	77	39	46	6/SYS	Y	Y			
7A	TB5-5,6	J5U	57	19	7	7	Y	Y			3
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED					
P61,P62	TB8-7,9	I13U	68	30	PED 6	6 PED					

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

(A)

[1] ADD JUMPER FROM I1-W TO J4-W, ON REAR OF INPUT FILE. (B)

* SYSTEM DETECTOR ONLY. REMOVE THE VEHICLE PHASE ASSIGNED TO THIS DETECTOR IN THE DEFAULT PROGRAMMING.

(C)

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

Full jumper list if all wired inputs are used:

[1] ADD JUMPER FROM I1-W TO J4-W, ON REAR OF INPUT FILE.
[2] ADD JUMPER FROM I5-W TO J8-W, ON REAR OF INPUT FILE.
[3] ADD JUMPER FROM J1-W TO I4-W, ON REAR OF INPUT FILE.
[4] ADD JUMPER FROM J5-W TO I8-W, ON REAR OF INPUT FILE.

2070 Input File Connection & Programming Chart - 332 (Oasis)

The purpose of the Input File Connection & Programming Chart is to provide the installer with a convenient reference for connecting inductive loops and pedestrian push buttons to the cabinet as well as for programming controller detectors. The example shown at left is set up to match the example shown in the 2070 Input File Layout section (STD. No. 8.0 sheet 2, feature "C").

The key value to each row is the input file position (third column from the left). The first six values in the row should be considered attributes of the input file position. The relationship of the input file position with a specific inductive loop (first column) is decided during the preparation of the input file layout. Also, once the input file layout is established, all rows corresponding to unused input file positions can be deleted.

The relationship of the input file position with the loop terminal and pin numbers is fixed in the cabinet hardware. Changing these values entails rewiring the cabinet and should be avoided. The relationship of the input file position with the input assignment and controller detector numbers is set in the controller software. The values shown on the start drawings are the controller defaults. Changing them is only necessary if the detector is to be reassigned to another function.

The remaining (right-most) six columns contain attributes that apply to the specific loop associated with the input file position in question. These values can be found in the '2070 Loop Detector and Installation' chart on the signal plan and should be duplicated in this chart.

Additional Features:

(A) Pedestrian Push buttons - If the design utilizes pedestrian push buttons, an extension is added to the Input File Connection & Programming Chart that contains the appropriate values for those detector channels. The values in the last five columns of the main chart do not apply to pedestrian detectors. The CADD cell containing the pedestrian detectors also includes a note reminding the installer to equip the appropriate slots with a DC isolator.

(B) Jumper Note - If a single loop requires two controller detector inputs (see STD. NO. 8.0 sheet 2), a note is placed below the chart detailing which controller input pins should be jumpered together.

(C) System Detector Note - If a detector channel is to serve as a system detector only, this note is included to remind the installer to remove the vehicle phase assigned to that detector in the default programming.

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL (D)	DETECTOR TYPE (E)
1A [1]	TB2-1,2	I1U	56	1	1	YES		15		S
	-	J4U	48	26	6	YES		3		G
2A	TB2-5,6	I2U	39	2	2	YES			X	N
2B	TB2-7,8	I2L	43	12	2	YES			X	N
2C	TB2-9,10	I3U	63	32	2	YES				S
2D	TB2-11,12	I3L	76	42	2	YES				S
3A	TB4-5,6	I5U	58	3	3	YES		3		S
4A	TB4-9,10	I6U	41	4	4	YES	2.0			S
4B	TB4-11,12	I6L	45	14	4	YES		15		S
4C	TB6-1,2	I7U	65	34	4	YES		15		S
* S1	TB6-9,10	I9U	60	11	SYS	NO				N
* S2	TB6-11,12	I9L	62	13	SYS	NO				N
5A	TB3-1,2	J1U	55	5	5	YES				S
5B	TB3-3,4	J1L	55	5	5	YES				S
6A	TB3-5,6	J2U	40	6	6	YES			X	N
6B	TB3-7,8	J2L	44	16	6	YES			X	N
6C/S3	TB3-9,10	J3U	64	36	6/SYS	YES				N
6D/S4	TB3-11,12	J3L	77	46	6/SYS	YES				N
7A	TB5-5,6	J5U	57	7	7	YES		3		S
8A	TB5-9,10	J6U	42	8	8	YES				S
8B	TB5-11,12	J6L	46	18	8	YES				S
PED PUSH BUTTONS										
P21,P22	TB8-4,6	I12U	67	PED 2	2 PED					
P61,P62	TB8-7,9	I13U	68	PED 6	6 PED					

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

(A) [1] Add jumper from I1-W to J4-W, on rear of input file. (B)

* System detector only. Remove any assigned vehicle phase.

(C)

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

Full jumper list if all wired inputs are used:

[1] ADD JUMPER FROM I1-W TO J4-W, ON REAR OF INPUT FILE.
[2] ADD JUMPER FROM I5-W TO J8-W, ON REAR OF INPUT FILE.
[3] ADD JUMPER FROM J1-W TO I4-W, ON REAR OF INPUT FILE.
[4] ADD JUMPER FROM J5-W TO I8-W, ON REAR OF INPUT FILE.

2070 Input File Connection & Programming Chart - 332 (ASC/3-2070)

The purpose of the Input File Connection & Programming Chart is to provide the installer with a convenient reference for connecting inductive loops and pedestrian push buttons to the cabinet as well as for programming controller detectors. The example shown at left is set up to match the example shown in the 2070 Input File Layout section (STD. No. 8.0 sheet 2, feature "C").

The key value to each row is the input file position (third column from the left). The first five values in the row should be considered attributes of the input file position. The relationship of the input file position with a specific inductive loop (first column) is decided during the preparation of the input file layout. Also, once the input file layout is established, all rows corresponding to unused input file positions can be deleted.

The relationship of the input file position with the loop terminal and pin numbers is fixed in the cabinet hardware. Changing these values entails rewiring the cabinet and should be avoided. The relationship of the input file positions with the controller detector numbers is set in the controller software. The values shown on the start drawings are the controller defaults. Changing them is only necessary if the detector is to be reassigned to another function.

The remaining (right-most) five columns contain attributes that apply to the specific loop associated with the input file position in question. These values can be found in the '2070 Loop Detector and Installation' chart on the signal plan and should be duplicated in this chart.

Additional Features:

(A) See STD. No. 8.1 Sheet 1

(B) See STD. No. 8.1 Sheet 1

(C) See STD. No. 8.1 Sheet 1

(D) ADDED INITIAL - loops that are designed for volume density. Put an 'X' in this column if a corresponding 'X' exists on the detector installation chart on the signal plan.

(E) DETECTOR TYPE - this column is where the exact detector type is programmed. Examples could be 'G', which allows delay during green, or 'S' for standard detector features. The detector type for each loop is found on the signal plan.

INPUT FILE POSITION LAYOUT

(front view)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I" U	Ø 1	Ø 2	Ø 3	Ø 4	Ø 5	Ø 6	Ø 7	Ø 8	PRE1 AC ISOLATOR	PRE3 DC ISOLATOR	PRE4 DC ISOLATOR	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	1A	2A	3A	4A	5A	6A	7A	8A						
L	Ø 2	Ø 2	Ø 4	Ø 4	Ø 6	Ø 6	Ø 8	Ø 8	PRE2 AC ISOLATOR	PRE5 DC ISOLATOR	PRE6 DC ISOLATOR	Ø4 PED DC ISOLATOR	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
	2C	2B	4C	4B	6C	6B	8C	8B						

EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME
PRE = PREEMPT

2070 Input File Layout (336)

NCDOT uses 2070 controllers in type 170 cabinets. The pole mounted 336 cabinet has one input file labeled 'I' that accepts inputs for traffic detection, pedestrian push buttons, preempt calls or other functions deemed necessary.

The input file has 14 slots. Each slot can hold a 2-channel inductive loop detector, AC isolator or DC isolator. Each slot has three input terminals, 'F', 'W', and 'SP' that are independently connected to the controller by way of a C1 pin.

Two examples of the input file layout for the pole mounted 336 cabinet are shown left. The upper example shows how the rack is represented on the start drawings. The functions shown for slots 1-14 correspond to the default input assignments in the Econolite Oasis software. The 'SP' pin in slot I9 is the Door Ajar input to the controller, and the 'SP' pin in slot I14 is the Manual Advance input to the controller.

INPUT FILE POSITION LAYOUT

(front view)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I" U	Ø 1	Ø2/SYS	Ø 3	Ø 4	Ø 5	Ø 6	Ø 7	Ø 8	PRE1 AC ISOLATOR	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	1A	2A/S3	3A	4A	5A	6A	7A	8A						
L	⊗ WIRED INPUT	Ø2/SYS 2B/S4	NOT USED	Ø 4 4B	NOT USED	Ø 6 6B	NOT USED	SYS. DET. S1	NOT USED			NOT USED	NOT USED	ST DC ISOLATOR

Ⓐ

EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME
PRE = PREEMPT

Features:

Ⓐ Inductive Loop Detectors - Input file slots 1-8 are set up for inductive loop detector cards. Each card has two channels. Each channel is represented on the electrical detail by a block in the layouts shown on the left. For each channel, the function of the loop is shown in the upper half of the block while the loop name is shown in the lower half. A channel can be assigned to a local detector, a system detector, or both. While the default phase settings should be followed as much as practical, controller detectors can be easily reassigned as needed.

(continued on next page)

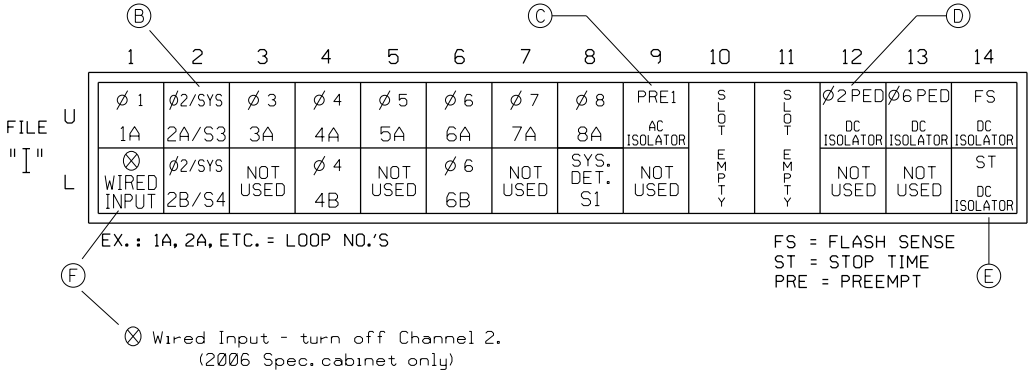
2070 Input File Layout – 336

SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

STD. NO.
8.2

INPUT FILE POSITION LAYOUT

(front view)



⊗ Wired Input - turn off Channel 2. (2006 Spec. cabinet only)

Ⓖ Detector Test Switches - There are eight detector test switches in the cabinet labeled 1-8 that can be used to test eight different phase approaches. They are wired, in order, to the controller C1 pin for slots 1-8 of the "I" file to the upper channel. When any of the aforementioned slots are used for detector inputs, it is recommended that the assigned phase match the default phase of the slot in the upper channel so a test switch activation will place a call to the correct phase.

Features (cont) :

Ⓑ System Detectors - Detector cards for dedicated system loops may be placed in any unused detector slot. If space in the I-File runs out and additional system detectors are called for, a detector may also serve as both a local and a system detector as shown in slot I2 in the example at left.

Ⓒ Preempt Inputs - The default setup can accommodate six preempt inputs. Preempts 1 and 2 interface the controller through an AC isolator card in slot J9. Preempt 1 is normally reserved for railroad preemption, while preempt 2 can be used for a second railroad preempt or (more commonly) for push button style emergency vehicle preemption. Preempts 3-6 are normally reserved for vehicle initiated EV preemptions and interface the controller through DC isolator cards. For more information on preemption see STD. No. 9.0.

Ⓓ Ped Detectors - Pedestrian push buttons interface to the controller through DC isolator cards in slots I12 and I13.

Ⓔ Slot I14 is reserved for flash sense and stop time. This DC isolator card is equipped from the factory and this slot always appears on electrical details without modification.

Ⓕ Loops That Call Two Phases (2006 Spec. cabinets) - Loops that call two phases in a 336 pole mounted cabinet require special wiring. A jumper must be added from the controller input pin of the first phase to the controller input pin of the second phase in the same slot that the loop detector is installed. Also, the second channel for the loop detector plugged into the slot must be turned OFF so that the detector can not inadvertantly place a call to the controller on the second channel.

Loops That Call Two Phases (2012 Spec. cabinets) - Loops that call two phases in a 336 pole mounted cabinet require special wiring. Typically a jumper is added from the controller input pin of the first phase to a spare controller input pin of the second phase located in the same slot that the loop detector is installed.

✳ Using any of these slots for purposes other than those shown here may require reassignment of inputs in the controller software and/or modification of the surge protection on the cabinet input panel.

2070 Input File Layout – 336

SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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STD. NO. 8.2

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A[1]	TB21-1,2	I1U	56	18	1	1	Y	Y			15
	-	-	59	21	15	6	Y	Y	Y		3
2A/S3	TB21-3,4	I2U	39	1	2	2/SYS	Y	Y			
2B/S4	TB23-3,4	I2L	43	5	12	2/SYS	Y	Y			
3A	TB21-5,6	I3U	58	20	3	3	Y	Y			
4A	TB21-7,8	I4U	41	3	4	4		Y		2.8	
4B	TB23-7,8	I4L	45	7	14	4	Y	Y			15
5A	TB21-9,10	I5U	55	17	5	5	Y	Y			
6A	TB21-11,12	I6U	40	2	6	6	Y	Y			
6B	TB23-11,12	I6L	44	6	16	6	Y	Y			
7A	TB21-13,14	I7U	57	19	7	7	Y	Y			3
8A	TB22-1,2	I8U	42	4	8	8	Y	Y			
* S1	TB24-1,2	I8L	46	8	18	SYS					
PED PUSH BUTTONS											
P21,P22	TB22-9,10	I12U	67	29	PED 2	2 PED					
P61,P62	TB22-11,12	I13U	68	30	PED 6	6 PED					

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

Ⓐ [1]Add jumper from I1-F to I1-SP, on rear of input file. Ⓑ

* SYSTEM DETECTOR ONLY. REMOVE THE VEHICLE PHASE ASIGNED TO THIS DETECTOR IN THE DEFAULT PROGRAMMING.

Ⓒ

INPUT FILE POSITION LEGEND: I2L
FILE I
SLOT 2
LOWER

Ⓑ

For 2006 Spec. cabinet:

[1]Add jumper from I1-F to I1-W, on rear of input file.
[2]Add jumper from I3-F to I3-W, on rear of input file.
[3]Add jumper from I5-F to I5-W, on rear of input file.
[4]Add jumper from I7-F to I7-W, on rear of input file.
(Include 'Wired Input' reference for Channel 2 slots where required)

For 2012 Spec. cabinet:

[1]Add jumper from I1-F to I1-SP, on rear of input file.
[2]Add jumper from I3-F to I3-SP, on rear of input file.
[3]Add jumper from I5-F to I5-SP, on rear of input file.
[4]Add jumper from I7-F to I7-SP, on rear of input file.

2070 Input File Connection & Programming Chart - 336 (Oasis)

The purpose of the Input File Connection & Programming Chart is to provide the installer with a convenient reference for connecting inductive loops and pedestrian push buttons to the cabinet as well as for programming controller detectors. The example shown at left is set up to match the example shown in the 2070 Input File Layout section (STD. No. 8.2 sheet 2, feature "F", 2012 Spec. cabinet).

The key value to each row is the input file position (third column from the left). The first six values in the row should be considered attributes of the input file position. The relationship of the input file position with a specific inductive loop (first column) is decided during the preparation of the input file layout. Also, once the input file layout is established, all rows corresponding to unused input file positions can be deleted.

The relationship of the input file position with the loop terminal and pin numbers is fixed in the cabinet hardware. Changing these values entails rewiring the cabinet and should be avoided. The relationship of the input file position with the input assignment and controller detector numbers is set in the controller software. The values shown on the start drawings are the controller defaults. Changing them is only necessary if the detector is to be reassigned to another function.

The remaining (right-most) six columns contain attributes that apply to the specific loop associated with the input file position in question. These values can be found in the '2070 Loop Detector and Installation' chart on the signal plan and should be duplicated in this chart.

Additional Features:

Ⓐ Pedestrian Push buttons - If the design utilizes pedestrian push buttons, an extension is added to the Input File Connection & Programming Chart that contains the appropriate values for those detector channels. The values in the last five columns of the main chart do not apply to pedestrian detectors. The CADD cell containing the pedestrian detectors also includes a note reminding the installer to equip the appropriate slots with a DC isolator.

Ⓑ Jumper Note - If a single loop requires two controller detector inputs (see STD. NO. 8.2 sheet 2, a note is placed below the chart detailing which controller input pins should be jumpered together.

Ⓒ System Detector Note - If a detector channel is to serve as a system detector only, this note is included to remind the installer to remove the vehicle phase assigned to that detector in the default programming.

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A	TB21-1,2	I1U	56	1	1	YES		15		S
	-	-	59	15	1	YES		3		G
2A/S3	TB21-3,4	I2U	39	2	2/SYS	YES			X	N
2B/S4	TB23-3,4	I2L	43	12	2/SYS	YES			X	N
3A	TB21-5,6	I3U	58	3	3	YES				S
4A	TB21-7,8	I4U	41	4	4	YES	2.0			S
4B	TB23-7,8	I4L	45	14	4	YES		15		S
5A	TB21-9,10	I5U	55	5	5	YES				S
6A	TB21-11,12	I6U	40	6	6	YES			X	N
6B	TB23-11,12	I6L	44	16	6	YES			X	N
7A	TB21-13,14	I7U	57	7	7	YES		3		S
8A	TB22-1,2	I8U	42	8	8	YES				S
✳ S1	TB24-1,2	I8L	46	18	SYS	NO				S
PED PUSH BUTTONS										
P21,P22	TB22-9,10	I12U	67	PED 2	2 PED					
P61,P62	TB22-11,12	I13U	68	PED 6	6 PED					

NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

[1] Add jumper from I1-F to I1-SP, on rear of input file.

✳ SYSTEM DETECTOR ONLY. REMOVE THE VEHICLE PHASE ASIGNED TO THIS DETECTOR IN THE DEFAULT PROGRAMMING.

INPUT FILE POSITION LEGEND: I2L
- FILE I
- SLOT 2
- LOWER

For 2006 Spec. cabinet:

[1] Add jumper from I1-F to I1-W, on rear of input file.
[2] Add jumper from I3-F to I3-W, on rear of input file.
[3] Add jumper from I5-F to I5-W, on rear of input file.
[4] Add jumper from I7-F to I7-W, on rear of input file.
(Include 'Wired Input' reference for Channel 2 slots where required)

For 2012 Spec. cabinet:

[1] Add jumper from I1-F to I1-SP, on rear of input file.
[2] Add jumper from I3-F to I3-SP, on rear of input file.
[3] Add jumper from I5-F to I5-SP, on rear of input file.
[4] Add jumper from I7-F to I7-SP, on rear of input file.

2070 Input File Connection & Programming Chart - 336 (ASC/3-2070)

The purpose of the Input File Connection & Programming Chart is to provide the installer with a convenient reference for connecting inductive loops and pedestrian push buttons to the cabinet as well as for programming controller detectors. The example shown at left is set up to match the example shown in the 2070 Input File Layout section (STD. No. 8.2 sheet 2, feature "F", 2012 Spec. cabinet).

The key value to each row is the input file position (third column from the left). The first five values in the row should be considered attributes of the input file position. The relationship of the input file position with a specific inductive loop (first column) is decided during the preparation of the input file layout. Also, once the input file layout is established, all rows corresponding to unused input file positions can be deleted.

The relationship of the input file position with the loop terminal and pin numbers is fixed in the cabinet hardware. Changing these values entails rewiring the cabinet and should be avoided. The relationship of the input file positions with the controller detector numbers is set in the controller software. The values shown on the start drawings are the controller defaults. Changing them is only necessary if the detector is to be reassigned to another function.

The remaining (right-most) five columns contain attributes that apply to the specific loop associated with the input file position in question. These values can be found in the '2070 Loop Detector and Installation' chart on the signal plan and should be duplicated in this chart.

Additional Features:

Ⓐ See STD. No. 8.3 Sheet 1

Ⓑ See STD. No. 8.3 Sheet 1

Ⓒ See STD. No. 8.3 Sheet 1

Ⓓ See STD. No. 8.3 Sheet 1

Ⓔ See STD. No. 8.3 Sheet 1

LOOP & DETECTOR INSTALLATION CHART

ASC/3-2070LXN2 CONTROLLER w/ TS-2 CABINET

INDUCTIVE LOOPS						DETECTOR UNITS						
LOOP NO.	SIZE (ft)	DIST. FROM STOPBAR (ft)	TURNS	NEW	EXISTING	NEMA PHASE	NEW	EXISTING	TIMING FEATURE	TIMING TIME	USE ADDED INITIAL	DET. TYPE
1A	6X40	0	2-4-2	X	-	1	X	-	DELAY	15 *	-	S
						6 #	X	-	DELAY	3	-	G
2A	6X6	300	5	X	-	2	X	-	-	-	X	N
2B	6X6	300	5	X	-	2	X	-	-	-	X	N
4A	6X40	0	2-4-2	X	-	4	X	-	-	-	-	S
4B	6X40	0	2-4-2	X	-	4	X	-	DELAY	10	-	S
5A	6X40	0	2-4-2	X	-	5	X	-	DELAY	15 *	-	S
						2 #	X	-	DELAY	3	-	G
6A	6X6	300	5	X	-	6	X	-	-	-	X	N
6B	6X6	300	5	X	-	6	X	-	-	-	X	N
8A	6X40	0	2-4-2	X	-	8	X	-	DELAY	3	-	S
8B	6X40	0	2-4-2	X	-	8	X	-	DELAY	10	-	S

* Reduce Delay to 3 seconds during alternate phasing operation.

Disable phase call during alternate phasing operation.

Ⓐ

Ⓑ

Ⓑ

DETECTOR RACK SET-UP DETAIL

Ⓒ

INSERT DETECTOR CARDS IN RACK ACCORDING TO THE DETAIL SHOWN BELOW.
PARTICULAR DETECTOR CHANNELS WILL CALL PHASES INDICATED.

BIU	CH1 L3 Ø2 **	CH1 L1 Ø1	CH1 L7 Ø4	CH1 L5 Ø5	CH1 L11 Ø8	CH1 L9 Ø6 **	CH1 L15 NOT USED	CH1 L13 NOT USED	CHA EVP3 Ø1,6	CHA EVP5 NOT USED	SLOT EMPTY
	CH2 L4 Ø2 **	CH2 L2 NOT USED	CH2 L8 Ø4	CH2 L6 NOT USED	CH2 L12 Ø8	CH2 L10 Ø6 **	CH2 L16 NOT USED	CH2 L14 NOT USED	CHB EVP4 Ø2,5	CHB EVP6 NOT USED	

WIRE LOOPS TO TERMINALS ON LOOP PANEL AS SHOWN IN THE CHART BELOW

LOOP NO.	LOOP PANEL TERMINALS
1A	L1A,L1B
NU	L2A,L2B
2A	L3A,L3B
2B	L4A,L4B
5A	L5A,L5B
NU	L6A,L6B
4A	L7A,L7B
4B	L8A,L8B
6A	L9A,L9B
6B	L10A,L10B
8A	L11A,L11B
8B	L12A,L12B
NU	L13A,L13B
NU	L14A,L14B
NU	L15A,L15B
NU	L16A,L16B

NU = Not Used

NOTE

BE SURE TO PROGRAM DETECTOR TYPES AND TIMERS (EXTEND AND DELAY) AS SHOWN ON THE SIGNAL PLANS.

* Detector Type - G

** Detector Type - N

Δ Logical Detector

PROGRAM CONTROLLER DETECTORS ACCORDING TO THE SCHEDULE SHOWN IN THE CHART BELOW

Ⓓ

CONTROLLER DETECTOR NO.	FUNCTION	TIMING FEATURE	TIMING TIME(SEC)
1	Ø1	DELAY	15
2			
** 3	Ø2		
** 4	Ø2		
5	Ø5	DELAY	15
6			
7	Ø4		
8	Ø4	DELAY	10
** 9	Ø6		
** 10	Ø6		
11	Ø8	DELAY	3
12	Ø8	DELAY	10
13	Ø		
14	Ø		
15	Ø		
16	Ø		
Δ* 61	Ø6	DELAY	3
Δ* 63	Ø2	DELAY	3

Δ NOTE: SEE LOGICAL DETECTOR PROGRAMMING SHEET 3.

NEMA TS-2 Detector Rack Detail Including Logical Detectors (ASC/3-2070)

The purpose of the Detector Rack Detail is to provide the installer with a convenient reference for connecting inductive loops and preemption detection equipment to the cabinet as well as for programming detectors in the controller. The example shown to the left is set up to match the Loop and Detector Installation Chart shown to the left which would be found on the signal design plan. A typical NEMA TS-2 cabinet is equipped with two detector racks while only one rack is shown here.

Each detector rack accomodates eight two channel detector cards. The loop numbers and their respective positions in the rack in a TS-2 cabinet are fixed and the detector numbers assigned to each loop input are also fixed as shown in the setup detail to the left. The phases that are assigned to each loop input are flexible and may be assigned at the discretion of the electrical designer. Loop features such as DELAY time are shown in the chart as per the Loop & Detector Installation Chart from the signal plan. Other information such as detector type are indicated in the rack detail and programming chart by footnote annotation.

Some loops are multipurposed to call more than one phase. In such cases the logic processor is used to place a call to a logical vehicle detector when a vehicle is detected on a pavement loop. Such loops are clearly designated in the Loop & Detector Installation Chart on the signal design plan. In the setup to the left, a vehicle detected on L1 will place a call to Detector 1 (phase 1) and Logical Detector 61 (phase 6). A vehicle detected on L5 will place a call to Detector 5 (phase 5) and Logical Detector 63 (phase 2). As noted under the chart, the logic to place the logical detector calls can be found on the designated plan sheet.

As is typical with the multipurposed loops, but not shown here, a vehicle detected on a detector programmed for phase 3 would place a Logical Detector 62 call (phase 8) and a detector programmed for phase 7 would place a Logical Detector 64 (phase 4) call.

Additional Features:

Ⓐ Loop & Detector Installation Chart from signal plan.

Ⓑ Multipurposed loops that call more than one phase.

Ⓒ Detector Rack showing physical setup of detector cards.

Ⓓ Charts showing detector programming details including virtual detectors.

NEMA TS–2 Detector Rack Detail Including Logical Detectors (ASC/3–2070)

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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STD. NO.

8.4

ECONOLITE ASC/3-2070 LOGIC PROCESSOR PROGRAMMING FOR LOGICAL DETECTORS

(program controller as shown)

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From the LOGIC PROCESSOR Submenu select [2. LOGIC STATEMENTS]

ENTER A "1" IN THE LP# FIELD, PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   1  COPY FROM:   1  ACTIVE:M     (T/F)
IF    DET                  1   IS  ON

THEN  DET SET VEH  49-64   61       ON


ELSE
```

LOGIC FOR LOOP 1A (DETECTOR 1/LOGICAL DETECTOR 61) "ON".

ENTER A "2" IN THE LP# FIELD, PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   2  COPY FROM:   2  ACTIVE:M     (T/F)
IF    DET                  1   IS  OFF

THEN  DET SET VEH  49-64   61       OFF


ELSE
```

LOGIC FOR LOOP 1A (DETECTOR 1/LOGICAL DETECTOR 61) "OFF".

ENTER A "3" IN THE LP# FIELD, PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   3  COPY FROM:   3  ACTIVE:M     (T/F)
IF    DET                  5   IS  ON

THEN  DET SET VEH  49-64   63       ON


ELSE
```

LOGIC FOR LOOP 5A (DETECTOR 5/LOGICAL DETECTOR 63) "ON".

ENTER A "4" IN THE LP# FIELD, PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   4  COPY FROM:   4  ACTIVE:M     (T/F)
IF    DET                  5   IS  OFF

THEN  DET SET VEH  49-64   63       OFF


ELSE
```

LOGIC FOR LOOP 5A (DETECTOR 5/LOGICAL DETECTOR 63) "OFF".

END PROGRAMMING

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From the LOGIC PROCESSOR Submenu select [1. LOGIC STATEMENT CONTROL]

ENABLE LOGIC PROCESSOR STATEMENTS 1-4 BY POSITIONING THE CURSOR OVER THE FIELD SHOWN BELOW AND USING THE TOGGLE KEY TO ENABLE THEM.

```
LOGIC STATEMENT CONTROL
          1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
LP 1-15   E E E E . . . . . . . . . . . .
LP 16-30  . . . . . . . . . . . . . . . .
LP 31-45  . . . . . . . . . . . . . . . .
LP 46-60  . . . . . . . . . . . . . . . .
LP 61-75  . . . . . . . . . . . . . . . .
LP 76-90  . . . . . . . . . . . . . . . .
```

END PROGRAMMING

NEMA TS-2 Detector Rack Detail Including Logical Detectors - Logic (ASC/3-2070)

These logic processor statements are designed to enable and disable the logical detectors paired with the physical pavement loops shown in the Loop & Detector Installation Chart.

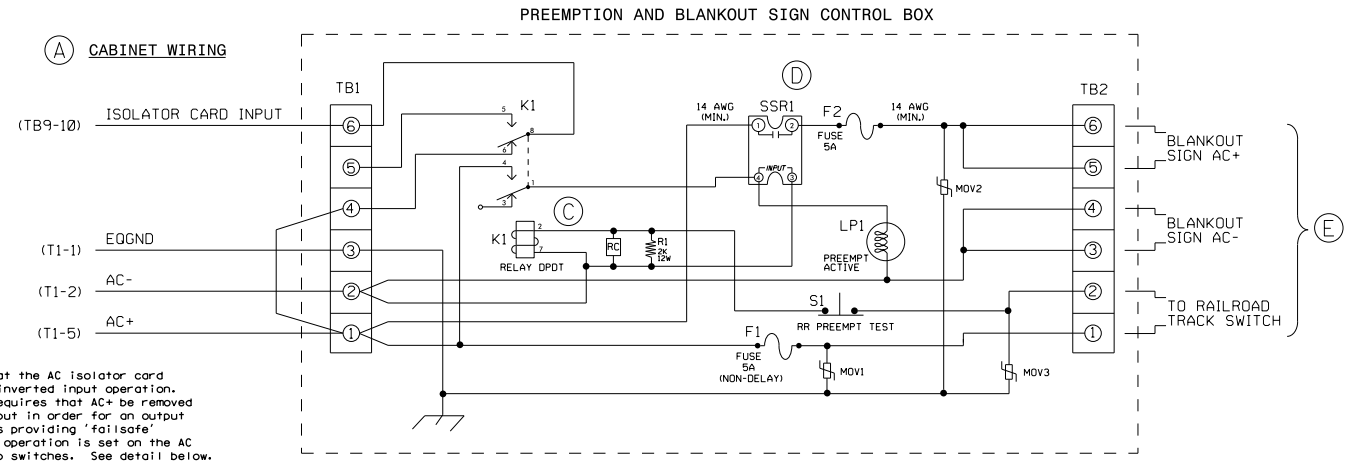
Loops that call phase	will call	Logical Detector & Phase
1		61 / 6
3		62 / 8
5		63 / 2
7		64 / 4

(B) NOTES

1. Relay K1 is shown in the energized (Preempt not active) normal operation state.
2. Relay K1 is an enclosed DPDT general purpose relay with a 120VAC coil, 10A contacts, and octal style plug.
3. Relay SSR1 is a SPST (normally open) Solid State Relay with AC input and AC (25 amp) output.
4. AC Isolator Card shall activate preemption upon removal of AC+ from the input (as shown above). To accomplish this set invert dip switch on AC Isolator Card.

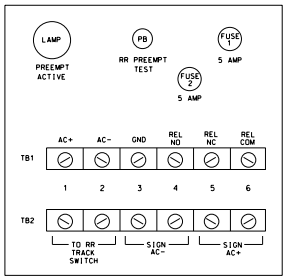
5. IMPORTANT!! A jumper must be added between input file terminals J14-E and J14-K if not already present. Also, terminal TB9-12 (on input panel) shall be connected to AC neutral (jumper may have to be added).

(A) CABINET WIRING



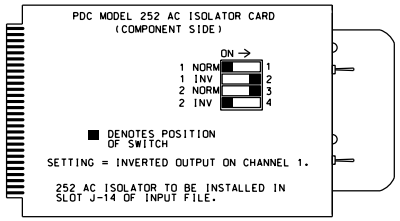
Note #4 indicates that the AC isolator card is to be set-up for inverted input operation. Inverted operation requires that AC+ be removed from the isolator input in order for an output to be generated, thus providing 'failsafe' operation. Inverted operation is set on the AC isolator card via dip switches. See detail below.

FRONT VIEW



PREEMPT 1 AC ISOLATOR (MODEL 252) OUTPUT PROGRAMMING DETAIL

(set DIP switches as shown below)



NOTE: IF ANOTHER MANUFACTURER TYPE OF AC ISOLATOR IS USED, OUTPUT PROGRAMMING IS LIKELY NOT TO EQUATE TO THAT SHOWN ABOVE.

2070 RR Preemption and Blankout Sign Control Box

The 2070 Preemption and Blankout Sign Control Assembly/Box provides the following functionality:

1. Provides the interface between the railroad crossing signal equipment and the traffic signal equipment, which includes, termination points for the interconnect cable, surge protection, and termination points for blankout signs.
2. Provides an output which directs the controller to begin the preemption sequence. A test switch is present to manually test this output.
3. Provides the control circuitry for the operation of any blankout signs required by the preemption sequence. This circuitry allows the blankout signs to operate normally, even when cabinet is in the flash mode.

Explanation of major components:

(A) Cabinet wiring termination points - Tells the installer where to make the connections in order to interface the box with the cabinet. These connections supply AC power to the box, as well as tie the preempt relay output to an AC isolator.

(B) Notes section - Describes the component types and part numbers used in the box. Any special wiring instructional notes are placed here.

(C) Preempt relay - The coil of this relay (K1) is tied to the RR cabinet contacts which, when opened, indicate the presence of a train. When the RR contacts open, this relay de-energizes and removes AC+ from the isolator card, thus causing a preempt input to be placed to the controller. The other set of contacts on this relay cause AC+ to be applied to the input of SSR1 which illuminates any blankout signs being used.

(D) Blankout sign relay - This relay is a SPST solid state relay which controls the illumination of the blankout signs. When this relay is activated by the preempt relay (K1), the signs will be switched "ON".

(E) Field wiring termination points - Tells the installer where the connections are made in order to interface the preempt box with the RR crossing signal equipment. Terminations for blankout sign AC+ and AC- are included here as well.

2070 RR and EV Preemption and Blankout Sign Control Box

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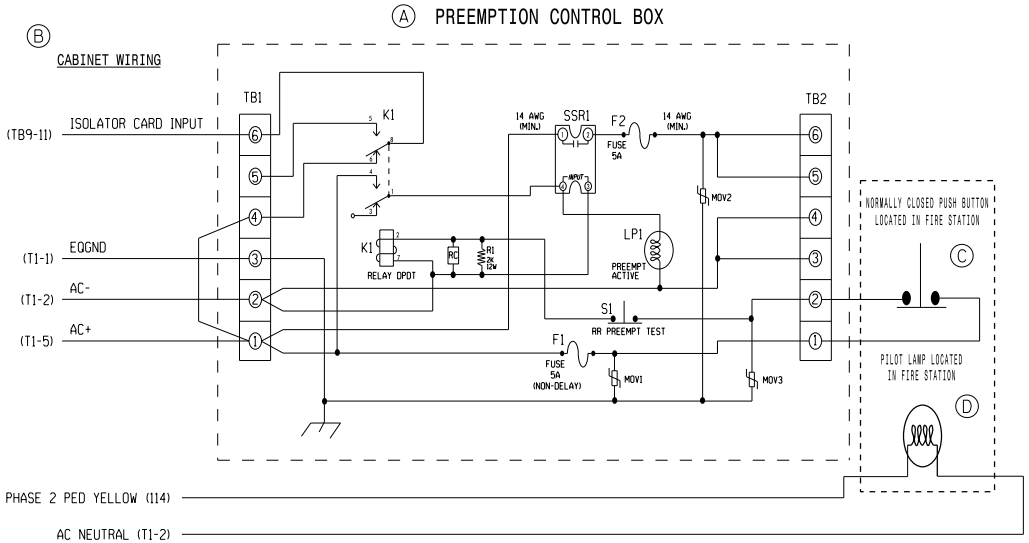


NOTES

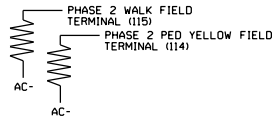
If the ped movement associated with the load switch being used to operate the lamp is not used, a load resistor will have to be placed on the ped walk field terminal to drain off load switch leakage current. This resistor is shown in the load resistor installation detail.

1. Relay K1 is shown in the energized (Preempt not active) normal operation state.
2. Relay 'K1' is an enclosed DPDT general purpose relay with a 120VAC coil, 10A contacts, and octal-style plug.
3. Relay SSR1 is a SPST (normally open) Solid State Relay with AC input and AC (25 amp) output.
4. AC Isolator Card shall activate preemption upon removal of AC+ from the input (as shown above). To accomplish this, set invert dip switch on AC Isolator Card.
5. IMPORTANT!! Terminal TB9-12 (on input panel) shall be connected to AC neutral (jumper may have to be added).

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

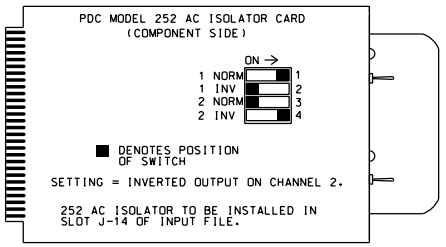
ACCEPTABLE VALUES	
VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



PREEMPT 2 AC ISOLATOR (MODEL 252) Ⓔ

OUTPUT PROGRAMMING DETAIL

(set DIP switches as shown below)



NOTE: IF ANOTHER MANUFACTURER TYPE OF AC ISOLATOR IS USED, OUTPUT PROGRAMMING IS LIKELY NOT TO EQUATE TO THAT SHOWN ABOVE.

Emergency Vehicle Preemption Push Button And Indicator Lamp Wiring Detail

This wiring detail gives the installer the information needed to interface the controller/cabinet assembly with a firehouse push button. The function of this button is to generate a controller input to initiate the EV preemption sequence.

Usually there is also an indicator (pilot) lamp to be installed in the firehouse. The purpose of this lamp is to give the user positive feedback from the controller that the traffic signal has been preempted. The wiring for the indicator lamp is also shown on this detail.

Major components:

Ⓐ Preemption Control Box - This box essentially serves the same purpose in fire preemption applications as it does in railroad preemption applications. See STD. NO. 9.0 sheet 1 for a detailed description of the preempt control box.

Ⓑ Cabinet wiring termination points - Tells the installer where to make the connections in order to interface the box with the cabinet. These connectons supply AC power to the box, as well as tie the preempt relay output to an AC isolator.

Ⓒ Firehouse Push Button - This is a momentary, normally closed, push button switch. The contacts of this switch are opened when the button is pressed, causing preempt to be activated.

Ⓓ Indicator Lamp - The function of this lamp is described above. This lamp is normally controlled by the yellow circuit of a pedestrian load switch. The function of the C1-pin associated with this ped yellow will have to be changed to operate this lamp correctly. A load resistor is normally tied in parallel with the lamp to drain off any induced voltage. Special programming notes are necessary to alert the installer of these changes. If delay before preempt interval is used, special logic processor programming is necessary for proper operation.

Ⓔ When the push button in the fire station is pressed, the preempt relay in the preempt control box de-energizes and removes AC+ from the AC isolator card. As such, the AC isolator card needs to have its switches set to the inverted position for Channel 2.

Emergency Vehicle Preemption (Push Button Style) Wiring Detail

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PREEMPTION PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS 'A' (PREEMPTION), THEN '1' (STANDARD PREEMPTION).

```
   PREEMPTION  #1  SETTINGS (NEXT:1-10)
INTERVAL/TIMING  |  CLEAR/DWELL PHASES
  GRN YEL  RED   |12345678910111213141516
1  12  4.0  3.5  |  XX
2 255  0.0  0.0  | X   X
3   0  0.0  0.0  |
4   0  0.0  0.0  |
5   1  0.0  0.0  |   X   X
EXIT CALLS       |
          OPTIONS
PRIORITY (Y/N TO SELECT) ............HIGH
DELAY TIMER (0-255 SEC) .............0
MIN GREEN BEFORE PRE (0= DEFAULT)....1
PED CLEAR BEFORE PRE (0= DEFAULT)....0
YELLOW CLEAR BEFORE PRE (0= DEFAULT).4.0
RED CLEAR BEFORE PRE (0= DEFAULT)....3.5
DWELL MIN TIMER (0-255 SEC) .........7
DWELL MAX TIMER (0=OFF,1-255MIN) ....0
DWELL HOLD-OVER TIMER (0-255) .......0
LATCH CALL? .........................N
LINK TO NEXT PREEMPT? ...............N
ENABLE BACKUP PROTECTION? ...........N
HOLD CLEAR 1 PHASES DURING DELAY? ...N
FAST GREEN FLASH DWELL PHASES? ......N
PED CLEARANCE THROUGH YELLOW? .......N
INHIBIT OVERLAP GREEN EXTENSION? ....N
SERVICE DURING SOFTWARE FLASH? ......N
REST IN RED DURING DWELL INTERVAL? ..N
FLASH DWELL INTERVAL? ...............N
ALLOW PEDS IN DWELL INTERVAL? .......N
RE-TIME DWELL INTERVAL? .............N
OVERLAPS:                | ABCDEFGHIJKLMNOP
DWELL INT FLASH YELLOW   |
OMIT OVERLAPS:           |
```

(A) (B) (C) (D) (E)

2070 Oasis Preemption Programming Detail

The image to the left is an exact duplication of the preempt programming display found on a 2070 controller running Oasis control software.

When a signal plan requires Railroad or Emergency Vehicle preemption, this detail is to be used on the electrical detail to instruct the installer on setting the different operational parameters required to operate the preempt sequence per the signal design plans.

Below is a brief description of the most commonly used features:

(A) Interval programming - This is the section in which interval phase selection and timing are programmed. Each interval consists of green, yellow clear, and red clear times. A section where phases are selected for each interval are positioned to the right of each set of timings. An interval time of 255 sec. is a special flag to the controller instructing it to use that interval as the "dwell" interval. The exit interval is designated when a 1 sec. green is selected following the dwell interval. Always use interval 5 as the exit interval.

Dwell interval - The dwell interval is the interval that the controller will rest in until the following two events occur:
1. The dwell minimum timer has expired, and
2. The preempt call is removed.

(B) Priority settings - There are four priority settings:
1. OFF - indicates the preemptor is not used.
2. LOW - use for low priority preempts such as transit vehicle preempts.
3. MED - use for emergency vehicle preempts.
4. HIGH - use for railroad preempts.

Railroad preempt should always be set to be the highest priority. If multiple preempts are set to the same priority, preempts will be served on a first come, first served basis.

(C) Dwell hold-over timer - This timer begins to time after the preempt call is removed. If this timer expires, the dwell interval will be released. If this timer does not expire before a second preempt call is received, the dwell interval will be retimed. Normally used with vehicle initiated EV preemption systems.

(D) Latch call - Used in conjunction with the delay timer. The application for this feature is normally the fire house push button style of preempt. These types of preempts normally have a delay interval. This feature will allow the preempt call to latch and not release until the preempt is served.

(E) Hold clear 1 phases during delay - This feature is used in conjunction with the delay interval. If clear 1 phases are used in normal operation, and those phases just happen to be served during the delay interval, this feature will apply a hold on the clear 1 phases during the remainder of the delay interval.

(continued on next page)

PREEMPTION PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS 'A' (PREEMPTION), THEN '1' (STANDARD PREEMPTION).

```
   PREEMPTION  #1  SETTINGS (NEXT:1-10)
INTERVAL/TIMING  |  CLEAR/DWELL PHASES
  GRN YEL  RED   |12345678910111213141516
1  12  4.0  3.5  |  XX
2 255  0.0  0.0  | X   X
3   0  0.0  0.0  |
4   0  0.0  0.0  |
5   1  0.0  0.0  |   X   X
EXIT CALLS       |
            OPTIONS
PRIORITY (Y/N TO SELECT) ............HIGH
DELAY TIMER (0-255 SEC) .............0
MIN GREEN BEFORE PRE (0= DEFAULT)....1
PED CLEAR BEFORE PRE (0= DEFAULT)....0
YELLOW CLEAR BEFORE PRE (0= DEFAULT).4.0
RED CLEAR BEFORE PRE (0= DEFAULT)....3.5
DWELL MIN TIMER (0-255 SEC) .........7
DWELL MAX TIMER (0=OFF,1-255MIN) ....0
DWELL HOLD-OVER TIMER (0-255) .......0
LATCH CALL? .........................N
LINK TO NEXT PREEMPT? ...............N
ENABLE BACKUP PROTECTION? ...........N
HOLD CLEAR 1 PHASES DURING DELAY? ...N
FAST GREEN FLASH DWELL PHASES? ......N
PED CLEARANCE THROUGH YELLOW? .......N
INHIBIT OVERLAP GREEN EXTENSION? ....N
SERVICE DURING SOFTWARE FLASH? ......N
REST IN RED DURING DWELL INTERVAL? ..N
FLASH DWELL INTERVAL? ...............N
ALLOW PEDS IN DWELL INTERVAL? .......N
RE-TIME DWELL INTERVAL? .............N
OVERLAPS:          | ABCDEFGHIJKLMNOP
DWELL INT FLASH YELLOW |
OMIT OVERLAPS:     |
```

(F) (G) (H) (I) (J)

PREEMPT ONLY PHASE OMIT NOTE (K)

(program controller as shown below)

From Main Menu press '2' (Phase Control). Then '1' (Phase Control Functions). Program Phase 3 for 'Omit Phase' and Phases 2, 4, 6, and 8 for 'Startup Calls'. This is to prevent Phase 3 from being served when not in Preempt.

2070 Oasis Preemption Programming Detail

(F) Inhibit overlap green extension - Affects how green extension overlaps (a.k.a. timed overlaps) transition into preemption. If a green extension overlap will not be used in the preemption, this setting is typically "YES". This will inhibit the overlap green extension from timing and allow transition to preemption to be accomplished in the quickest possible time. This is most important in RR preemption applications. If the overlap is used in the first interval of the preempt, the setting should be programmed as "NO".

(G) Service during software flash - This allows the controller to come out of software flash in order to serve the EV preempt.

(H) Rest in red during dwell interval - If the signal plan calls for the preempt dwell to be an all red rest state, this feature should be enabled. In addition, do not select any phases for the dwell interval.

(I) Re-time dwell interval - Used in conjunction with dwell hold-over timer. Allows the controller to re-time the dwell interval if a second preempt call is received before the hold-over timer times out. Normally used with EV preemption. Do not use this feature with railroad preemption unless there are special circumstances.

(J) Omit overlaps - This feature allows overlaps to be omitted during preemption when the overlap parents are active during preempt, but the overlap is not desired. Overlaps will return during exit interval 5.

Note: Description of features is not complete. This section is intended to address applicational use. Consult the Signal Design Section of this design manual and/or the Econolite Oasis manual for more details.

(K) In designs with a phase that is only run during preemption, e.g. a four section head with a protected left turn arrow that is only served during the preempt track clearance interval, use the note and the programming shown to the left to omit the protected turn at controller startup.

2070 Oasis Firestation Pilot Lamp Logic Programming Detail

For firestation preemption designs that utilize a push button inside the firestation with a pilot lamp, use the logic processor to turn the lamp "ON" when the button is pressed and "OFF" at the end of the preempt sequence. The example shown to the left uses PRE2 for the fire preempt and the PED 2 Yellow output to light the pilot lamp. Make sure to install load resistors as described in STD. NO. 9.1 sheet 1.

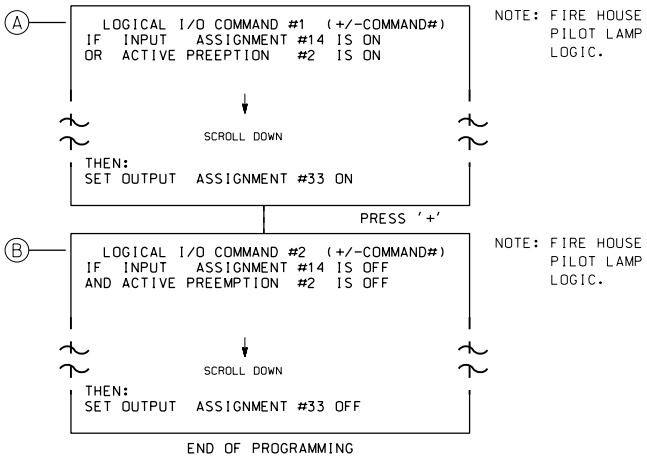
Ⓐ Firestation preempts are usually always latched calls because the push button is a momentary input and there may be delay time programmed. When the firestation push button is pressed, the preempt call is latched and both statements of command #1 will evaluate TRUE in the order they are shown. This turns on the load switch that drives the pilot lamp in the firestation.

Ⓑ When the Dwell and/or Cycle intervals end, the actual preempt input (the push button) is already FALSE so both statements will evaluate FALSE, at which point the pilot lamp will turn off.

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL FOR PILOT LAMP CONTROL

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1 AND 2.
2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



OUTPUT REFERENCE SCHEDULE

USE TO INTERPRET LOGIC PROCESSOR

INPUT 14 = Preempt 2 (Firestation push button)
OUTPUT 33 = Phase 2 PED Yellow (Pilot lamp)

ECONOLITE ASC/3-2070 RAILROAD PREEMPT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [4. PREEMPTOR/TSP]
2. From PREEMPTOR/TSP/SCP Submenu select [1. PREEMPT PLAN 1-10]

Place cursor in [ ] next to Preempt Plan and press 1. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Railroad Preempt #1.

```
PREEMPT PLAN [  1]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . .
TRKCLR O . . . . . .
ENA TRL  . . . . . .
DWEL VEH . . . . . .
DWEL PED . . . . . .
DWEL OLP . . . . . .
CYC VEH  . . . . . .
CYC PED  . . . . . .
CYC OLP  . . . . . .
EXIT PH  . . . . . .
EXIT CAL . . . . . .
SP FUNC  . . . . . .

ENABLE... YESIPMT OVRIDE.XIINTERLOCK. NO
DET LOCK... XIDELAY..    0IINHIBIT...  0
OVERIDE FL. .IDURATION   0ICLR-GRN... NO
TERM OLP.  NOIPC>YEL    NOITERM PH    NO
PED DARK.. NOITC RESRV YESIDWELL FL   OFF
LINK PMT....0IX FLCOLR REDIEXIT OPT. OFF
X TMG PLN...0IRE-SERV..  0IFLT TYPE.HARD
FREE DUR PMTIR1  NOIR2  NOIR3  NOIR4  NO
--TIMING-----WALKIPED CLIMN GRI YELI RED
ENTRANCE TM.  255I   255I    1I25.5I25.5
-----------MIN GRIEXT GRIMX GRI YELI RED
TRACK CLEAR     0I     0I    0I25.5I25.5
-----------MIN DLIPMTEXTIMX TMI YELI RED
DWL/CYC-EXIT    7I   0.0I    0I25.5I25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

ASC/3-2070 Preemption Programming Detail

The image to the left is an exact duplication of the preempt programming display found on a 2070 controller running Econolite ASC/3-2070 software.

When a signal plan requires Railroad or Emergency Vehicle preemption, this detail is to be used on the electrical detail to instruct the installer on setting the different operational parameters required to operate the preempt sequence per the signal design plans.

Below is a brief description of the most commonly used features:

Ⓐ Preempt Plan - this setting is used to select the preemptor plan as well as establish preempt priority. Preemptor 1 is the highest priority preemptor and should always be used for railroad preemption.

Ⓑ Interval programming - these settings describe which phases run when the controller transitions into preemption, dwells, and exits. All entrance, dwell, and exit timing is shown in another section of the programming display.

- -TRKCLR V/O are vehicle phases and overlaps that run during the track clearance interval of the preemption sequence.
- -ENA TRL enables or disables the trailing G/Y/R overlap timing during preemption (often referred to as a timed overlap)
- -DWEL VEH/PED/OLP are the vehicle, pedestrian, and overlaps that are first served following the TRKCLR interval of the preemption sequence.
- -CYC VEH/PED/OLP are the vehicle, pedestrian, and overlaps that are served during the preemption sequence after the DWELL phases.
- -EXIT PH selects the phases that the controller will exit to at the end of the DWELL and/or CYCLE intervals. The preemption sequence terminates when all exit phases are timing.

Ⓒ PMT OVRIDE - When enabled allows this preemptor to override all higher numbered preemptors.

Ⓓ DELAY - The time between receipt of the preemptor call and initialization of preemption. Delay is typically used in firestation preempt applications where a push button in the firestation initiates the preemptor call a set DELAY time after the press of the button.

DET LOCK - A preemptor call is non latched when this setting is not programmed and is latched when it is programmed. When DELAY is used and a preemptor call is dropped during the DELAY period and DET LOCK is programmed, the preempt will be latched and will be serviced. This setting is typically used in tandem with DELAY in firestation preemption applications.

Ⓔ OVERIDE FL - Allows the preemptor to override automatic flash and time the preemptor sequence, after which the controller returns to automatic flash.

(continued on next page)

ECONOLITE ASC/3-2070 RAILROAD PREEMPT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [4. PREEMPTOR/TSP]
2. From PREEMPTOR/TSP/SCP Submenu select [1. PREEMPT PLAN 1-10]

Place cursor in [ ] next to Preempt Plan and press 1. Then press the right cursor arrow and toggle the controller to YES. Next cursor down. This will select Railroad Preempt #1.

```
PREEMPT PLAN [  1]    ENABLE....YES
 VEH/PED 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 OVERLAP A B C D E F G H I J K L M N O P
TRKCLR V . . . . . . . . . . . . . . . .
TRKCLR O . . . . . . . . . . . . . . . .
ENA TRL  . . . . . . . . . . . . . . . .
DWEL VEH . . . . . . . . . . . . . . . .
DWEL PED . . . . . . . . . . . . . . . .
DWEL OLP . . . . . . . . . . . . . . . .
CYC VEH  . . . . . . . . . . . . . . . .
CYC PED  . . . . . . . . . . . . . . . .
CYC OLP  . . . . . . . . . . . . . . . .
EXIT PH  . . . . . . . . . . . . . . . .
EXIT CAL . . . . . . . . . . . . . . . .
SP FUNC  . . . . . . . . . . . . . . . .

ENABLE... YES|PMT OVRIDE.X|INTERLOCK. NO
DET LOCK... X|DELAY..    0|INHIBIT...  0
OVERIDE FL. .|DURATION   0|CLR-GRN... NO
TERM OLP.  NO|PC>YEL    NO|TERM PH    NO
PED DARK.. NO|TC RESRV YES|DWELL FL  OFF
LINK PMT....0|X FLCOLR RED|EXIT OPT. OFF
X TMG PLN...0|RE-SERV..  0|FLT TYPE.HARD
FREE DUR PMT|R1  NO|R2  NO|R3  NO|R4  NO
--TIMING-----WALK|PED CL|MN GR|  YEL|  RED
ENTRANCE TM.  255|  255|    1|25.5|25.5
-----------MIN GR|EXT GR|MX GR|  YEL|  RED
TRACK CLEAR     0|     0|    0|25.5|25.5
-----------MIN DL|PMTEXT|MX TM|  YEL|  RED
DWL/CYC-EXIT    7|   0.0|    0|25.5|25.5
PMT ACTIVE OUT..ON   PMT ACT DWELL...NO
OTHER - PRI PMT.OFF  NON-PRI PMT.....OFF
INH EXT TIME... 0.0  PED PR RETURN...OFF
PRIORITY RETURN.OFF  QUEUE DELAY.... OFF
COND DELAY......OFF
PHASES     1   2   3   4   5   6   7   8
PR RTN%    0   0   0   0   0   0   0   0
PHASES     9  10  11  12  13  14  15  16
PR RTN%    0   0   0   0   0   0   0   0
```

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ASC/3-2070 Preemption Programming Detail (continued)

Ⓕ TERM OLP (ASAP) - Forces overlaps to terminate immediately with their included phases and ignore any existing Lagging Overlap programming.

PC>YEL - Allows the Yellow Change indication to time with the completion of Pedestrian Clearance interval.

TERM PH - Terminate all timing phases and force an All Red condition before starting the activated preempt. Phases will NOT be terminated if the current Green phases exactly match the preempt's entry phase(s) and a yellow trap will not be caused for conflicting PPLT overlap programming.

Ⓖ TC RESRV - Allows the preemptor to reservice the track clearance phases when the preemption call goes away and returns before the preemption sequences terminate. When enabled, the PREEMPTION EXTEND option is disabled.

Ⓗ Timing Parameters - these settings describe the controller operation as it transitions from normal operation into preemption, dwells, and then exits from preemption back to normal operation.

- -ENTRANCE TM. describes the minimum green, pedestrian walk and clear, and yellow and red clearance times for the phases currently timing when the preemptor receives a call and transitions from normal operation into preemption. The values 25.5 and 255 are special values used by the controller that allow the phase minimum times of the phases currently running to be timed by the controller. There is no way for the phase indication time to be larger than their programming when entering preemption any time these values are used.
- -TRACK CLEAR times are used for the track clearance phases and time after the entrance timing. Programming clearance times to 25.5 allows the phase minimum times to be used.
- -DWL/CYC-EXIT times determine the minimum dwell, preempt extend, max preempt time, and preempt exit clear times. The controller will serve any programmed dwell phases before serving cycle phases. Programming clearance times to 25.5 allows the phase minimum times to be used. Preemption advances to the exit sequence when the preempt input is removed and the preempt sequence is no longer active once all exit phases are timing.
- -MX TM is the Maximum Time that a preemption call can be active and be recognized by the controller. When it has failed, the input must return to inactive state to be recognized again. Zero entry disables the function for the associated preempt. NOTE: this feature is disabled if the preemptor is NOT called by a low priority input so the Preempt Filtering cell should be added to plans where a maximum preempt time is a desired function.

ECONOLITE ASC/3-2070 LOGIC PROCESSOR PROGRAMMING DETAIL FOR PREEMPT ONLY PHASE OMIT

(program controller as shown)

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From the LOGIC PROCESSOR Submenu select [2. LOGIC STATEMENTS]

ENTER A "1" IN THE LP# FIELD. PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   1  COPY FROM:   1  ACTIVE:  M   (T/F)
IF     PMT PREEMPT ACTIVE    1     IS  OFF

THEN   CTR OMIT PHASE        3         ON


ELSE
```

OMITS PHASE 3 DURING NORMAL OPERATION AND ALLOWS PHASE 3 TO RUN WHEN PREEMPT 1 IS ACTIVE

END PROGRAMMING

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From the LOGIC PROCESSOR Submenu select [1. LOGIC STATEMENT CONTROL]

ENABLE LOGIC PROCESSOR STATEMENT 1 BY POSITIONING THE CURSOR OVER THE FIELD SHOWN BELOW AND USING THE TOGGLE KEY TO ENABLE IT.

```
LOGIC STATEMENT CONTROL
          1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
LP 1-15   E  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 16-30  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 31-45  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 46-60  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 61-75  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 76-90  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
```

END PROGRAMMING

ASC/3-2070 Preempt Only Phase Omit Programming Detail

In designs with a phase that is only run during preemption, ASC/3-2070 uses the logic processor to omit that particular phase when the preempt is not active. The example shown indicates phase 3 is omitted during normal operation and is allowed to run when preempt 1 (typically a railroad preempt) is active. The preempt number and the phase number in the logic statement should be edited to match the signal plan.

ECONOLITE ASC/3-2070 LOGIC PROCESSOR PROGRAMMING DETAIL FOR PILOT LAMP CONTROL

(program controller as shown)

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From the LOGIC PROCESSOR Submenu select [2. LOGIC STATEMENTS]

ENTER A "1" IN THE LP# FIELD. PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   1  COPY FROM:   1  ACTIVE:  M   (T/F)
IF    PMT INPUT             2     IS  ON
OR    PMT PREEMPT ACTIVE    2     IS  ON

THEN  SIG SET PH PED CLR    2        ON


ELSE
```

NOTE: FIRE HOUSE PILOT LAMP LOGIC

ENTER A "2" IN THE LP# FIELD. PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   2  COPY FROM:   2  ACTIVE:  M   (T/F)
IF    PMT INPUT             2     IS  OFF
AND   PMT PREEMPT ACTIVE    2     IS  OFF

THEN  SIG SET PH PED CLR    2        OFF


ELSE
```

NOTE: FIRE HOUSE PILOT LAMP LOGIC

END PROGRAMMING

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From the LOGIC PROCESSOR Submenu select [1. LOGIC STATEMENT CONTROL]

ENABLE LOGIC PROCESSOR STATEMENTS 1 AND 2 BY POSITIONING THE CURSOR OVER THE FIELDS SHOWN BELOW AND USING THE TOGGLE KEY TO ENABLE THEM.

```
LOGIC STATEMENT CONTROL
          1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
LP 1-15   E E . . . . . . . . . . . . . .
LP 16-30  . . . . . . . . . . . . . . . .
LP 31-45  . . . . . . . . . . . . . . . .
LP 46-60  . . . . . . . . . . . . . . . .
LP 61-75  . . . . . . . . . . . . . . . .
LP 76-90  . . . . . . . . . . . . . . . .
```

END PROGRAMMING

ASC/3-2070 Pilot Lamp Logic Programming Detail

For firestation preemption designs that utilize a push button inside the firestation with a pilot lamp, use the logic processor to turn the lamp "ON" when the button is pressed and "OFF" at the end of the preempt sequence. The example shown to the left uses PRE2 for the fire preempt and the PED 2 Yellow output to light the pilot lamp. Make sure to install load resistors as described in STD. NO. 9.1 sheet 1.

Wireless Emergency Vehicle Preemption (EVP) Push Button Detail

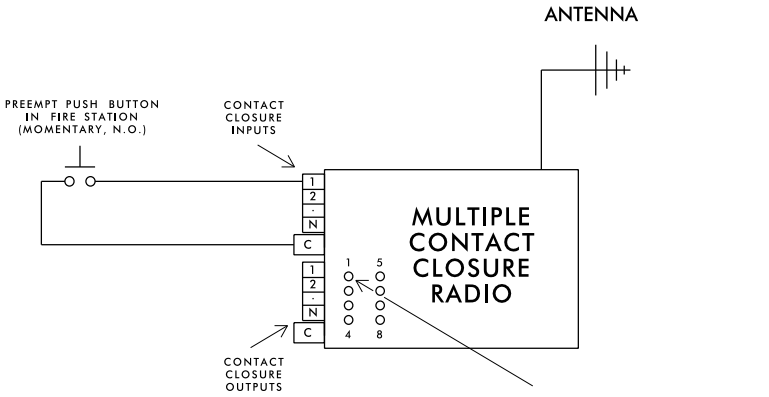
The detail shown on STD. NO. 9.4 sheet 2 gives the installer the information needed to interface the controller/cabinet assembly wirelessly via a multi-contact closure radio with a firehouse push button. The function of the push button is to generate a controller input that initiates an EV preemption sequence.

Typically there is also an indicator (pilot) lamp to be installed in the firehouse used to give the user positive feedback from the controller that the traffic signal has been preempted, but in this application a front panel lamp on the firehouse radio serves as the pilot lamp. The unused ped yellow output of a pedestrian loadswitch is used to energize a relay which sends a confirmation signal back to the firehouse radio for the duration of the preemption interval.

For the wireless emergency vehicle pushbutton preempt shown on the next sheet, preempt 3 is used as the controller preempt input and the cabinet is assumed to be a 332 base mount. The ped yellow output from ped loadswitch 4 (S6) is used to energize the relay for the confirmation signal for the pilot lamp in the firehouse. The radios that are used are capable of transmitting and receiving and have multiple contact closures. The notes shown on the detail contain additional information about the relay and the DC isolator used for the EV preemption application.

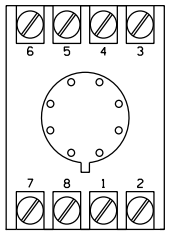
Relay K1 is de-energized under normal operation and is used to activate Input 1 to send a confirmation signal back to the fire station unit during EVP3.

FIRE STATION

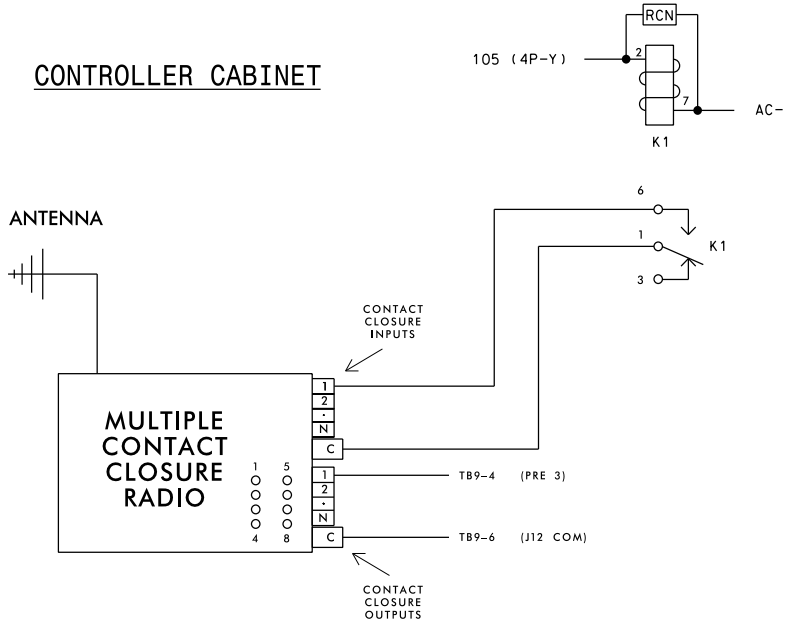


OUTPUT 1 INDICATOR IS USED TO CONFIRM THAT THE PREEMPT ACTIVATION SIGNAL FROM THE FIRE STATION WAS RECEIVED BY THE CABINET RADIO AND WILL REMAIN ILLUMINATED FOR THE DURATION OF THE PREEMPT SEQUENCE.

RELAY OCTAL BASE TERMINAL LOCATIONS



CONTROLLER CABINET



NOTES:

1. Relay K1 is an enclosed SPDT general purpose relay with a 120 VAC coil, 10A contacts, and octal style plug (DOT NO. 625028600).
2. The RC Network is valued at 0.1 microfarad, 100 ohm (DOT NO. 106018075).
3. Make sure load switch S6 is installed.
4. Install DC Isolator in Input File slot J12. See Input File Position Layout on sheet 1.

Emergency Vehicle Preemption (Push Button Wireless) Detail

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TRANSPORTATION MOBILITY AND SAFETY DIVISION
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9.4
SHEET 2 OF 2

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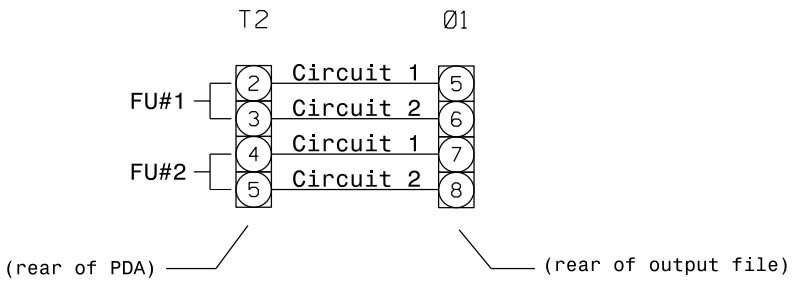
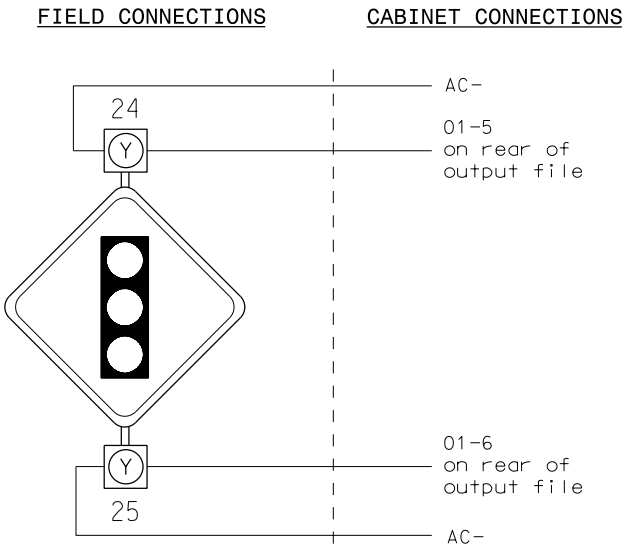
CABINET FLASHER OUTPUTS — Ⓐ



WIG WAG ADVANCE BEACON — Ⓑ



Advance Beacons - Continuous Flash

ADVANCE BEACONS that flash continuously can be wired directly to the flasher unit outputs in the cabinet. Flasher outputs are wired from the power distribution assembly to the output file. Each flasher unit has two circuits, each of which flashes 180 degrees out of phase with the other. Single flashing beacons, side by side, or WIG WAG type beacons can all be wired directly to the cabinet flasher outputs. This type of ADVANCE BEACONS will continue to flash even when the cabinet is in flash.

Ⓐ Cabinet flasher terminal block output reference.

Ⓑ WIG WAG ADVANCE BEACON - This diagram illustrates a beacon that has two heads that flash out of phase with each other. One head flashes with flasher unit #1 circuit #1, and the other head flashes with flasher unit #1 circuit #2. To maintain proper phasing, it is important that a WIG WAG flasher use the outputs of the same flasher unit.

Advance Beacons – Continuous Flash

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TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

STD. NO.
10.0
SHEET 1 OF 1

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ADVANCE BEACON OUTPUT ASSIGNMENT PROGRAMMING DETAIL — Ⓐ

(program controller as shown below)

FROM MAIN MENU PRESS '6' (OUTPUTS). THEN '1' (OUTPUT ASSIGNMENTS). PRESS '+' UNTIL OUTPUT #33 (PIN 35) IS REACHED.

```
PAGE:1  C1 PIN:35  NOT ENABLED
OUTPUT ASSIGNMENT #.................33
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...1.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...50
MODE (0=SOLID,1=FLASH)..............1
SELECT ASSIGNMENT:
NOT ENABLED.........................Y
VEHICLE PHASE.......................
PEDESTRIAN PHASE....................
VEHICLE OVERLAP.....................
PEDESTRIAN OVERLAP..................
WATCHDOG............................
DETECTOR RESET......................
ADVANCE BEACON......................Y
OUT OF PHASE FLASHER................
CONTROLLER FLASH....................
RUN FREE............................
RESERVED............................
PREEMPT.............................
SOFT PREEMPT........................
ANY PREEMPT.........................
COORDINATION PLAN...................
OFFSET..............................
PHASE CHECK.........................
PHASE ON............................
PHASE NEXT..........................
```

Ⓐ

THE FIRST THREE PROGRAMMING ROWS DEFINE THE OUTPUT TO FLASH. ALONG WITH THE RATE AT WHICH IT WILL FLASH.

THE NOT ENABLED 'Y' WILL REMAIN UNTIL THE FUNCTION OF THIS OUTPUT IS CHANGED. DO NOT ENTER AN 'N'.

```
PAGE:1  C1 PIN:35  NOT ENABLED
SELECT BEACON INDEX (1-4)..........1
```

WHEN A 'Y' IS ENTERED FOR 'ADVANCE BEACON' THE SCREEN SHOWN ABOVE WILL APPEAR. ENTER DATA AS SHOWN.

PRESS THE 'ENT' KEY AFTER INPUTTING DATA. THEN 'ESC'.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS 'ADVANCE BEACON' AS SHOWN BELOW.

```
PAGE:1  C1 PIN:35  ADVANCE BEACON
OUTPUT ASSIGNMENT #.................33
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...1.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...50
MODE (0=SOLID,1=FLASH)..............1
SELECT ASSIGNMENT:
NOT ENABLED.........................
VEHICLE PHASE.......................
PEDESTRIAN PHASE....................
VEHICLE OVERLAP.....................
PEDESTRIAN OVERLAP..................
WATCHDOG............................
DETECTOR RESET......................
ADVANCE BEACON......................Y
OUT OF PHASE FLASHER................
CONTROLLER FLASH....................
RUN FREE............................
RESERVED............................
PREEMPT.............................
SOFT PREEMPT........................
ANY PREEMPT.........................
COORDINATION PLAN...................
OFFSET..............................
PHASE CHECK.........................
PHASE ON............................
PHASE NEXT..........................
```

TYPICAL ADVANCE BEACON WIRING DETAIL (FOR PHASE 2 APPROACH) — Ⓑ

(wire flasher as shown below)

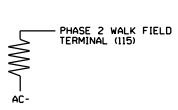
FIELD CONNECTIONS — CABINET CONNECTIONS

IMPORTANT

1. REMOVE, TAPE AND LABEL CONFLICT MONITOR WIRE ATTACHED TO THE REAR OF TERMINAL 114 (2PY).
2. INSTALL LOAD SWITCH IN OUTPUT FILE SLOT S3.
3. MAKE SURE LOAD RESISTOR IS IN PLACE AS SHOWN IN LOAD RESISTOR INSTALLATION DETAIL ON THIS SHEET.
4. TO ACTIVATE ADVANCE BEACON OPERATION AS INDICATED ON THE SIGNAL PLAN, REASSIGN OUTPUT 33 AS SHOWN ON THIS SHEET.

LOAD RESISTOR INSTALLATION DETAIL

ACCEPTABLE VALUES	
VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



ADVANCE BEACON PROGRAMMING DETAIL — Ⓒ

(program controller as shown below)

1. FROM MAIN MENU PRESS '6' (OUTPUTS). THEN '2' (OUTPUT BEACON SETTINGS).

```
          OUTPUT BEACON SETTINGS
TRIGGER PHASES: 123456789101112131415 16
BEACON #1 OFF   X
BEACON #2 OFF
BEACON #3 OFF
BEACON #4 OFF
                BEACON    1   2   3   4
OFF DELAY TIME (0-255)    0   0   0   0
ON DELAY TIME  (0-255)    0   0   0   0
STOP-TIME HOLD (0-255)    0   0   0   0
```

SCROLL DOWN TO VIEW ALL DATA

ADVANCE BEACON PROGRAMMING COMPLETE

NOTE: AN OUTPUT HAS TO BE ASSIGNED AS AN ADVANCE BEACON IN ORDER FOR PROPER OPERATION TO OCCUR. SEE OUTPUT ASSIGNMENT DETAIL ON SHEET X.

Oasis Single Programmable/Actuated Advance Beacons

Any output may be programmed as an ADVANCE BEACON and programmed to flash at variable frequencies and duty cycles when turned on. The unused ped yellow load switch outputs are typically chosen for advance beacon outputs and most often turned on and off by the logic processor.

Ⓐ ADVANCE BEACON OUTPUT PROGRAMMING - The four normally unused ped yellow outputs are typically chosen first for ADVANCE BEACON outputs. Their outputs are set up to flash at 1Hz with a 50% duty cycle when turned on. The ADVANCE BEACON is assigned a unique index number from 1-4 as shown.

Ⓑ ADVANCE BEACON WIRING - When using a ped yellow load switch output to drive a beacon, a load resistor must be used on the ped green output to prevent a conflict on the monitor. The wire that connects the yellow signal to the conflict monitor must also be disconnected.

Ⓒ ADVANCE BEACON PROGRAMMING - A typical Advance Beacon is controller by a trigger phase. The beacon will be "OFF" whenever the trigger phase is not in its green interval.

Oasis Advance Beacons – Single Programmable /Actuated

SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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STD. NO. 10.1

ADVANCE BEACON OUTPUT ASSIGNMENT PROGRAMMING DETAIL — Ⓐ

(program controller as shown below)

FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS). PRESS '+' UNTIL OUTPUT #33 (PIN 35) IS REACHED.

```
PAGE:1  C1 PIN:35  NOT ENABLED
OUTPUT ASSIGNMENT #.................33
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...1.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...50
MODE (0=SOLID.1=FLASH)..............1
SELECT ASSIGNMENT:
NOT ENABLED.........................Y
VEHICLE PHASE.......................
PEDESTRIAN PHASE....................
VEHICLE OVERLAP.....................
PEDESTRIAN OVERLAP..................
WATCHDOG............................
DETECTOR RESET......................
ADVANCE BEACON......................Y
OUT OF PHASE FLASHER................
CONTROLLER FLASH....................
RUN FREE............................
RESERVED............................
PREEMPT.............................
SOFT PREEMPT........................
ANY PREEMPT.........................
COORDINATION PLAN...................
OFFSET..............................
PHASE CHECK.........................
PHASE ON............................
PHASE NEXT..........................
```

Ⓐ

THE FIRST THREE PROGRAMMING ROWS DEFINE THE OUTPUT TO FLASH, ALONG WITH THE RATE AT WHICH IT WILL FLASH.

THE NOT ENABLED 'Y' WILL REMAIN UNTIL THE FUNCTION OF THIS OUTPUT IS CHANGED. DO NOT ENTER AN 'N'.

```
PAGE:1  C1 PIN:35  NOT ENABLED
SELECT BEACON INDEX (1-4)...........1
```

WHEN A 'Y' IS ENTERED FOR 'ADVANCE BEACON' THE SCREEN SHOWN ABOVE WILL APPEAR. ENTER DATA AS SHOWN.

PRESS THE 'ENT' KEY AFTER INPUTTING DATA. THEN 'ESC'.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS 'ADVANCE BEACON' AS SHOWN BELOW.

```
PAGE:1  C1 PIN:35  ADVANCE BEACON
OUTPUT ASSIGNMENT #.................33
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...1.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...50
MODE (0=SOLID.1=FLASH)..............1
SELECT ASSIGNMENT:
NOT ENABLED.........................
VEHICLE PHASE.......................
PEDESTRIAN PHASE....................
VEHICLE OVERLAP.....................
PEDESTRIAN OVERLAP..................
WATCHDOG............................
DETECTOR RESET......................
ADVANCE BEACON......................Y
OUT OF PHASE FLASHER................
CONTROLLER FLASH....................
RUN FREE............................
RESERVED............................
PREEMPT.............................
SOFT PREEMPT........................
ANY PREEMPT.........................
COORDINATION PLAN...................
OFFSET..............................
PHASE CHECK.........................
PHASE ON............................
PHASE NEXT..........................
```

FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS). PRESS '+' UNTIL OUTPUT #34 (PIN 36) IS REACHED.

```
PAGE:1  C1 PIN:36  NOT ENABLED
OUTPUT ASSIGNMENT #.................34
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID.1=FLASH)..............0
SELECT ASSIGNMENT:
NOT ENABLED.........................Y
VEHICLE PHASE.......................
PEDESTRIAN PHASE....................
VEHICLE OVERLAP.....................
PEDESTRIAN OVERLAP..................
WATCHDOG............................
DETECTOR RESET......................
ADVANCE BEACON......................
OUT OF PHASE FLASHER................Y
CONTROLLER FLASH....................
RUN FREE............................
RESERVED............................
PREEMPT.............................
SOFT PREEMPT........................
ANY PREEMPT.........................
COORDINATION PLAN...................
OFFSET..............................
PHASE CHECK.........................
PHASE ON............................
PHASE NEXT..........................
```

Ⓑ

THE NOT ENABLED 'Y' WILL REMAIN UNTIL THE FUNCTION OF THIS OUTPUT IS CHANGED. DO NOT ENTER AN 'N'.

```
PAGE:1  C1 PIN:36  NOT ENABLED
SELECT OUTPUT ASSIGNMENT (1-64).....33
```

Ⓑ

WHEN A 'Y' IS ENTERED FOR 'OUT OF PHASE FLASHER' THE SCREEN SHOWN ABOVE WILL APPEAR. ENTER DATA AS SHOWN.

PRESS THE 'ENT' KEY AFTER INPUTTING DATA. THEN 'ESC'.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS 'OUT OF PHASE FLASHER' AS SHOWN BELOW.

```
PAGE:1  C1 PIN:36  OUT OF PHASE FLASHER
OUTPUT ASSIGNMENT #.................34
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID.1=FLASH)..............0
SELECT ASSIGNMENT:
NOT ENABLED.........................
VEHICLE PHASE.......................
PEDESTRIAN PHASE....................
VEHICLE OVERLAP.....................
PEDESTRIAN OVERLAP..................
WATCHDOG............................
DETECTOR RESET......................
ADVANCE BEACON......................
OUT OF PHASE FLASHER................Y
CONTROLLER FLASH....................
RUN FREE............................
RESERVED............................
PREEMPT.............................
SOFT PREEMPT........................
ANY PREEMPT.........................
COORDINATION PLAN...................
OFFSET..............................
PHASE CHECK.........................
PHASE ON............................
PHASE NEXT..........................
```

Oasis Wig Wag Programmable/Actuated Advance Beacons

Any output may be programmed as an ADVANCE BEACON and programmed to flash at variable frequencies and duty cycles when turned on. Any output may be programmed as an OUT OF PHASE FLASHER and programmed to flash 180 degrees out of phase with an ADVANCE BEACON. Unused ped yellow load switch outputs are typically used for this application and WIG WAG beacons that are actuated by pavements loops and ancillary equipment are the most common application.

Ⓐ ADVANCE BEACON OUTPUT PROGRAMMING - The four normally unused ped yellow outputs are typically chosen first for ADVANCE BEACON outputs. Their outputs are set up to flash at 1Hz with a 50% duty cycle when turned on.

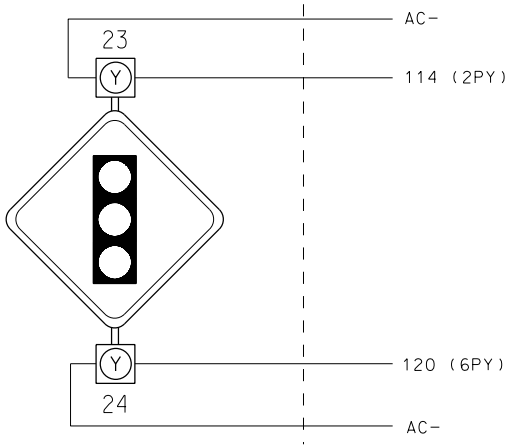
Ⓑ OUT OF PHASE FLASHER - An output may be programmed to flash 180 degrees out of phase with an existing output that has has already been programmed to flash its output. Typically the OUT OF PHASE FLASHER will be paired with an ADVANCE BEACON. The actual output that the OUT OF PHASE FLASHER is to be paired with must be specified in the programming. Unused ped yellow load switch outputs are typically used for OUT OF PHASE FLASHER outputs.

(continued on next page)

ADVANCE BEACON WIRING DETAIL (FOR PHASE 2 APPROACH) — Ⓒ

(wire flashers as shown below)

FIELD CONNECTIONS CABINET CONNECTIONS

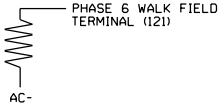


IMPORTANT

1. REMOVE, TAPE AND LABEL CONFLICT MONITOR WIRE ATTACHED TO THE REAR OF TERMINAL 114 (2PY) AND TERMINAL 120 (6PY).
2. INSTALL LOAD SWITCHES IN OUTPUT FILE SLOTS S3 AND S9.
3. MAKE SURE LOAD RESISTORS ARE IN PLACE AS SHOWN IN LOAD RESISTOR INSTALLATION DETAIL ON THIS SHEET.
4. TO ACTIVATE ADVANCE BEACON OPERATION AS INDICATED ON THE SIGNAL PLAN, REASSIGN OUTPUTS 33 AND 34 AS SHOWN ON THIS SHEET.

LOAD RESISTOR INSTALLATION DETAIL

ACCEPTABLE VALUES	
VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



Oasis Wig Wag Programmable/Actuated Advance Beacons

Ⓒ ADVANCE BEACON WIRING - For a typical WIG WAG ADVANCE BEACON application, two unused ped yellow load switch outputs are used to drive the beacons. One beacon is programmed as an ADVANCE BEACON while the other is set up to flash as an OUT OF PHASE FLASHER. To prevent conflicts, load resistors and wiring modifications must be made in the cabinet as shown to the left.

Ⓓ HOOK-UP CHART WITH ADVANCE BEACON - For any location where an ADVANCE BEACON is deployed, the signal head hook-up chart will show which load switches drive the beacon signal heads and other pertinent installation requirements.

Ⓓ

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3		S4	S5	S6	S7	S8	S9		S10	S11	S12
CMU CHANNEL NO.	1	2	13		3	4	14	5	6	15		7	8	16
PHASE	1	2	2 PED	ADVANCE BEACON	3	4	4 PED	5	6	6 PED	ADVANCE BEACON	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22	P21, P22	23	NU	41,42	P41, P42	NU	61,62	NU	24	NU	81,82	NU
RED		128				101			134				107	
YELLOW		129				102			135				108	
GREEN		130				103			136				109	
RED ARROW														
YELLOW ARROW														
GREEN ARROW														
✋			113				104							
PED YELLOW				** 114							** 120			
🚶			115				106			*				

NU = Not Used

* Denotes install load resistor. See load resistor installation detail on sheet x.

** Special advance beacons will be wired to S3-Y and S9-Y. See wiring and programming details on sheets x and y of this electrical detail.

Oasis Advance Beacons – Wig Wag (Out Of Phase) Programmable /Actuated

SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

STD. NO. 10.1

ADVANCE BEACON PROGRAMMING DETAIL FOR STOP TIME HOLD

Ⓐ

(program controller as shown below)

1. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '2' (OUTPUT BEACON SETTINGS).

```
          OUTPUT BEACON SETTINGS
TRIGGER PHASES:  123456789101111213141516
BEACON #1 OFF    X
BEACON #2 OFF         X
BEACON #3 OFF
BEACON #4 OFF
                BEACON    1   2   3   4
OFF DELAY TIME (0-255)    0   0   0   0
ON DELAY TIME  (0-255)    0   0   0   0
STOP-TIME HOLD (0-255)    2   2   0   0
```

Ⓑ

SCROLL DOWN TO VIEW ALL DATA

ADVANCE BEACON PROGRAMMING COMPLETE

← NOTICE STOP TIME HOLD SETTINGS FOR BEACONS #1 AND #2.

NOTE: AN OUTPUT HAS TO BE ASSIGNED AS AN ADVANCE BEACON IN ORDER FOR PROPER OPERATION TO OCCUR. SEE OUTPUT ASSIGNMENT DETAIL ON SHEET X.

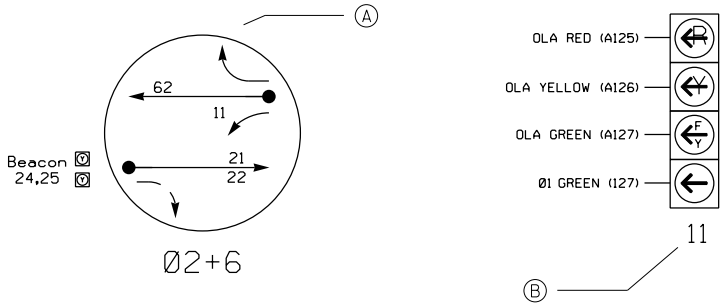
Oasis Wig Wag Advance Beacons With Stop Time Hold

Ⓐ STOP TIME HOLD - ADVANCE BEACONS are typically programmed to turn "ON" and "OFF" using trigger phases. The beacon will be "OFF" when the trigger phase is green. Some signal designs also specify that the beacon turn "ON" a specified amount of time prior to the end of green on a specified phase. The STOP-TIME HOLD setting specifies the interval that the beacon will turn back "ON" prior to the trigger phase turning yellow. The interval is served as additional green time given to the trigger phase beyond the gap or max termination point. In the illustration to the left, the beacon will turn "ON" two seconds prior to the end of phase 2 green and will flash until the time at which phase 2 turns green again.

Ⓑ STOP TIME HOLD FOR DUMMY BEACON - In a situation where there are opposing approaches and one is equipped with an ADVANCE BEACON that is programmed with STOP-TIME HOLD and the other does not have a beacon, it is necessary to create a dummy ADVANCE BEACON with the same amount of STOP-TIME HOLD on the approach with no beacon. Without the dummy beacon, the approach would clear while the opposing move would be held green for the duration of STOP-TIME HOLD which could create a yellow trap. The dummy programming ensures the two approaches clear simultaneously.

(continued on next page)

Oasis Advance Beacons – Wig Wag (Out Of Phase) With Stop Time Hold



ADVANCE BEACON PROGRAMMING DETAIL — Ⓒ
FOR STOP TIME HOLD

(program controller as shown below)

1. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '2' (OUTPUT BEACON SETTINGS).

```
          OUTPUT BEACON SETTINGS
TRIGGER PHASES: 123456789101112131415 16
BEACON #1 OFF   X
BEACON #2 OFF
BEACON #3 OFF
BEACON #4 OFF
                BEACON    1   2   3   4
OFF DELAY TIME (0-255):   0   0   0   0
ON DELAY TIME  (0-255):   0   0   0   0
STOP-TIME HOLD (0-255):   2   0   0   0
```

SCROLL DOWN TO VIEW ALL DATA

← NOTICE STOP TIME HOLD SETTINGS FOR BEACON #1.

ADVANCE BEACON PROGRAMMING COMPLETE

NOTE: AN OUTPUT HAS TO BE ASSIGNED AS AN ADVANCE BEACON IN ORDER FOR PROPER OPERATION TO OCCUR. SEE OUTPUT ASSIGNMENT DETAIL ON SHEET X.

OVERLAP PROGRAMMING DETAIL — Ⓓ

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

```
 PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
 PHASE:          123456789101112131415 16
VEH OVL PARENTS: XX
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:  X
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  X GREEN
SELECT VEHICLE OVERLAP OPTIONS:   (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC).....2
YELLOW CLEAR (0=PARENT,3-25.5 SEC)..0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)....0
```

← NOTICE VEH OVL GRN EXT

← NOTICE GREEN FLASH

← NOTICE GREEN EXTEND

OVERLAP PROGRAMMING COMPLETE

Oasis Wig Wag Advance Beacons With Stop Time Hold and FYAs

Special consideration must be taken into account when a three or four section flashing yellow arrow opposes a beacon that has stop time hold programmed. Because the flashing yellow arrow has the opposing through movement as a parent, it will clear at the end of the opposing green while the controller turns on the beacon and times the stop time hold. This means the flashing yellow arrow clears while the opposing through movement stays green, and this creates a yellow trap. To eliminate the yellow trap, green extension time equal to the stop time hold time has to be added to the flashing yellow arrow overlap programming to hold the flashing yellow arrow on for the same duration as its parent.

Ⓐ Signal design example showing an ADVANCE BEACON with two WIG WAG heads on one approach where the opposing approach has a four section flashing yellow arrow.

Ⓑ Four section flashing yellow arrow with typical overlap and protected turn output assignments.

Ⓒ ADVANCE BEACON programming detail with a phase 2 trigger phase and two seconds of stop time hold programmed.

Ⓓ Overlap programming showing the green extension time for overlap A equal to the stop time hold specified for beacon #1. This means at the end of green when the controller starts flashing the beacon and extends the green time of the trigger phase, the overlap will begin timing its green extension which keeps the flashing yellow arrow flashing for the same amount of time before clearing. The 'VEH OVL GRN EXT' parameter is the phase that starts the green extension timer at the end of green for the specified phase. Typically only the opposing through move parent phase extends green for a four section FYA signal head because the protected turn is often allowed to lag. If the protected turn lags and the through move is not programmed exclusively to start the green extension timer, each of the parent phases could start the timer and cause it to time twice, which is unnecessary.

Oasis Advance Beacons – Wig Wag (Out Of Phase) With Stop Time Hold & FYAs

ASC/3-2070 Single Programmable/Actuated Advance Beacons

Any output may be used to drive an ADVANCE BEACON. The unused ped yellow load switch outputs are typically chosen for ADVANCE BEACON outputs and are most often turned on and off by the logic processor. The example illustrated on this page turns ADVANCE BEACON 23 "ON" whenever phase 2 is not green.

Ⓐ ADVANCE BEACON WIRING - When using a ped yellow load switch output to drive a beacon, a load resistor must be used on the ped green output to prevent a conflict on the monitor. The wire that connects the yellow signal to the monitor must also be disconnected.

Ⓑ LOGIC PROCESSOR PROGRAMMING - The controller tests to see that phase 2 is not green and the controller is not in flash. When these two statements are true, the beacon will begin to flash on and off at 1Hz with a 50% duty cycle.

Ⓐ

TYPICAL ADVANCE BEACON WIRING DETAIL (FOR PHASE 2 APPROACH)

(wire flasher as shown below)

FIELD CONNECTIONS CABINET CONNECTIONS

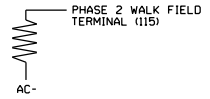
IMPORTANT

1. REMOVE, TAPE AND LABEL CONFLICT MONITOR WIRE ATTACHED TO THE REAR OF TERMINAL 114 (2PY).
2. INSTALL LOAD SWITCH IN OUTPUT FILE SLOT S3.
3. MAKE SURE LOAD RESISTOR IS IN PLACE AS SHOWN IN LOAD RESISTOR INSTALLATION DETAIL ON THIS SHEET.

LOAD RESISTOR INSTALLATION DETAIL

ACCEPTABLE VALUES

VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



Ⓑ

ECONOLITE ASC/3-2070 LOGIC PROCESSOR PROGRAMMING TO TURN ON ADVANCE BEACON

(program controller as shown)

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From the LOGIC PROCESSOR Submenu select [2. LOGIC STATEMENTS]

ENTER A "1" IN THE LP# FIELD. PRESS 'ENTER'. AND PROGRAM AS SHOWN.

```
LP#:   1  COPY FROM:   1  ACTIVE:  M   (T/F)
IF     VEH GREEN ON PH      2     IS  OFF
AND    LP COB CODE ON                 546
AND    LP COB CODE OFF                544

THEN   SIG SET PH PED CLR   2        ON

ELSE
```

END PROGRAMMING

FLASH ADVANCE BEACON 23 AS LONG AS PHASE 2 GREEN IS OFF AND THE CONTROLLER IS NOT IN FLASH.

COB CODE 544 = Automatic (Remote) Flash
COB CODE 546 = Flashing Logic 1Hz

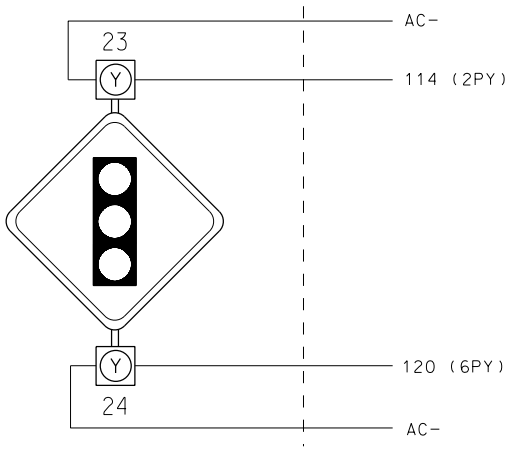
1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From the LOGIC PROCESSOR Submenu select [1. LOGIC STATEMENT CONTROL]

ENABLE LOGIC PROCESSOR STATEMENT 1 BY POSITIONING THE CURSOR OVER THE FIELD SHOWN BELOW AND USING THE TOGGLE KEY TO ENABLE IT.

```
LOGIC STATEMENT CONTROL
          1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
LP 1-15   E . . . . . . . . . . . . . . .
LP 16-30  . . . . . . . . . . . . . . . .
LP 31-45  . . . . . . . . . . . . . . . .
LP 46-60  . . . . . . . . . . . . . . . .
LP 61-75  . . . . . . . . . . . . . . . .
LP 76-90  . . . . . . . . . . . . . . . .
```

END PROGRAMMING

ADVANCE BEACON WIRING DETAIL (A)
(FOR PHASE 2 APPROACH)
(wire flashers as shown below)

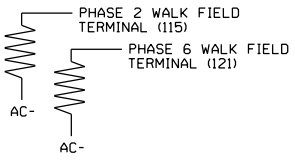


IMPORTANT

1. REMOVE, TAPE AND LABEL CONFLICT MONITOR WIRE ATTACHED TO THE REAR OF TERMINAL 114 (2PY) AND TERMINAL 120 (6PY).
2. INSTALL LOAD SWITCHES IN OUTPUT FILE SLOTS S3 AND S9.
3. MAKE SURE LOAD RESISTORS ARE IN PLACE AS SHOWN IN LOAD RESISTOR INSTALLATION DETAIL ON THIS SHEET.

LOAD RESISTOR
INSTALLATION DETAIL

ACCEPTABLE VALUES	
VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



ASC/3-2070 Wig Wag Programmable/Actuated Advance Beacons

Any output may be used to drive an ADVANCE BEACON. The unused ped yellow load switch outputs are typically chosen for ADVANCE BEACON outputs and are most often turned on and off by the logic processor. The example illustrated on this page turns on ADVANCE BEACONS 23 and 24 in a WIG WAG pattern whenever phase 2 is not green by driving them with two different ped yellow load switch outputs.

(A) ADVANCE BEACON WIRING - When using a ped yellow load switch output to drive a beacon, a load resistor must be used on the ped green output to prevent a conflict on the monitor. The wire that connects the yellow signal to the monitor must also be disconnected.

(continued on next page)

ECONOLITE ASC/3-2070 LOGIC PROCESSOR PROGRAMMING TO TURN ON ADVANCE BEACON

Ⓑ

(program controller as shown)

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From the LOGIC PROCESSOR Submenu select [2. LOGIC STATEMENTS]

ENTER A "1" IN THE LP# FIELD. PRESS 'ENTER'. AND PROGRAM AS SHOWN.

```
LP#:   1  COPY FROM:   1  ACTIVE:  M   (T/F)
IF    VEH GREEN ON PH      2     IS  OFF
AND   LP COB CODE ON                546
AND   LP COB CODE OFF               544

THEN  SIG SET PH PED CLR   2        ON

ELSE  SIG SET PH PED CLR   2        OFF
```

FLASHES ADVANCE BEACON 23 AS LONG AS PHASE 2 GREEN IS OFF AND THE CONTROLLER IS NOT IN FLASH.

COB CODE 544 = Automatic (Remote) Flash
COB CODE 546 = Flashing Logic 1Hz

ENTER A "2" IN THE LP# FIELD. PRESS 'ENTER'. AND PROGRAM AS SHOWN.

```
LP#:   2  COPY FROM:   2  ACTIVE:  M   (T/F)
IF    VEH GREEN ON PH      2     IS  OFF
AND   LP COB CODE OFF               546
AND   LP COB CODE OFF               544

THEN  SIG SET PH PED CLR   6        ON

ELSE  SIG SET PH PED CLR   6        OFF
```

FLASHES ADVANCE BEACON 24 AS LONG AS PHASE 2 GREEN IS OFF AND THE CONTROLLER IS NOT IN FLASH.

END PROGRAMMING

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From the LOGIC PROCESSOR Submenu select [1. LOGIC STATEMENT CONTROL]

ENABLE LOGIC PROCESSOR STATEMENTS 1 AND 2 BY POSITIONING THE CURSOR OVER THE FIELDS SHOWN BELOW AND USING THE TOGGLE KEY TO ENABLE THEM.

```
LOGIC STATEMENT CONTROL
          1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
LP 1-15   E E . . . . . . . . . . . . . . .
LP 16-30  . . . . . . . . . . . . . . . . .
LP 31-45  . . . . . . . . . . . . . . . . .
LP 46-60  . . . . . . . . . . . . . . . . .
LP 61-75  . . . . . . . . . . . . . . . . .
LP 76-90  . . . . . . . . . . . . . . . . .
```

END PROGRAMMING

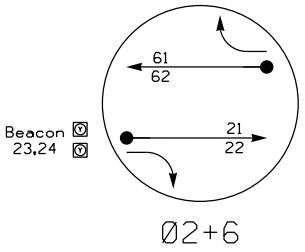
ASC/3-2070 Wig Wag Programmable/Actuated Advance Beacons

Ⓑ LOGIC PROCESSOR PROGRAMMING - The controller tests to see that phase 2 is not green and the controller is not in flash. When these two statements are true, the beacons will begin to flash on and off at 1Hz with a 50% duty cycle in a WIG WAG pattern.

ASC/3-2070 Wig Wag Programmable/Actuated Before End Of Green Advance Beacons

Some vehicle approaches with Advance Beacons require the beacons to begin flashing before the end of the vehicle green. This is accomplished using timed overlaps with extended green time (LAG GRN) and logic. For this discussion assume the example in the paragraph below is a continuation of the of the Advance Wig Wag beacon example explained on sheets 2 and 3 of STD. NO. 10.2 with the advance wig wag beacons on the phase 2 approach.

The signal plan will have a note stating something to the effect "flash beacons 3 seconds before the end of green". To accomplish this the load switch driving the signal heads on the phase 2 approach will have to be reassigned as an overlap. That overlap will then require its parent be assigned to the same approach as the beacon (phase 2 in this case) and will have to have LAG GRN, YEL, and RED times added. The LAG X PH (the phase that starts the LAG GRN timer when it clears from green to yellow) will be assigned to phase 2. To make the beacon turn on the requisite time before the end of green, LAG GRN must equal the time specified by the signal plan that the beacon should turn on before the end of green. The YEL and RED times in the overlap programming should equal that shown in the timing chart on the signal plan for phase 2. The logic to flash the beacons is the same as that shown on sheet 3 of STD. NO. 10.2



ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

Toggle to reach Overlap 'G'

OVERLAP G

Select TMG VEH OVLP [G] and 'OTHER/ECONOLITE'

```
TMG VEH OVLP...[G] TYPE:[OTHER/ECONOLITE]
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . X . . . . . . . . . . . . . .
PROTECT  . . . . . . . . . . . . . . . .
PED PRTC . . . . . . . . . . . . . . . .
NOT OVLP . . . . . . . . . . . . . . . .
FLSH GRN . . . . . . . . . . . . . . . .
LAG X PH . X . . . . . . . . . . . . . .
LAG 2 PH . . . . . . . . . . . . . . . .

LAG GRN 3.0 YEL 3.0 RED 2.0 ADV GRN 0.0
```

END PROGRAMMING

ECONOLITE ASC/3-2070 LOAD SWITCH ASSIGNMENT DETAIL

(program controller as shown)

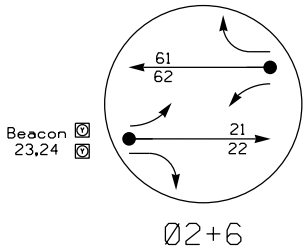
To assign load switch S2 as OLG, program LD SWITCH 2 as OVLP '7' TYPE 'O'.

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [3. LOAD SW ASSIGN]

```
LD SWITCH ASSIGN
     PHASE       DIMMING ---FLASH---
     /OVLP TYPE R Y G D PWR AUT TGR
1      1    V    . . . + A    R   X
2      7    O    . . . + A    Y   .
3      3    V    . . . + A    R   X
4      4    V    . . . + A    R   .
5      5    V    . . . - A    R   .
6      6    V    . . . - A    Y   X
7      7    V    . . . - A    R   .
8      8    V    . . . - A    R   X
9      1    O    . . . + A    R   X
10     2    O    . . . + A    R   X
11     3    O    . . . - A    R   .
12     4    O    . . . - A    R   .
13     2    P    . . . + A    .   .
14     4    P    . . . - A    .   .
15     6    P    . . . + A    .   .
16     8    P    . . . - A    .   .
```

ASC/3-2070 Wig Wag Programmable/Actuated Before End Of Green Advance Beacons With Permitted Left Turn Opposing The Beacon Approach

This example builds on the example shown in STD 10.2 sheet 4 and adds permitted left turns to each of the approaches. When phase 2 clears from green to yellow overlap 'G' begins to time its green extension at which point the advance beacon begins to flash. However, opposing approach phase 6 will clear from green to yellow simultaneously with phase 2 and because phase 6 has a permitted left turn a yellow trap will be created. To avoid a yellow trap a "dummy beacon" has to be created for the phase 6 approach to extend the phase 6 green time the same amount of time as the phase 2 green time. To accomplish this the load switch driving the signal heads on the phase 6 approach will also have to be reassigned as an overlap, overlap 'H' in this example, which will then have to have LAG GRN, YEL, and RED times added that are identical to those of phase 2. This ensures the phase 6 heads will clear simultaneously with the phase 2 heads.



ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

Toggle to reach Overlap 'H'

OVERLAP H

Select TMG VEH OVLP [H] and 'OTHER/ECONOLITE'

```
TMG VEH OVLP...[H] TYPE:[OTHER/ECONOLITE]
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . . . . . X . . . . . .
PROTECT  . . . . . .
PED PRTC . . . . . .
NOT OVLP . . . . . .
FLSH GRN . . . . . .
LAG X PH . . . . . X . . . . . .
LAG 2 PH . . . . . .

LAG GRN 3.0 YEL 3.0 RED 2.0 ADV GRN 0.0
```

END PROGRAMMING

ECONOLITE ASC/3-2070 LOAD SWITCH ASSIGNMENT DETAIL

(program controller as shown)

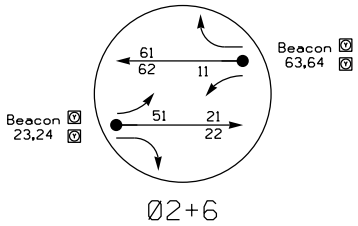
To assign load switch S8 as OLH, program LD SWITCH 6 as OVLP '8' TYPE 'O'.

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [3. LOAD SW ASSIGN]

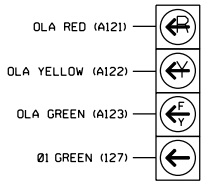
```
LD SWITCH ASSIGN
     PHASE       DIMMING ---FLASH---
     /OVLP TYPE R Y G D PWR AUT TGR
1    1     V    . . . + A   R   X
2    7     O    . . . + A   Y   .
3    3     V    . . . + A   R   X
4    4     V    . . . + A   R   .
5    5     V    . . . - A   R   .
6    8     O    . . . - A   Y   X
7    7     V    . . . - A   R   .
8    8     V    . . . - A   R   X
9    1     O    . . . + A   R   X
10   2     O    . . . + A   R   X
11   3     O    . . . - A   R   .
12   4     O    . . . - A   R   .
13   2     P    . . . + A   .   .
14   4     P    . . . - A   .   .
15   6     P    . . . + A   .   .
16   8     P    . . . - A   .   .
```

ASC/3-2070 Wig Wag Programmable/Actuated Before End Of Green Advance Beacons With Flashing Yellow Arrows

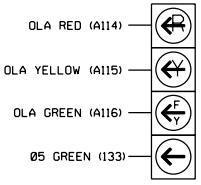
When FYAs and Advance Beacons that are actuated before the end of green are used together, care must be taken to ensure that the through heads and the FYAs all clear simultaneously so no yellow traps are created. This is remedied in two ways. First, the load switches that drive the through moves are reassigned as overlaps using LAG GRN, RED, and YEL clear in the same way as described in STD 10.2 sheets 4 and 5. Second, the the DELAY START OF FYA CLEARANCE in the FYA overlap programming is programmed with the identical time as the LAG GRN of the parent. This tells the FYA that after the parent phase clears it should "wait" the programmed amount of time before it clears. When programmed correctly all heads will clear simultaneously and no yellow traps will occur. For the beacons to flash, logic similar to that shown on STD. 10.2 sheet 3 for phase 2 will have to be added.



Ø2+6



11



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ECONOLITE ASC/3-2070 LOAD SWITCH ASSIGNMENT DETAIL

(program controller as shown)

To assign load switch S2 as OLG and S8 as OLH. program LD SWITCH 2 as OVLP '7' and LD SWITCH 6 as OVLP '8' TYPE 'O'.

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [3. LOAD SW ASSIGN]

LD SWITCH ASSIGN

	PHASE /OVLP	TYPE	DIMMING R	Y	G	D	PWR	FLASH AUT	FLASH TGR
1	1	V	.	.	.	+	A	R	X
→ 2	7	O	.	.	.	+	A	Y	.
3	3	V	.	.	.	+	A	R	X
4	4	V	.	.	.	+	A	R	.
5	5	V	.	.	.	−	A	R	.
→ 6	8	O	.	.	.	−	A	Y	X
7	7	V	.	.	.	−	A	R	.
8	8	V	.	.	.	−	A	R	X
9	1	O	.	.	.	+	A	R	X
10	2	O	.	.	.	+	A	R	X
11	3	O	.	.	.	−	A	R	.
12	4	O	.	.	.	−	A	R	.
13	2	P	.	.	.	+	A	.	.
14	4	P	.	.	.	−	A	.	.
15	6	P	.	.	.	+	A	.	.
16	8	P	.	.	.	−	A	.	.

ASC/3-2070 Wig Wag Programmable/Actuated Before End Of Green Advance Beacons With Flashing Yellow Arrows

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

Select TMG VEH OVLP [A] and 'PPLT FYA'

```
TMG VEH OVLP...[A] TYPE: ....PPLT FYA

PROTECTED LEFT TURN....   PHASE    1
OPPOSING THROUGH.......   PHASE    2

FLASHING ARROW OUTPUT.....CH9  ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..3.0
ACTION PLAN SF BIT DISABLE..... 0
```

← NOTICE DELAY START OF FYA CLEARANCE TIME EQUAL TO LAG GRN OF OVERLAP PARENT

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

Toggle to reach Overlap 'C'

Select TMG VEH OVLP [C] and 'PPLT FYA'

```
TMG VEH OVLP...[C] TYPE: ....PPLT FYA

PROTECTED LEFT TURN....   PHASE    5
OPPOSING THROUGH.......   PHASE    6

FLASHING ARROW OUTPUT.....CH11 ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..3.0
ACTION PLAN SF BIT DISABLE..... 0
```

← NOTICE DELAY START OF FYA CLEARANCE TIME EQUAL TO LAG GRN OF OVERLAP PARENT

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

Toggle to reach Overlap 'G'

OVERLAP G

Select TMG VEH OVLP [G] and 'OTHER/ECONOLITE'

```
TMG VEH OVLP...[G] TYPE:OTHER/ECONOLITE
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . X . . . . . . . . . . . . . .
PROTECT  . . . . . . . . . . . . . . . .
PED PRTC . . . . . . . . . . . . . . . .
NOT OVLP . . . . . . . . . . . . . . . .
FLSH GRN . . . . . . . . . . . . . . . .
LAG X PH . X . . . . . . . . . . . . . .
LAG 2 PH . . . . . . . . . . . . . . . .

LAG GRN 3.0 YEL 3.0 RED 2.0 ADV GRN 0.0
```

END PROGRAMMING

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

Toggle to reach Overlap 'H'

OVERLAP H

Select TMG VEH OVLP [H] and 'OTHER/ECONOLITE'

```
TMG VEH OVLP...[H] TYPE:OTHER/ECONOLITE
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . . . . . X . . . . . . . . . .
PROTECT  . . . . . . . . . . . . . . . .
PED PRTC . . . . . . . . . . . . . . . .
NOT OVLP . . . . . . . . . . . . . . . .
FLSH GRN . . . . . . . . . . . . . . . .
LAG X PH . . . . . X . . . . . . . . . .
LAG 2 PH . . . . . . . . . . . . . . . .

LAG GRN 3.0 YEL 3.0 RED 2.0 ADV GRN 0.0
```

END PROGRAMMING

ASC/3–2070 Beacons – Wig Wag Programmable /Actuated Before End Of Green

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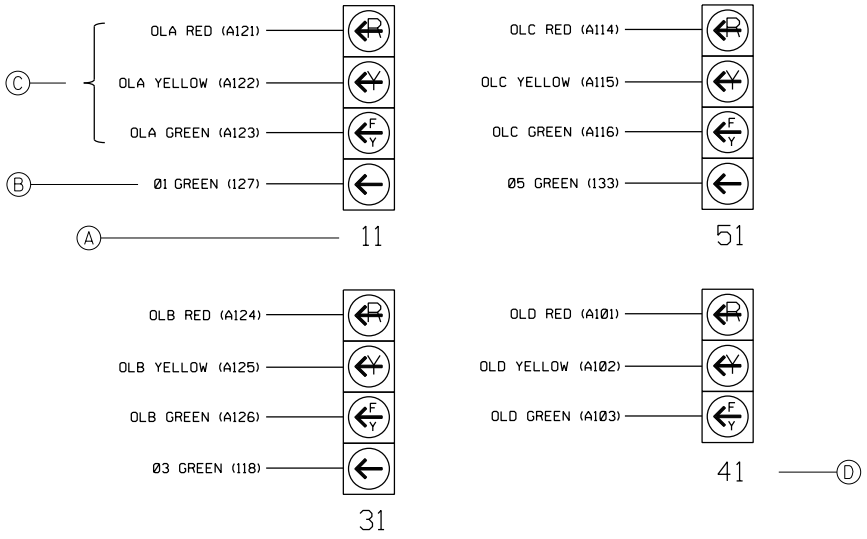
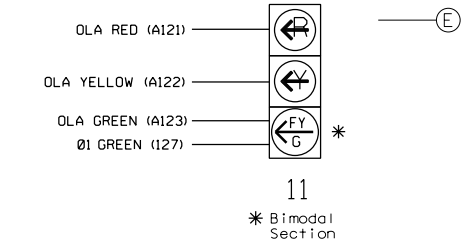
FYA SIGNAL WIRING DETAIL FOR 332 BASE MOUNTED CABINET

(wire signal heads as shown)



NOTE

The sequence display for signal heads 11, 31, and 51 requires special logic programming. See sheet 2 for programming instructions.



NOTE

The sequence display for signal head 11 requires special logic programming. See sheet 2 for programming instructions.

2070 FYA 332 Signal Head Wiring

Flashing Yellow Arrow signals may consist of 4-section heads where there is both a protected and permitted vehicle movement, or they may be 3-section heads that are permitted movements only. Each type has unique wiring requirements that vary depending on whether the cabinet type being used is a 332 base type or a 336 pole type.

Ⓐ Four section FYA signal - Equipped with four signal faces required to implement the protected/permitted flashing yellow arrow vehicle movement.

Ⓑ Green signal face used for the protected turn and is typically wired to the load switch associated with the protected turn phase.

Ⓒ Flashing yellow, solid yellow, and red arrows that comprise the permitted turn portion of the protected/permitted FYA signal sequence. These signal faces are driven by overlaps.

Ⓓ Three section FYA signal - Equipped with three signal faces required to implement a permitted only flashing yellow movement. This signal head has no protected turn associated with it but does require a correctly configured overlap with a parent to run correctly.

Ⓔ Bi-Modal FYA signal - Serves the same purpose as a four section FYA signal head. The bi-modal signal face has wiring for both the protected green turn and the flashing yellow arrow and will display either of those two signals in the correct color when they are active.

2070 FYA for 332 Base Mounted Cabinets – Signal Head Wiring

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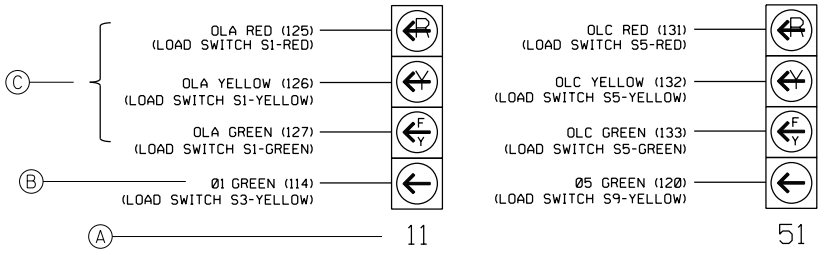
11.0
SHEET 1 OF 2

FYA SIGNAL WIRING DETAIL FOR 336 POLE MOUNTED CABINET

(wire signal heads as shown)



NOTE

The sequence display for signal heads 11 and 51 requires special logic and output remapping. See sheet 2 for programming instructions.

2070 FYA 336 Signal Head Wiring

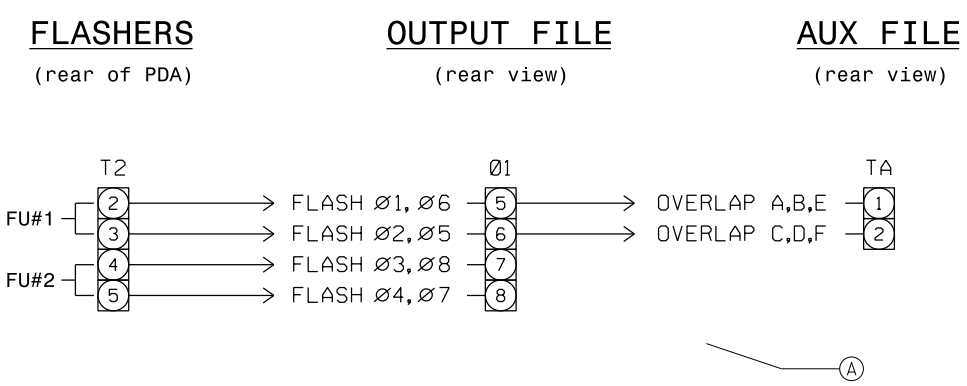
Flashing Yellow Arrow signals may consist of 4-section heads where there is both a protected and permitted vehicle movement, or they may be 3-section heads that are permitted movements only. Each type has unique wiring requirements that vary depending on whether the cabinet type being used is a 332 base type or a 336 pole type.

Ⓐ Four section FYA signal - Equipped with four signal faces required to implement the protected/permitted flashing yellow arrow vehicle movement.

Ⓑ The green signal face used for the protected turn when using a 336 cabinet must be connected to the PED yellow output of a PED load switch. This is because there are a limited number of load switches due to the fact there is no auxiliary output file in the cabinet. To use this output as a vehicle phase it must first be remapped as a vehicle phase and assigned the appropriate phase.

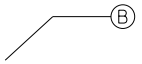
Ⓒ Flashing yellow, solid yellow, and red arrows that comprise the permitted turn portion of the protected/permitted FYA signal sequence. These signal faces are driven by overlaps Before being used as an overlap, the load switch in use must first be remapped as the appropriate vehicle overlap.

2070 FYA Flasher Circuit Modification



The 170 type signal cabinets, both base and pole mount styles, are equipped with two flasher units that are designed to flash signal heads on the various spans of a design per the signal design plan. All signal heads on a span shall flash in unison, but when dealing with flashing yellow arrow designs the default flasher wiring found in the cabinet does not always readily facilitate this requirement. When faced with heads that do not flash in unison with default cabinet flasher wiring, it becomes necessary to modify the cabinet flasher wiring to ensure all heads on their respective spans will flash in unison. The chart shown to the left illustrates where the flasher circuits originate, where they terminate, and which phases and overlaps they are associated with.

Ⓐ This diagram shows where the flasher circuits originate and terminate in the cabinets and which phases and overlaps are associated with each flasher circuit. Each flasher unit has two flasher circuits that flash 180 degrees out of phase with each other at a 1Hz 50% duty cycle rate. Each flasher unit operates independently. This diagram can be used to compare which signal heads on a span are being driven by which flasher unit in an effort to determine whether they flash in unison.



FLASHER CIRCUIT MODIFICATION DETAIL

IN ORDER TO ENSURE THAT SIGNALS FLASH CONCURRENTLY ON THE SAME APPROACH, MAKE THE FOLLOWING FLASHER CIRCUIT CHANGES:

1. ON REAR OF PDA – REMOVE WIRE FROM TERM. T2-4 AND TERMINATE ON T2-2.
2. ON REAR OF PDA – REMOVE WIRE FROM TERM. T2-5 AND TERMINATE ON T2-3.
3. REMOVE FLASHER UNIT 2.

THE CHANGES LISTED ABOVE TIES ALL PHASES AND OVERLAPS TO FLASHER UNIT 1.

Ⓑ FLASHER CIRCUIT MODIFICATION - Often times when FYAs are used on a signal design, the heads on a span will not flash in unison. This happens more often than not on side streets where an overlap flashes out of phase with a through move phase on the same span. When this is the case and flashing all heads on a single flasher unit will remedy the problem, put the note shown to the left on the electrical detail.

2070 FYA for 332 and 336 Cabinets – Flasher Circuit Modification

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OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

```
 PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
 PHASE:          |1234567891O111213141516
VEH OVL PARENTS:|XX
VEH OVL NOT VEH:|
VEH OVL NOT PED:|
VEH OVL GRN EXT:|
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  X GREEN
SELECT VEHICLE OVERLAP OPTIONS:   (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (O-255 SEC).........O
YELLOW CLEAR (O=PARENT,3-25.5 SEC)..0.0
RED CLEAR (O=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (O=NONE, 1-16)....O
```

Ⓐ

Ⓑ

NOTICE GREEN FLASH

Ⓒ

PRESS '+' TWICE

```
 PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
 PHASE:          |1234567891O111213141516
VEH OVL PARENTS:|    XX
VEH OVL NOT VEH:|
VEH OVL NOT PED:|
VEH OVL GRN EXT:|
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  X GREEN
SELECT VEHICLE OVERLAP OPTIONS:   (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (O-255 SEC).........O
YELLOW CLEAR (O=PARENT,3-25.5 SEC)..0.0
RED CLEAR (O=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (O=NONE, 1-16)....O
```

NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

2070 Oasis FYA Overlap Programming

Flashing Yellow Arrow designs utilizing three and four section heads to run protected/permitted sequences require overlaps to properly run the protected and the permitted movements. The protected turn is assigned a parent phase that is associated with the usual turning phase. The permitted move is assigned a parent phase that is the opposing through movement of the protected turn. In cases where FYA designs are permitted turns only (three section heads), there is only one parent for the overlap and it is normally the opposing through move phase.

Ⓐ VEH OVL PARENTS: - Overlaps will be allowed to run when any of the phases selected in this row are active. Most times the odd phases are the turning phases and the even phases are the opposing through phases.

Ⓑ FLASH COLORS: - When selected, the controller will flash the selected color at 1Hz with a 50% duty cycle when it is timing. For FYAs, the flashing yellow arrow is wired to the overlap load switch green output so flashing the green is what produces the flashing yellow arrow.

Ⓒ FLASH YELLOW IN CONTROLLER FLASH - When programmed with a 'Y', the controller will flash the overlap yellow output if the controller goes into controller flash.

2070 Oasis FYA 332 Base and 336 Pole Mounted Cabinets – Overlaps

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STD. NO. 11.2

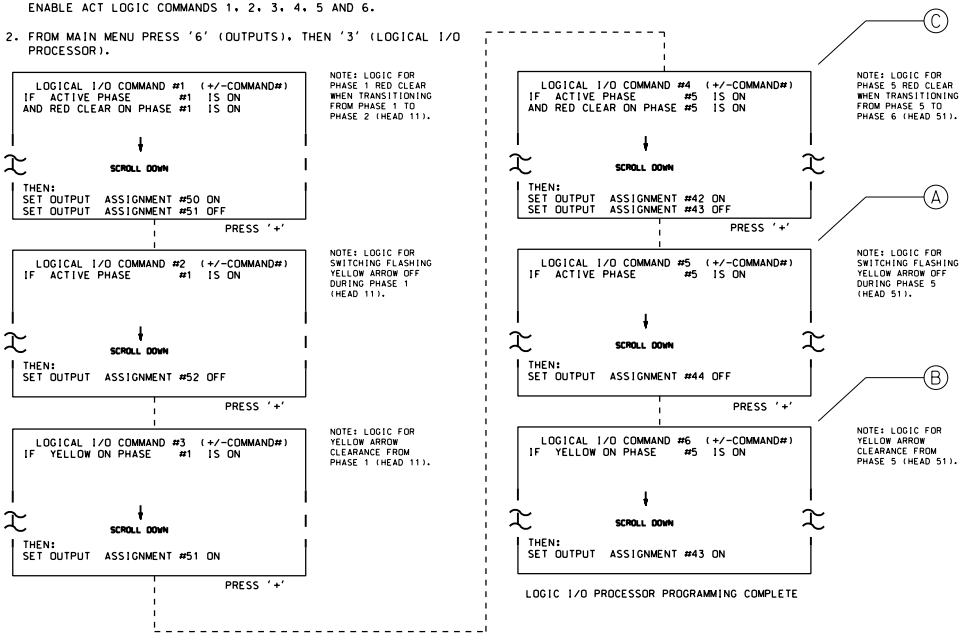
SHEET 1 OF 1

10-18

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL
TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, 3, 4, 5 AND 6.
2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



D

OUTPUT REFERENCE SCHEDULE

OUTPUT 42 = Overlap C Red
OUTPUT 43 = Overlap C Yellow
OUTPUT 44 = Overlap C Green
OUTPUT 50 = Overlap A Red
OUTPUT 51 = Overlap A Yellow
OUTPUT 52 = Overlap A Green

2070 Oasis FYA 332 Logic Processor Programming

The Logic Processor contained in the Oasis software is required to produce the proper protected/permitted vehicle sequence when running FYAs that use four section heads.

Ⓐ When the protected turn phase is being serviced, this logic forces the flashing yellow arrow section of the FYA "OFF".

Ⓑ When the protected turn phase is transitioning through yellow clear, this logic forces the four section FYA to display a solid yellow indication.

Ⓒ When the protected turn phase is transitioning through red clear, this logic forces the four section FYA to display a solid red indication while ensuring the solid yellow indication is "OFF".

Ⓓ Reference Schedule that defines the controller output assignment to overlap/signal face relationship.

2070 Oasis FYA 332 Base Mounted Cabinets – Logic Processor

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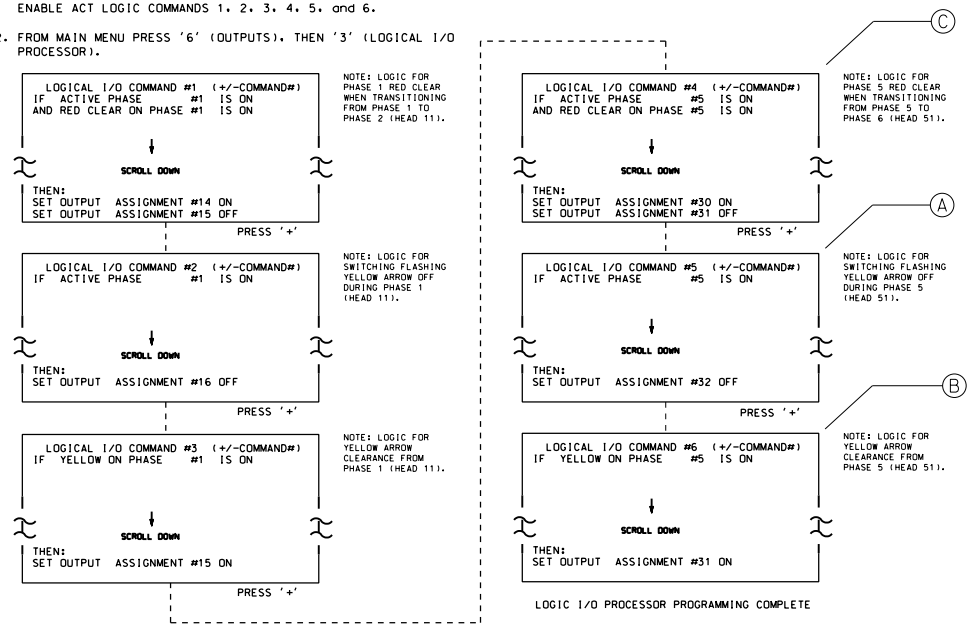
STD. NO.
11.3
SHEET 1 OF 2

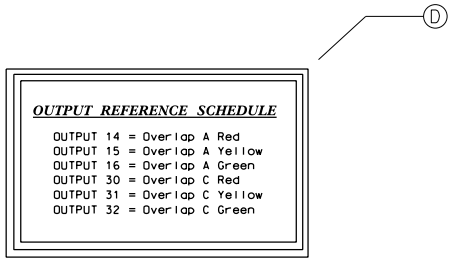
10-18

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL
TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL). THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1. 2. 3. 4. 5. and 6.
2. FROM MAIN MENU PRESS '6' (OUTPUTS). THEN '3' (LOGICAL I/O PROCESSOR).





Note: All outputs shown above have been remapped. See sheets 3 and 4 of this electrical detail.

2070 Oasis FYA 336 Logic Processor Programming

The Logic Processor contained in the Oasis software is required to produce the proper protected/permitted vehicle sequence when running FYAs that use four section heads.

Ⓐ When the protected turn phase is being serviced, this logic forces the flashing yellow arrow section of the FYA "OFF".

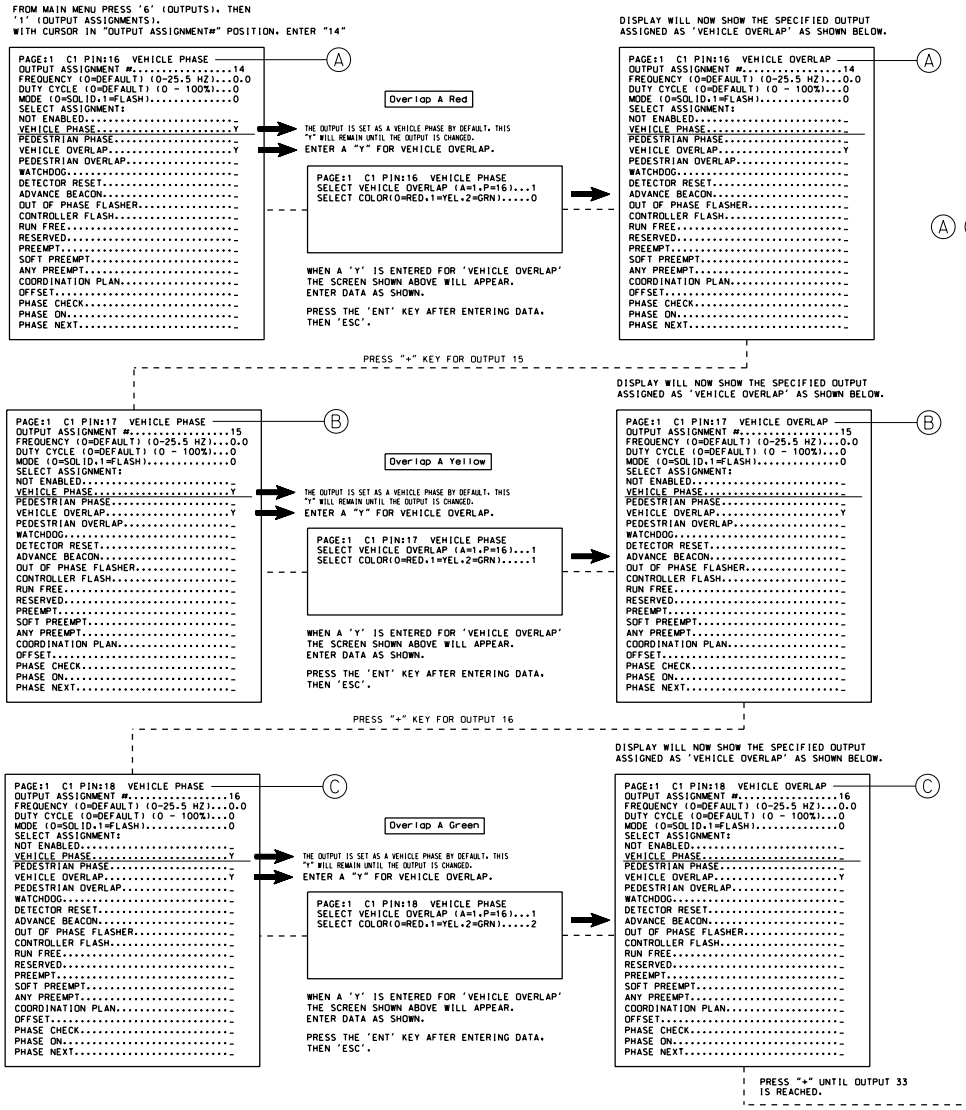
Ⓑ When the protected turn phase is transitioning through yellow clear, this logic forces the four section FYA to display a solid yellow indication.

Ⓒ When the protected turn phase is transitioning through red clear, this logic forces the four section FYA to display a solid red indication while ensuring the solid yellow indication is "OFF".

Ⓓ Reference Schedule that defines the controller output assignment to overlap/signal face relationship.

FYA SIGNAL OUTPUT REMAPPING ASSIGNMENT PROGRAMMING DETAIL FOR LOADSWITCHES S1 & S3 (SIGNAL HEAD 11)

(program controller as shown below)



2070 Oasis FYA 336 Output Remapping

When using four section heads to implement protected/permitted FYA sequences in a 336 cabinet, the protected turn is driven by a PED yellow output that has been remapped as a vehicle green phase and the permitted move is driven by a vehicle load switch whose outputs have been remapped as vehicle overlaps.

Ⓐ Ⓑ Ⓒ Vehicle Phase load switch outputs which have been remapped as Vehicle Overlap A red, yellow, and green.

Ⓓ Phase 2 Ped yellow output remapped as vehicle phase 1 green.

2070 Oasis FYA for 336 Pole Mounted Cabinets – Output Remapping

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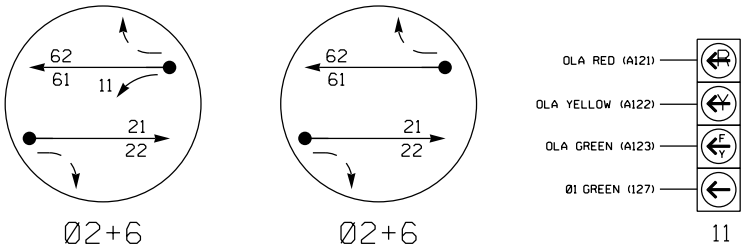
11.4
SHEET 1 OF 1

2070 Oasis 4-Section FYA Alternate Phasing

Often times a signal plan will call for alternate phasing where the protected and permitted turning movements of a four section flashing yellow arrow signal are run as the default phasing but the protected only movement is run during an alternate phasing period. This section illustrates the steps needed to run the protected and permitted turning movements of a four section flashing yellow arrow signal during default phasing and only the protected turn during the alternate phasing. Also shown are loop detector programming changes that are implemented during the alternate phasing period.

Ⓐ



Ⓑ

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A[1]	TB2-1,2	I1U	56	18	1	1	Y	Y			15
	-	J4U	48	10★	26	6	Y	Y	Y		3
	-	I1U	56	18★	51	1	Y	Y			

★See Input Page Assignment programming details on sheets 3 and 4.

Ⓒ

OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

```
PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
PHASE:          |12345678910111213141516
VEH OVL PARENTS:|XX
VEH OVL NOT VEH:|
VEH OVL NOT PED:|
VEH OVL GRN EXT:|
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  X GREEN
SELECT VEHICLE OVERLAP OPTIONS:   (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC).........0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)..0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)....0
```

OVERLAP PROGRAMMING COMPLETE

NOTICE PAGE 2 →

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS). THEN '1' (VEHICLE OVERLAP SETTINGS). PRESS 'NEXT' TO ADVANCE TO PAGE 2.

```
PAGE 2: VEHICLE OVERLAP 'A' SETTINGS
PHASE:          |12345678910111213141516
VEH OVL PARENTS:|X
VEH OVL NOT VEH:|
VEH OVL NOT PED:|
VEH OVL GRN EXT:|
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  _ GREEN
SELECT VEHICLE OVERLAP OPTIONS:   (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC).........0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)..0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)....0
```

OVERLAP PROGRAMMING COMPLETE

Ⓐ Default and Alternate phasing diagrams from the signal plan showing that the permitted turn on flashing yellow arrow signal head 11 does not run during alternate phasing 2+6.

Ⓑ Input File Chart - Information contained here is taken directly from the signal plan. The detector call to phase 6 on loop 1A is turned off during the alternate phasing period and the delay time on loop 1A is reduced. Programming required to implement this is found on subsequent sheets of the electrical detail as shown in the footnote.

Ⓒ Overlap Programming - To ensure the permitted flashing yellow arrow signal face does not run during the alternate phasing, its parent overlap must be omitted and it should not be programmed to flash green. This is programmed on overlap "PAGE 2" for use during alternate phasing.

(continued on next page)

2070 Oasis 4–Section FYA Alternate Phasing

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2070 Oasis 4-Section FYA Alternate Phasing

INPUT PAGE 2 ASSIGNMENT PROGRAMMING DETAIL FOR ALTERNATE PHASING - LOOP 1A — Ⓓ

(program controller as shown below)

NOTES: 1. THIS PROGRAMMING APPLIES FOR INPUT PAGE 2 ONLY. INPUT PAGE 1 WILL USE STANDARD DEFAULT SETTINGS. THIS PROGRAMMING IS NECESSARY FOR PROPER DETECTOR OPERATION DURING ALTERNATE PHASING OPERATION.

2. THE FIRST TASK THIS PROGRAMMING ACCOMPLISHES IS THE DISABLING OF INPUT #10 (DETECTOR 26) SO THAT A VEHICLE CALL WILL NOT BE PLACED TO PHASE 6 DURING ALTERNATE PHASING OPERATION. THE SECOND TASK THIS PROGRAMMING ACCOMPLISHES IS THAT IT REASSIGNS DETECTOR 51 TO INPUT #18 SO THAT THE DELAY ON LOOP 1A CAN BE REDUCED FROM 15 SECONDS TO 0 SECONDS.

FROM MAIN MENU PRESS '5' (INPUTS). THEN PRESS 'NEXT' TO GET TO INPUT PAGE '2'. PRESS THE '+' KEY UNTIL INPUT 10 IS REACHED.

```
PAGE: 2 C1 PIN:48  VEHICLE DETECTOR
INPUT ASSIGNMENT #.................10
DEBOUNCE TIME (0-25.5 SEC).........0.5
DELAY TIME (0-25.5 SEC)............0.0
HOLD-OVER TIME (0-25.5 SEC).........0.0
ASSIGNMENT SELECTION:
NOT ENABLED (Y/N)..................Y
VEHICLE DETECTOR (1-64).............26
PEDESTRIAN DETECTOR (1-16)..........
ALTERNATE PED DETECTOR (1-16).......
PREEMPT (1-10)......................
INVERTED PREEMPT (1-10).............
STOP TIME (Y/N).....................
FLASH SENSE (Y/N)...................
DOOR OPEN (Y/N).....................
MANUAL CONTROL ENABLE (Y/N).........
MANUAL CONTROL ADVANCE (Y/N)........
SPECIAL FUNCTION ALARM (1-8)........
TOD HOUR SYCHRONIZATION (0-23)......
FORCE OFF RING (1-4)................
HOLD PHASES (1-16)..................
PLAN (65=FLSH,66=FREE)...  OFFSET#...
CHANGE PHASE SEQUENCE PAGE (1-12)....
CHANGE PHASE TIMING PAGE (1-4)......
CHANGE PHASE CONTROL PAGE (1-4).....
CHANGE OVERLAP CONTROL PAGE (1-4)....
CHANGE INPUT PAGE (1-4).............
CHANGE OUTPUT PAGE (1-4)............
OVERRIDE PHASE CONTROL FUNCTION (Y)..
```

→ ENTER A 'Y' FOR NOT ENABLED

DEFAULT DETECTOR NUMBER WILL REMAIN UNTIL 'NOT ENABLED' IS ENTERED.

(LOOP 1A - PHASE 6)

```
PAGE: 2 C1 PIN:48  NOT ENABLED
INPUT ASSIGNMENT #.................10
DEBOUNCE TIME (0-25.5 SEC).........0.5
DELAY TIME (0-25.5 SEC)............0.0
HOLD-OVER TIME (0-25.5 SEC).........0.0
ASSIGNMENT SELECTION:
NOT ENABLED (Y/N)..................Y
VEHICLE DETECTOR (1-64).............
PEDESTRIAN DETECTOR (1-16)..........
ALTERNATE PED DETECTOR (1-16).......
PREEMPT (1-10)......................
INVERTED PREEMPT (1-10).............
STOP TIME (Y/N).....................
FLASH SENSE (Y/N)...................
DOOR OPEN (Y/N).....................
MANUAL CONTROL ENABLE (Y/N).........
MANUAL CONTROL ADVANCE (Y/N)........
SPECIAL FUNCTION ALARM (1-8)........
TOD HOUR SYCHRONIZATION (0-23)......
FORCE OFF RING (1-4)................
HOLD PHASES (1-16)..................
PLAN (65=FLSH,66=FREE)...  OFFSET#...
CHANGE PHASE SEQUENCE PAGE (1-12)....
CHANGE PHASE TIMING PAGE (1-4)......
CHANGE PHASE CONTROL PAGE (1-4).....
CHANGE OVERLAP CONTROL PAGE (1-4)....
CHANGE INPUT PAGE (1-4).............
CHANGE OUTPUT PAGE (1-4)............
OVERRIDE PHASE CONTROL FUNCTION (Y)..
```

PRESS '+' TO ADVANCE TO INPUT 18

```
PAGE: 2 C1 PIN:56  VEHICLE DETECTOR
INPUT ASSIGNMENT #.................18
DEBOUNCE TIME (0-25.5 SEC).........0.5
DELAY TIME (0-25.5 SEC)............0.0
HOLD-OVER TIME (0-25.5 SEC).........0.0
ASSIGNMENT SELECTION:
NOT ENABLED (Y/N)..................
VEHICLE DETECTOR (1-64).............1
PEDESTRIAN DETECTOR (1-16)..........
ALTERNATE PED DETECTOR (1-16).......
PREEMPT (1-10)......................
INVERTED PREEMPT (1-10).............
STOP TIME (Y/N).....................
FLASH SENSE (Y/N)...................
DOOR OPEN (Y/N).....................
MANUAL CONTROL ENABLE (Y/N).........
MANUAL CONTROL ADVANCE (Y/N)........
SPECIAL FUNCTION ALARM (1-8)........
TOD HOUR SYCHRONIZATION (0-23)......
FORCE OFF RING (1-4)................
HOLD PHASES (1-16)..................
PLAN (65=FLSH,66=FREE)...  OFFSET#...
CHANGE PHASE SEQUENCE PAGE (1-12)....
CHANGE PHASE TIMING PAGE (1-4)......
CHANGE PHASE CONTROL PAGE (1-4).....
CHANGE OVERLAP CONTROL PAGE (1-4)....
CHANGE INPUT PAGE (1-4).............
CHANGE OUTPUT PAGE (1-4)............
OVERRIDE PHASE CONTROL FUNCTION (Y)..
```

→ ENTER '51' TO REASSIGN THE VEHICLE DETECTOR FOR THIS INPUT

(LOOP 1A - PHASE 1)

```
PAGE: 2 C1 PIN:56  VEHICLE DETECTOR
INPUT ASSIGNMENT #.................18
DEBOUNCE TIME (0-25.5 SEC).........0.5
DELAY TIME (0-25.5 SEC)............0.0
HOLD-OVER TIME (0-25.5 SEC).........0.0
ASSIGNMENT SELECTION:
NOT ENABLED (Y/N)..................
VEHICLE DETECTOR (1-64).............51
PEDESTRIAN DETECTOR (1-16)..........
ALTERNATE PED DETECTOR (1-16).......
PREEMPT (1-10)......................
INVERTED PREEMPT (1-10).............
STOP TIME (Y/N).....................
FLASH SENSE (Y/N)...................
DOOR OPEN (Y/N).....................
MANUAL CONTROL ENABLE (Y/N).........
MANUAL CONTROL ADVANCE (Y/N)........
SPECIAL FUNCTION ALARM (1-8)........
TOD HOUR SYCHRONIZATION (0-23)......
FORCE OFF RING (1-4)................
HOLD PHASES (1-16)..................
PLAN (65=FLSH,66=FREE)...  OFFSET#...
CHANGE PHASE SEQUENCE PAGE (1-12)....
CHANGE PHASE TIMING PAGE (1-4)......
CHANGE PHASE CONTROL PAGE (1-4).....
CHANGE OVERLAP CONTROL PAGE (1-4)....
CHANGE INPUT PAGE (1-4).............
CHANGE OUTPUT PAGE (1-4)............
OVERRIDE PHASE CONTROL FUNCTION (Y)..
```

PROGRAMMING COMPLETE

SPECIAL DETECTOR PROGRAMMING DETAIL - LOOP 1A (ALT.)

(program controller as shown below)

FROM MAIN MENU PRESS '7' (DETECTORS). THEN PRESS '1' FOR VEHICLE DETECTORS. PRESS THE '-' KEY TO GET TO VEHICLE DETECTOR #51.

```
VEHICLE DETECTOR #51  SETTINGS (+-,1-64)
SETTING:                          (Y/N)
ENABLE DETECTOR.....................N
ENABLE LOGGING......................N
ENABLE DIAGNOSTICS..................N
SPEED TRAP..........................N
CALL DETECTOR.......................Y
EXTENSION DETECTOR..................Y
MODE 2 STOP BAR.....................N
SWITCHING DETECTOR..................N
DUPLICATING DETECTOR................N
ENABLE FULL TIME DELAY..............N
IF FAILED, SET MIN RECALL?..........N
IF FAILED, SET MAX1 RECALL?.........N
IF FAILED, SET MAX2 RECALL?.........N
PHASE#       :123456789101112131415 16
PHASES ASSIGNED :
SWITCH/DUPLICATE:
LOOP SIZE (0-255 FT)................6
SPEED TRAP DISTANCE (0-255 FT)......0
STOP BAR TIME (0-255 SEC)...........0
STRETCH (0-25.5 SEC)................0.0
DELAY (0-255 SEC)...................0
MAX CALLS/MIN (0-255)..............255
MIN CALLS/DIAGNOSTIC PERIOD (0-255).0
MAX OCCUPANCY (0-100%).............100
EXTENSION DISABLE TIME (0-255 SEC)..0
QUEUE MAX OCCUPANCY TIME (0-255)....0
QUEUE GAP RESET TIME (0-25.5).......0.0
PREEMPTION INDEX FOR QUEUE (0-10)...0
```

→ ENTER 'Y' FOR ENABLE DETECTOR

→ ENTER '1' FOR PHASES ASSIGNED

→ ENSURE DELAY IS '0'

```
VEHICLE DETECTOR #51  SETTINGS (+-,1-64)
SETTING:                          (Y/N)
ENABLE DETECTOR.....................Y
ENABLE LOGGING......................N
ENABLE DIAGNOSTICS..................N
SPEED TRAP..........................N
CALL DETECTOR.......................Y
EXTENSION DETECTOR..................Y
MODE 2 STOP BAR.....................N
SWITCHING DETECTOR..................N
DUPLICATING DETECTOR................N
ENABLE FULL TIME DELAY..............N
IF FAILED, SET MIN RECALL?..........N
IF FAILED, SET MAX1 RECALL?.........N
IF FAILED, SET MAX2 RECALL?.........N
PHASE#       :123456789101112131415 16
PHASES ASSIGNED :X
SWITCH/DUPLICATE:
LOOP SIZE (0-255 FT)................6
SPEED TRAP DISTANCE (0-255 FT)......0
STOP BAR TIME (0-255 SEC)...........0
STRETCH (0-25.5 SEC)................0.0
DELAY (0-255 SEC)...................0
MAX CALLS/MIN (0-255)..............255
MIN CALLS/DIAGNOSTIC PERIOD (0-255).0
MAX OCCUPANCY (0-100%).............100
EXTENSION DISABLE TIME (0-255 SEC)..0
QUEUE MAX OCCUPANCY TIME (0-255)....0
QUEUE GAP RESET TIME (0-25.5).......0.0
PREEMPTION INDEX FOR QUEUE (0-10)...0
```

DETECTOR PROGRAMMING COMPLETE

Ⓓ Input Assignment and Detector programming provides the programming steps necessary to disable a phase 6 call on loop 1A, reassign the detector number assigned to loop 1A's input, and reduce the delay. This is all programmed on input "PAGE 2" for use during alternate phasing.

NOTE: DETECTOR IS PROGRAMMED PER THE INPUT FILE CONNECTION AND PROGRAMMING CHART SHOWN ON SHEET 1.

(continued on next page)

2070 Oasis 4-Section FYA Alternate Phasing

Ⓔ

ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING COORDINATION - SELECT ALL PAGE CHANGES (AS SHOWN BELOW) WITHIN COORDINATION PLAN PROGRAMMING.

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM PAGE CHANGES (SHOWN BELOW) IN SEPARATE TIME OF DAY EVENTS. IF PAGE 1 IS USED, NO EVENT PROGRAMMING IS NECESSARY FOR THAT PARTICULAR PAGE.

PHASING	INPUTS PAGE	OVERLAPS PAGE
ACTIVE PAGES REQUIRED TO RUN DEFAULT PHASING	1	1
ACTIVE PAGES REQUIRED TO RUN ALTERNATE PHASING	2	2

NOTE: PAGES NOT SHOWN (i.e. sequence, phase control, etc.) SHOULD REMAIN AS '1', OR AS DEFINED BY TIMING ENGINEER.

IMPORTANT: IF ALT. PHASING IS USED DURING FREE RUN AND COORDINATION, DO NOT OPERATE TIME OF DAY PAGE CHANGE EVENTS CONCURRENTLY WITH COORDINATION PLAN EVENTS IN THE EVENT SCHEDULER. (EX. FREE RUN PAGE CHANGE EVENT SHOULD END BEFORE COORDINATION PLAN EVENT STARTS AND VICE-VERSA).

Ⓔ Alternate Phasing Activation Detail is a legend that outlines which inputs, overlaps, and other relevant pages are required to run during normal operation or during alternate phasing operation.

Ⓕ

ALTERNATE PHASING PAGE CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN THESE OVERLAP/INPUT PAGE CHANGES ACTIVATE TO CALL THE "ALTERNATE PHASING":

OVERLAPS PAGE 2: Modifies overlap parent phases for heads 11 to run protected turns only.

INPUTS PAGE 2: Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 0 seconds.

Ⓕ Alternate Phasing Page Change Summary - This area is used to describe in detail how the programming changes made to the different controller programming pages affect the phasing operation during the alternate phasing period. The loop delay reduction time of "0" seconds shown in this example is taken from the signal design plan, and that value may vary.

PED YELLOW CONFLICT MONITOR WIRING DETAIL — Ⓐ

(make cabinet wiring changes as shown below)

In order to use FYA COMPACT mode with the 2018ECL-NC Monitor, the cabinet must be wired such that the (unused) Ped Yellow load switch outputs are wired to the conflict monitor as follows: From 2 PY (field term. 114) to chan. 9 green (monitor pin 13), from 4 PY (field term. 105) to chan. 9 yellow (monitor pin 16), from 6 PY (field term. 120) to chan. 10 green (monitor pin R), and from 8 PY (field term. 111) to chan. 10 yellow (monitor pin U).

Follow the instructions below to make the appropriate connections:

STEP 1: Fold down rear panel of output file.

STEP 2: Find unused wiring harness from conflict monitor card edge connector (which should be tied and bundled together).

STEP 3: Find the conductors that correspond to the following conflict monitor card edge pins and solder wire to the appropriate terminal on the rear of the output file as shown below:

CMU-13	———	2PY (term. 114)
CMU-16	———	4PY (term. 105)
CMU-R	———	6PY (term. 120)
CMU-U	———	8PY (term. 111)

NOTE: Some cabinet manufacturers use keyed connectors to accomplish this wiring configuration. If connectors are used, fold down the rear panel of the output file and find the set of 3 keyed connectors and connect them as shown below:

1-2PY	-----	1-CMU-13
2-4PY	-----	2-CMU-16
3-6PY	-----	3-CMU-R
4-8PY	-----	4-CMU-U

2070 Oasis FYA 336 Conflict Monitor Wiring Detail

When using four section heads to implement protected/permitted FYA sequences in a 336 cabinet, the protected turn is driven by a PED yellow output that has been remapped as a vehicle green phase and the permitted move is driven by a vehicle load switch whose outputs have been remapped as overlaps. For the monitor to be able to see the protected turn indication on the rempped PED yellow output, special wiring must be made between the output file and the conflict monitor.

Ⓐ PED Yellow Conflict Monitor Wiring Detail giving the monitor visibility of the protected turn that is output on the remapped PED yellow load switch output.

2070 Oasis FYA for 336 Pole Mounted Cabinets – Conflict Monitor Wiring Detail

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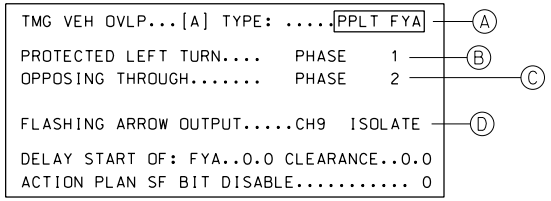
ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP A

Select TMG VEH OVLP [A] and 'PPLT FYA'



END PROGRAMMING

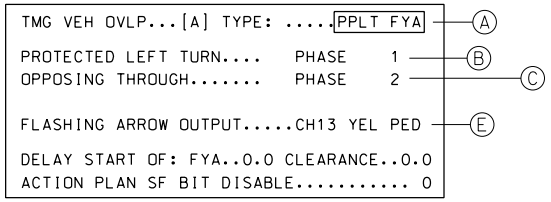
ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP A

Select TMG VEH OVLP [A] and 'PPLT FYA'



END PROGRAMMING

ASC/3-2070 4-Section FYA Overlap Programming

Flashing Yellow Arrow designs utilizing four section heads to run protected/permitted sequences require overlaps to properly run the protected and the permitted movements. ASC/3-2070 has an overlap mode designed specifically for protected/permitted FYA applications that takes care of sequencing the signal face outputs on the four section FYA signal heads.

Ⓐ Toggle through the overlap selections in the overlap programming and select PPLT FYA when using four section FYA signal heads. A compliant conflict monitor is required to monitor FYA/s when using this type of overlap.

Ⓑ PROTECTED LEFT TURN - Represents the protected turning movement of the protected/permitted FYA sequence.

Ⓒ OPPOSING THROUGH - Represents the opposing through movement during which the left turn movement is permitted for the protected/permitted FYA sequence.

When using a 332 base mounted cabinet...

Ⓓ FLASHING ARROW OUTPUT - Toggle through the selections to select ISOLATE, which refers to the isolated green indication of the protected turn channel. The appropriate output channel for the assigned protected and permitted phases will be displayed as shown in a read only field.

When using a 336 pole mounted cabinet...

Ⓔ FLASHING ARROW OUTPUT - Toggle through the selections to select YEL PED in order to assign the permitted turn channel to a PED yellow output channel. The appropriate PED channel for the assigned protected and permitted phases will be displayed as shown in a read only field. Output remapping is required to satisfy the conflict monitor FYA channel monitoring requirements. Refer to STD 11.8, sheet 1 of 2 for remapping details.

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP A

Select TMG VEH OVLP [A] and 'OTHER/ECONOLITE'

```
TMG VEH OVLP...[A] TYPE:OTHER/ECONOLITE      (A)
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
(B)INCLUDED . X . . . . . .
PROTECT  . . . . . .
PED PRTC . . . . . .
NOT OVLP . . . . . .
(C)FLSH GRN . 1 . . . . . .
LAG X PH . . . . . .
LAG 2 PH . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0 ADV GRN 0.0
```

Toggle TWICE

OVERLAP C

Select TMG VEH OVLP [C] and 'OTHER/ECONOLITE'

```
TMG VEH OVLP...[C] TYPE:OTHER/ECONOLITE
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
(B)INCLUDED . . . . . X . . . . . .
PROTECT  . . . . . .
PED PRTC . . . . . .
NOT OVLP . . . . . .
(C)FLSH GRN . . . . . 1 . . . . . .
LAG X PH . . . . . .
LAG 2 PH . . . . . .

LAG GRN 0.0 YEL 0.0 RED 0.0 ADV GRN 0.0
```

END PROGRAMMING

ASC/3-2070 3-Section FYA Overlap Programming

Flashing Yellow Arrow designs utilizing three section heads to run permitted only sequences require overlaps to properly run the permitted movements. ASC/3-2070 has an overlap mode that will flash the flashing yellow arrow signal face during the permitted phase movement.

Ⓐ Toggle through the overlap selections in the overlap programming and select OTHER/ECONOLITE when using three section FYA signal heads. A compliant conflict monitor is required when using this type of overlap to monitor the FYA's.

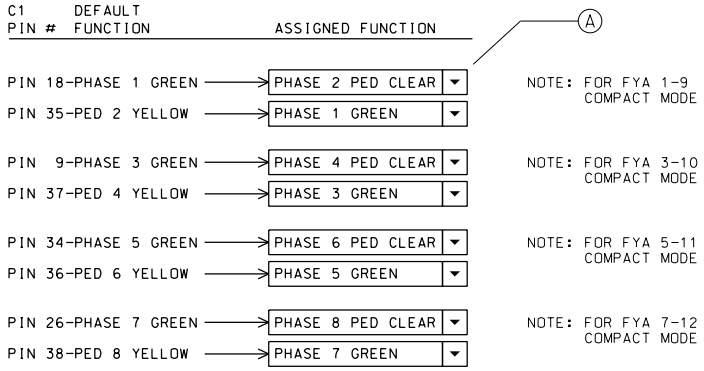
Ⓑ INCLUDED - Select the phases in which the the permitted move is allowed to run for the permitted FYA sequence.

Ⓒ FLASH GRN - Defines the rate at which the overlap will flash during the green interval of each included phase. Toggle this setting to '1' to flash the flashing yellow arrow signal face at a 1Hz 50% duty cycle rate.

ECONOLITE ASC/3-2070 I/O PIN REMAPPING

The ASC/3 Configurator utility program must be used to remap the I/O pins as shown below. Consult the ASC/3 Configurator User Guide for specific instructions on software use.

1. Run the Configurator utility. Load a file as the Current DB.
2. Choose the C1-out tab to change the I/O mapping as needed. Use the drop down list within the program to select the assigned function for the pins shown below.
3. Save the database file and download it to the controller.



NOTE: The steps below can be used to view changes to I/O pins within the controller. Any I/O pins that have been remapped will display and show their default function in addition to the current assigned function.

1. From Main Menu select [7. STATUS DISPLAY]
2. From STATUS DISPLAY Submenu select [8. INPUTS/OUTPUTS]
3. From INPUT/OUTPUT Submenu select [9. I/O DIFFERENCES]

ASC/3-2070 4-Section FYA Output Remapping

By default, when "YEL PED" is selected as the flashing arrow output during overlap programming, the ASC/3-2070 software outputs the flashing yellow arrow on a PED yellow channel and the protected turn on the green load switch channel of the protected turn phase. This arrangement places the protected turn and the flashing yellow arrow on the wrong conflict monitor input channels and as such these two outputs must be swapped with each other to satisfy the conflict monitor requirements. The ASC/3-2070 Configurator is used to remap these two outputs.

Ⓐ By selecting the C1 pin associated with the phase 1 green output and changing its function to "PHASE 2 PED CLEAR" from the drop down menu, and by selecting the C1 pin associated with the Ped 2 yellow output and changing its function to "PHASE 1 GREEN", the flashing yellow arrow will now be output on the overlap A green output and the solid green arrow will be output on the Ped 2 yellow output. These same actions are repeated as needed for any four section FYA in use.

ASC/3–2070 4–SECTION FYA for 336 Pole Mounted Cabinets – Output Remapping

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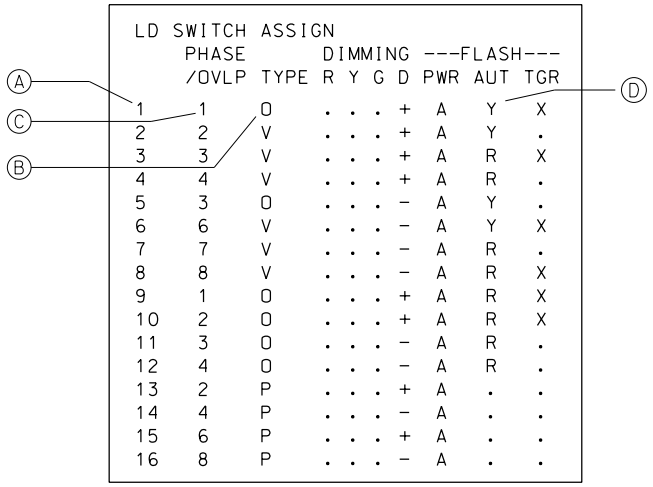
ECONOLITE ASC/3-2070
LOAD SWITCH ASSIGNMENT DETAIL

(program controller as shown)

To assign load switches S1 and S5 as OLA and OLC, program LD SWITCH 1 as OVLP '1' TYPE 'O' and LD SWITCH 5 as OVLP '3' TYPE 'O' as shown below.

1. From Main Menu select **1. CONFIGURATION**
2. From CONFIGURATION Submenu select **3. LOAD SW ASSIGN**



ASC/3-2070 FYA Load Switch Reassignment

The function of a load switch can be reassigned using ASC/3-2070 software. To implement permitted turn movements using three section FYA signal heads, vehicle load switches must be reassigned as vehicle overlaps. This is accomplished by reassigning the required load switches using the programming screen shown to the left.

Ⓐ LD SWITCH ASSIGN - This column represents 16 load switches that are typically found in a 170 type cabinet. Numbers 1-8 are vehicle load switches, 9-12 are overlap load switches located in an auxiliary output file if the cabinet were so equipped, and 13-16 are pedestrian load switches. This is a read only field.

Ⓑ TYPE - This column defines the output type of the load switch. The four assignment types can be toggled between Vehicle, Overlap, Pedestrian, or the load switch can be turned OFF with no selection being shown in this column.

Ⓒ PHASE/OVLP - This column defines the Vehicle or Pedestrian phase number assigned to type "V" and type "P" load switches. For load switches reassigned as type "O", the OVLP numbers range from 1-16 which represents overlaps A-P. In the screen shown to the left, load switches 1 and 5 have been reassigned as overlaps "A" and "C" respectively.

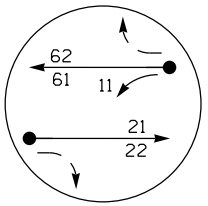
Ⓓ AUT - This column defines the load switch Automatic Flash color, which can be set to Red, Yellow, or dark. In the screen shown to the left, overlap A and overlap C will flash yellow when the controller goes into automatic flash.

ASC/3-2070 4-Section FYA Alternate Phasing

Occasionally a signal plan will call for alternate phasing where the protected and permitted turning movements of a four section flashing yellow arrow signal are run as the default phasing but the protected only movement is run during an alternate phasing period. This section illustrates the steps needed to run the protected and permitted turning movements of a four section flashing yellow arrow signal during default phasing and only the protected turn during the alternate phasing. Also shown are loop detector programming changes that are implemented in the alternate phasing period.

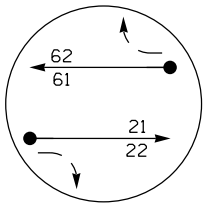
Ⓐ

Default

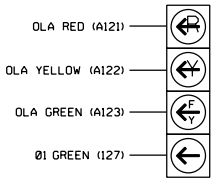


Ø2+6

Alternate



Ø2+6



11

Ⓑ

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	DETECTOR TYPE
1A [1]	TB2-1,2	I1U	56	1 ★	1	YES		15	S
	-	J4U	48	26★	6	YES		3	G

★See Input Page Assignment programming details on sheet 3. Ⓑ

Ⓐ Default and Alternate phasing diagrams from the signal plan showing that the permitted turn on flashing yellow arrow signal head 11 does not run during alternate phasing 2+6.

Ⓑ Input File Chart - Information contained here is taken directly from the signal plan. The detector call to phase 6 on loop 1A is turned off during the alternate phasing period and the delay time on loop 1A is reduced. Programming required to implement this is found on subsequent sheets of the electrical detail as shown in the footnote.

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL Ⓒ

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP A

Select TMG VEH OVLP [A] and 'PPLT FYA'

```
TMG VEH OVLP...[A] TYPE: .....[PPLT FYA]

PROTECTED LEFT TURN....   PHASE    1
OPPOSING THROUGH.......   PHASE    2

FLASHING ARROW OUTPUT.....CH9  ISOLATE

DELAY START OF: FYA..0.0 CLEARANCE..0.0
ACTION PLAN SF BIT DISABLE..... 1
```

← NOTICE ACTION PLAN SF BIT "1"

END PROGRAMMING

Ⓒ Overlap Programming - ASC/3-2070 has special function bits that can be entered in the overlap programming and be used to disable the permitted left turn of a four section flashing yellow arrow during alternate phasing. Enable the selected special function bit to disable the permitted turn during alternate phasing.

(continued on next page)

ASC/3–2070 4–Section FYA – Alternate Phasing

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ECONOLITE ASC/3-2070 VEHICLE DETECTOR SETUP — Ⓓ
PROGRAMMING DETAIL FOR ALTERNATE PHASING LOOP 1A

(program controller as shown)

IMPORTANT!

Program detectors per the input file connection and programming chart shown on sheet 1 before proceeding.

1. From Main Menu select [8. UTILITIES]
2. From UTILITIES Submenu select [1. COPY/CLEAR]
3. Copy from DETECTOR PLAN "1" to DETECTOR PLAN "2".

```
COPY / CLEAR UTILITY
        FROM                TO
PHASE TIMING.... . > PHASE TIMING.... .
TIMING PLAN..... . > TIMING PLAN..... .
PH DET OPT PLAN. . > PH DET OPT PLAN. .
DETECTOR PLAN... 1 > DETECTOR PLAN... 2
  TOGGLE TO SELECT A "FROM" AND A "TO"
            THEN PRESS ENTER
```

4. From Main Menu select [6. DETECTORS]
5. From DETECTOR Submenu select [2. VEHICLE DETECTOR SETUP]
6. Place cursor in VEH DET PLAN [ ] position and enter "2".

- Place cursor in VEH DETECTOR [ ] position and enter "1".
- Set delay time to "0".

```
VEH DETECTOR [ 1]   VEH DET PLAN [ 2]      <- NOTICE VEH DET PLAN 2
TYPE: S-STANDARD
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 1  1    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    0.0   <- ENSURE DELAY IS SET TO '0'
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN..... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

- Place cursor in VEH DETECTOR [ ] position and enter "26".
- Set assigned phase to "0".

```
VEH DETECTOR [26]   VEH DET PLAN [ 2]      <- NOTICE VEH DET PLAN 2
TYPE: G-GREEN EXTENSION/DELAY
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
 26 0    . . . . . . . . . . . . . . . .
EXTEND TIME...  0.0 DELAY TIME...    3.0
USE ADDED INITIAL . CROSS SWITCH PH..  0
LOCK IN..... NONE NTCIP VOL . OR OCC .
PMT QUEUE DELAY. NO
```

ENSURE PHASE IS SET TO "0" →

END PROGRAMMING

ASC/3-2070 4-Section FYA Alternate Phasing

Ⓓ Vehicle Detector Setup provides the programming steps necessary to disable a phase 6 call on loop 1A and reduce the delay. This is all programmed on vehicle detector plan 2 for use by an action plan during alternate phasing operation.

(continued on next page)

ECONOLITE ASC/3-2070 ACTION PLAN PROGRAMMING DETAIL

1. From Main Menu select [5. TIME BASE]

2. From TIME BASE Submenu select [2. ACTION PLAN]

```
ACTION PLAN...[  *]
PATTERN.....AUTO   SYS OVERRIDE.... NO
TIMING PLAN..... 0   SEQUENCE.....  0
VEH DETECTOR PLAN.. 2   DET LOG.....NONE
FLASH.....   --   RED REST..... NO
VEH DET DIAG PLN... 0   PED DET DIAG PLN..0
DIMMING ENABLE..   NO   PRIORITY RETURN. NO
PED PR RETURN..    NO   QUEUE DELAY..... NO
PMT COND DELAY     NO
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
PED RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
WALK 2    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
VEH RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX RCL   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
MAX 2     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
  PHASE   1  2  3  4  5  6  7  8  9  0  1  2  3  4  5  6
MAX 3     .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
CS INH    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
OMIT      .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
SPC FCT   X  .  .  .  .  .  .  .  (1-8)
AUX FCT   .  .  .  (1-3)
          1  2  3  4  5  6  7  8  9  0  1  2  3  4  5
LP 1-15   .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 16-30  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 31-45  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 46-60  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 61-75  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 76-90  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 91-100 .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
```

* The Action Plan number(s) are to be determined by the Division and/or City Traffic Engineer.

Ⓔ To run protected only turns during the Alternate Phasing period, an Action Plan is programmed to enable Vehicle Detector Plan 2 and to enable Special Funtion Bit 1. The Action Plan for the Alternate Phasing period typically runs during a scheduled day plan or during coordination.

Ⓕ The note at the bottom of the programming detail should be included on the electrical detail and makes it clear that the noted engineer(s) will be responsible for determining the Action Plan number(s) required to operate the signal correctly during the Alternate Phasing period(s).

(continued on next page)

Ⓕ

ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM CHANGES (SHOWN BELOW) IN A TIME BASED ACTION PLAN. SCHEDULE A DAY PLAN THAT INCLUDES THE ACTION PLAN PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BIT 1

TO RUN ALT. PHASING DURING COORDINATION - SELECT THE TIME BASED ACTION PLAN THAT IS PROGRAMMED TO SELECT VEH DET PLAN 2 AND ENABLE SF BIT 1

PHASING	VEH DET PLAN	SF BITS ENABLED
ACTIONS REQUIRED TO RUN DEFAULT PHASING	1	NONE
ACTIONS REQUIRED TO RUN ALTERNATE PHASING	2	1

IMPORTANT: IF ALT. PHASING IS USED DURING FREE RUN AND COORDINATION, DO NOT OPERATE TIME OF DAY EVENTS CONCURRENTLY WITH COORDINATION PLAN EVENTS IN THE EVENT SCHEDULER. (EX. FREE RUN EVENT SHOULD END BEFORE COORDINATION PLAN EVENT STARTS AND VICE-VERSA).

Ⓖ

ALTERNATE PHASING CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN SF BIT 1 AND VEH DET PLAN 2 ACTIVATE TO CALL THE "ALTERNATE PHASING":

SF BIT 1:	Modifies overlap parent phases for head 11 to run protected turns only.
VEH DET PLAN 2:	Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 0 seconds.

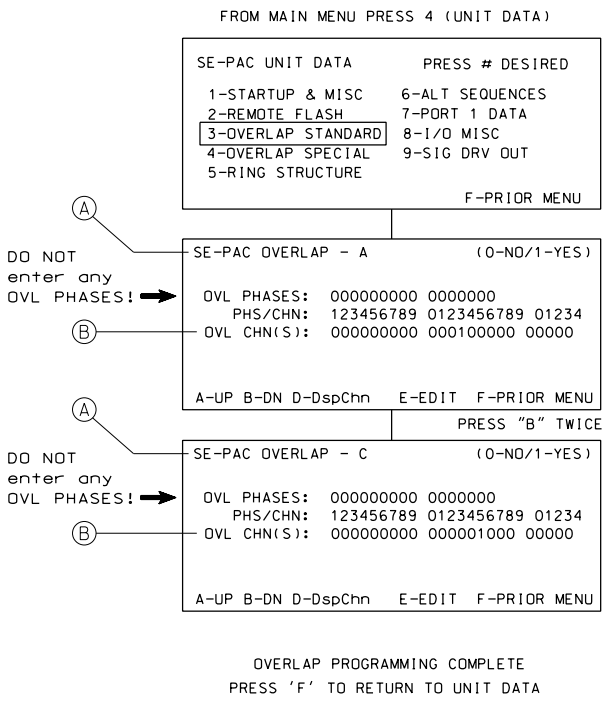
ASC/3-2070 4-Section FYA Alternate Phasing

Ⓕ Alternate Phasing Activation Detail is a legend that outlines which vehicle detector plan, special function bits, and other relevant programming is required to run during normal operation or during alternate phasing operation.

Ⓖ Alternate Phasing Page Change Summary - This area is used to describe in detail how the programming changes made to the different controller programming pages affect the phasing operation during the alternate phasing period. The loop delay reduction time of "0" seconds shown in this example is taken from the signal design plan, and that value may vary.

SE-PAC2070 FYA PROTECTED/PERMISSIVE SEQUENCE FOR OVERLAPS A & C

(program controller as shown below)



SE-PAC2070 FYA Overlap Programming

Flashing Yellow Arrow designs utilizing three and four section heads to run protected/permitted sequences typically require overlaps to properly run the protected and the permitted movements. When using SE-PAC2070 software, the protected/permitted overlap phase relationship is programmed in a special overlap portion of the software so care must be taken to ensure no standard overlaps are programmed for overlaps that are to be used for the protected/permitted sequence.

Ⓐ SE-PAC OVERLAP - Overlap being used for the protected/permitted or permitted only flashing yellow arrow movement.

Ⓑ OVL CHN(S) - This represents the signal driver output for the designated overlap. Make sure this channel is correct for the SE-PAC OVERLAP, e.g. OVL CHN 13 = SE-PAC OVERLAP A, and ensure no overlap phases are assigned.

SE–PAC2070 FYA 332 Base Mounted Cabinets – Overlaps

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SHEET 1 OF 1

PROTECTED AND PERMISSIVE PHASES FOR FLASHING YELLOW ARROW

(program controller as shown below)

FROM MAIN MENU PRESS 4 (UNIT DATA)

```
SE-PAC UNIT DATA          PRESS # DESIRED

 1-STARTUP & MISC      6-ALT SEQUENCES
 2-REMOTE FLASH        7-PORT 1 DATA
 3-OVERLAP STANDARD    8-I/O MISC
 4-OVERLAP SPECIAL     9-SIG DRV OUT
 5-RING STRUCTURE

                                F-PRIOR MENU
```

```
SE-PAC OVLP.A...B...C...D...E...F...G...H.
   TR GRN   0   0   0   0   0   0   0   0
   YEL/10  40  40  40  40  40  40  40  40
   RED/10  20  20  20  20  20  20  20  20
   -G/Y     1   0   5   0   0   0   0   0
   +GRN     2   0   6   0   0   0   0   0
(-) #-PH G/Y KILLS OVLP= (+) #-PH G STRT
A-UP B-DN C-LT D-RT E-ENTER F-PRIOR MENU
```

PROTECTED PHASES → 1

PERMISSIVE PHASES → 2

NOTE: THIS PROGRAMMING IS REQUIRED FOR SIGNAL HEADS 11 AND 51 SO THAT THE SOLID GREEN ARROWS TURN ON EXCLUSIVELY DURING PROTECTED GREEN PHASES 1 AND 5, AND THE FLASHING YELLOW ARROWS TURN ON EXCLUSIVELY DURING PERMITTED GREEN PHASES 2 & 6.

```
PPLT DEFINITION PROGRAMMING COMPLETE
PRESS 'F' TO RETURN TO UNIT DATA
```

SE-PAC2070 FYA Protected/Permissive Phases

Flashing Yellow Arrow designs utilizing three and four section heads to run protected/permitted sequences typically require overlaps to properly run the protected and the permitted movements. When using SE-PAC2070 software, the protected/permitted overlap phase relationship is programmed in a special overlap portion of the software shown to the left. The -G/Y entry defines the protected move and the +GRN entry defines the permissive move. Both of the phases must be in the same ring for the software to consider them valid entries.

When three section flashing yellow arrow signal heads are used to run permitted only movements, there is no protected phase. In spite of this, the protected phase that would normally be associated with the permissive must still be entered in the -G/Y field to make the signal head function correctly. This protected phase is turned "OFF" in the INIT & N.A RESPONSE programming.

SE-PAC2070 FYA 332 Base Mounted Cabinets – Protected/Permissive Phases

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11.12

INIT & N.A. RESP PROGRAMMING DETAIL

(program controller as shown below)

From Main Menu, press '3' (Phase Data)

```
SE-PAC PHASE DATA        PRESS # DESIRED

 1-VEHICLE TIMES         6-N.LOCK & MISC
 2-DENSITY TIMES         7-SPEC. SEQUENCE
 3-PEDEST. TIMES         8-SPEC. DETECTOR
 4-INIT & N.A. RESP      9-PHASE COPY
 5-V & P RECALLS         0-MISC PED OPTIONS

                                F-PRIOR MENU
```

Phases 1,5 NOT used!

```
PHASE.....1...2...3...4...5...6...7...8...9
 INITIAL   0   4   1   1   0   4   1   1   1   (A)
 NA RESP   0   1   0   2   0   1   0   0   0

CODES.......0....1....2....3....4....5
 INITIAL   NONE INACT RED  YEL  GRN  DRK
 NA RESP   NONE  NA1  NA2 BOTH  ---  ---
A-UP B-DN C-LT D-RT E-ENTER F-PRIOR MENU
```

INIT & N.A. RESP programming complete.

SE-PAC2070 FYA Init & N.A Response Programming

When using SE-PAC2070 software to implement a permitted only flashing yellow arrow movement using a three section signal head, care must be taken to ensure that the protected phase programmed in the PROTECTED AND PERMISSIVE PHASES FOR FYA is not an enabled phase in the Init & N.A. Resp Programming.

(A) INITIAL - Entering a "0" will turn the load switch outputs "OFF" for the selected phase. This is required for the protected phase that is programmed in the protected/permissive programming when using a three section flashing yellow arrow signal head that has no protected turn move.

SE–PAC2070 FYA 332 Base Mounted Cabinets – Init & N.A. Resp Programming

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SHEET 1 OF 1

OASIS 2070 TIMING CHART					
	PHASE				
FEATURE	1	2	3	4	6
Min Green 1 *	7	12	7	7	12
Extension 1 *	3.0	6.0	1.0	1.0	6.0
Max Green 1 *	40	90	25	25	90
Yellow Clearance	3.0	4.6	3.7	4.3	4.6
Red Clearance	2.1	1.6	2.7	2.7	1.6
Walk 1 *	-	-	-	-	7
Don't Walk 1	-	-	-	-	12
Walk Advance Time *	-	-	-	-	5
Seconds Per Actuation *	-	-	-	-	-
Max Variable Initial *	-	-	-	-	-
Time Before Reduction *	-	-	-	-	-
Time To Reduce *	-	-	-	-	-
Minimum Gap	-	-	-	-	-
Recall Mode	-	MIN RECALL	-	-	MIN RECALL
Vehicle Call Memory	-	YELLOW	-	-	YELLOW
Dual Entry	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

Ⓐ

ADVANCED WALK NOTE

Ⓑ

(program controller as shown below)

From Main Menu press '2' (Phase Control), then '1' (Phase Control Functions). Program phase 6 for 'Advanced Walk'. Make sure the Walk Advance Time shown on the Signal Design plans are programmed in the 'Phase Timing' menu.

TIMING CHART ASC/3-2070 CONTROLLER					
PHASE	02	04	05	06	08
MINIMUM GREEN *	12 SEC.	7 SEC.	7 SEC.	12 SEC.	7 SEC.
VEHICLE EXT. *	6.0 SEC.	2.0 SEC.	1.0 SEC.	6.0 SEC.	– SEC.
GUAR MIN OVL GREEN	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
YELLOW CHANGE INT.	4.7 SEC.	3.0 SEC.	3.0 SEC.	4.7 SEC.	3.0 SEC.
RED CLEARANCE	1.9 SEC.	3.2 SEC.	3.4 SEC.	1.9 SEC.	3.2 SEC.
MAX. 1 *	100 SEC.	60 SEC.	30 SEC.	100 SEC.	35 SEC.
RECALL POSITION	MIN. RECALL	NONE	NONE	MIN. RECALL	NONE
LOCK DET.	ON	OFF	OFF	ON	OFF
DELAYED GREEN	– SEC.	– SEC.	– SEC.	5 SEC.	– SEC.
WALK *	– SEC.	– SEC.	– SEC.	7 SEC.	– SEC.
PED. CLEAR	– SEC.	– SEC.	– SEC.	12 SEC.	– SEC.
VOLUME DENSITY	ON	OFF	OFF	ON	OFF
ACTUATION B4 ADD *	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MAX. INITIAL *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME B4 REDUCTION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME TO REDUCE *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MINIMUM GAP	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
DUAL ENTRY	OFF	ON	OFF	OFF	OFF
SIMULTANEOUS GAP	ON	ON	ON	ON	ON

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

Ⓒ

Leading Pedestrian Interval

Some signal designs call for a pedestrian movement that precedes its associated vehicle movement in the phase interval, i.e. the pedestrian move leads the phase interval in question. The controller will serve the pedestrian walk for a designated time while at the same time holding the associated vehicle move red, thus giving the pedestrian a "head start" into the crosswalk.

There are potential vehicle/pedestrian conflicts that may arise, depending on the exact signal design, that remove the "protection" the leading pedestrian interval is designed to offer a pedestrian. These conflicts are remedied in different ways depending on the exact configuration of the signal design and signal heads used, and the software being used in the controller.

Ⓐ Oasis Advanced Walk - Oasis software refers to the leading pedestrian interval as Advanced Walk. The absolute total pedestrian walk time is shown in the timing chart as the Walk 1 entry. The Walk Advance Time is the amount of walk time that will display on the ped head while its associated vehicle movement is being held in red. After the walk advance time has expired, the controller will display the remaining balance of Walk 1 on the ped head before timing the don't walk time. The Advance Walk Time should never be greater than Walk 1.

Ⓑ Oasis Advanced Walk Note - Include this note on the electrical detail for any design utilizing Oasis software that has leading pedestrian intervals.

Ⓒ ASC/3-2070 Delayed Green - ASC/3-2070 software refers to the leading pedestrian interval as Delayed Green. The absolute total pedestrian walk time is shown in the timing chart as the Walk entry. The Delayed Green time is the amount of walk time that will display on the ped head while its associated vehicle movement is being held in red. After the delayed green time has expired, the controller will display the remaining balance of Walk on the ped head before timing the ped clear time. The Delayed Green time should never be greater than Walk.

Leading Pedestrian Interval

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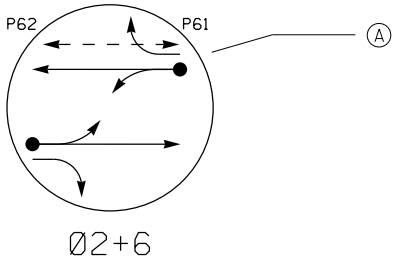
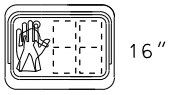
12.0
SHEET 1 OF 1





Leading Pedestrian Interval - No Startup Ped Call With Actuated Peds

Oasis software provides a phase control option that allows pedestrian movements to be called for service one time at controller startup even when no demand may exist. This applies to pedestrian moves that are push button actuated as opposed to those that may be programmed for ped recall. Specific programming instructions are found in the 'NOTES' section of the electrical detail and specify which phases should be served at startup, if any.

Pedestrian phases that have advanced walk time and are specified as the startup in green phases should NOT be programmed for startup ped calls. The reason for this is that when the controller is powered on and is coming out of flash, or if the controller is running in controller flash and is coming out of controller flash, a leading pedestrian interval on the startup phase will cause the startup phase to transition from a flashing yellow indication to a solid red indication as the leading ped interval is being timed. This transition from flashing yellow to solid red is in violation of the MUTCD and is avoided by not programming the pedestrian movement for a startup ped call.

NOTES

Ⓑ

5. Program phase 6 for Startup Ped Call.

DO NOT USE THIS NOTE FOR THIS APPLICATION!

OASIS 2070 TIMING CHART				
	PHASE			
FEATURE	2	4	6	8
Min Green 1 *	12	7	12	7
Extension 1 *	6.0	1.0	6.0	1.0
Max Green 1 *	90	25	90	25
Yellow Clearance	4.6	4.3	4.6	4.3
Red Clearance	1.6	2.7	1.6	2.7
Walk 1 *	-	-	7	-
Don't Walk 1	-	-	12	-
Walk Advance Time *	-	-	5	- Ⓒ
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MIN RECALL	-	MIN RECALL	-
Vehicle Call Memory	YELLOW	-	YELLOW	-
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

Ⓐ Phase diagram from the signal plan illustrating the pedestrian movement on one of the main street phases, phase 6 in this example.

Ⓑ One of the notes in the standard notes section specifies all of the phases that should be programmed for a ped call at controller startup. In order to prevent the MUTCD flash to right of way violation, this is where startup phases with ped movements that have leading pedestrian intervals should have no startup calls specified. If there is more than one pedestrian phase in use, only the phases causing a violation should be deleted from the note.

Ⓒ Oasis timing chart from the signal chart showing that the pedestrian phase should be programmed for advance walk.

2070 Oasis Leading Pedestrian Interval Exceptions – No Startup Ped Call

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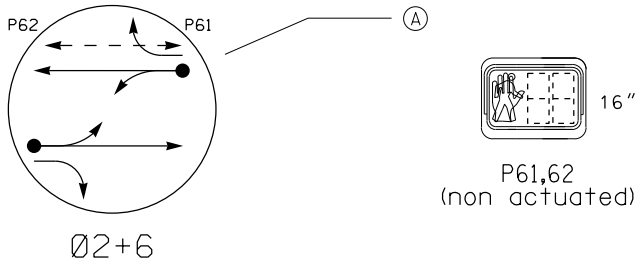
STD. NO.
12.1
SHEET 1 OF 1



Leading Pedestrian Interval - No Startup Ped Call With Pretimed Peds

Pretimed systems with non actuated ped movements are programmed to serve the pedestrian movement during every interval with a ped recall, and the ped movements are also served at startup. For startup ped phases with leading pedestrian intervals, the only way to omit the startup ped call is through a special phase override function and a series of logic processor statements.

Ⓐ Phase diagram from the signal plan illustrating the pedestrian movement on one of the main street phases, phase 6 in this example.

Ⓑ Oasis timing chart from the signal chart showing that the pedestrian phase should be programmed for advance walk and ped recall.

OASIS 2070 TIMING CHART				
	PHASE			
FEATURE	2	4	6	8
Min Green 1 *	12	7	12	7
Extension 1 *	6.0	1.0	6.0	1.0
Max Green 1 *	90	25	90	25
Yellow Clearance	4.6	4.3	4.6	4.3
Red Clearance	1.6	2.7	1.6	2.7
Walk 1 *	-	-	7	-
Don't Walk 1	-	-	12	-
Walk Advance Time *	-	-	5	- Ⓑ
Seconds Per Actuation *	-	-	-	-
Max Variable Initial *	-	-	-	-
Time Before Reduction *	-	-	-	-
Time To Reduce *	-	-	-	-
Minimum Gap	-	-	-	-
Recall Mode	MAX RECALL	-	MAX/PED RECALL	Ⓑ
Vehicle Call Memory	YELLOW	-	YELLOW	-
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

(continued on next page)

2070 Oasis Leading Pedestrian Interval Exceptions – No Startup Ped Call

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PROGRAMMING TO OMIT PHASE 6 PEDESTRIAN OPERATION AT "STARTUP" — Ⓒ

INPUT ASSIGNMENT PROGRAMMING DETAIL

(program controller as shown below)

1. FROM MAIN MENU PRESS '5' (INPUTS).
2. WITH CURSOR IN "INPUT ASSIGNMENT #" FIELD, USE "-" KEY TO FIND THE INPUT ASSIGNMENT NUMBER 64, AS SHOWN BELOW.
3. PROGRAM CONTROLLER AS SHOWN:

STEP 1

```
PAGE:1  C1 PIN: 0  NOT ENABLED
INPUT ASSIGNMENT #.................64
DEBOUNCE TIME (0-25.5 SEC).........0.5
DELAY TIME (0-25.5 SEC)............. 0.0
HOLD-OVER TIME (0-25.5 SEC).........0.0
ASSIGNMENT SELECTION:
NOT ENABLED.....................Y
VEHICLE DETECTOR (1-64).............
PEDESTRIAN DETECTOR (1-16).........
ALTERNATE PED DETECTOR (1-16).......
PREEMPT (1-10)......................
INVERTED PREEMPT (1-10).............
STOP TIME (Y/N).....................
FLASH SENSE (Y/N)...................
DOOR OPEN (Y/N).....................
MANUAL CONTROL ENABLE (Y/N).........
MANUAL CONTROL ADVANCE (Y/N)........
SPECIAL FUNCTION ALARM (1-8)........
TOD HOUR SYNCHRONIZATION (0-23).....
FORCE OFF RING (1-4)................
HOLD PHASES (1-16)..................
PLAN (65=FLSH,66=FREE)...  OFFSET#..
CHANGE PHASE SEQUENCE PAGE (1-12)...
CHANGE PHASE TIMING PAGE (1-4)......
CHANGE PHASE CONTROL PAGE (1-4).....
CHANGE OVERLAP CONTROL PAGE (1-4)...
CHANGE INPUT PAGE (1-4).............
CHANGE OUTPUT PAGE (1-4)............
OVERRIDE PHASE CONTROL FUNCTION (Y).Y
```

Ⓓ → EXISTING DEFAULT PROGRAMMING (IGNORE FOR NOW)

SCROLL DOWN TO VIEW ALL DATA ↓

SELECT "Y" FOR OVERRIDE PHASE CONTROL FUNCTION — Ⓔ

STEP 2 — Ⓔ

AFTER SELECTION IS MADE, THE PHASE CONTROL FUNCTIONS TABLE APPEARS. SCROLL DOWN ON THIS TABLE AND FIND "OMIT PEDESTRIAN". THEN SELECT PHASE 6 FOR "OMIT PEDESTRIAN".

AFTER SELECTION IS MADE PRESS "ESC". SCREEN NOW APPEARS AS SHOWN BELOW.

STEP 3

```
PAGE:1  C1 PIN: 0  OVERRIDE PHASE CONTRO
INPUT ASSIGNMENT #.................64
DEBOUNCE TIME (0-25.5 SEC).........0.5
DELAY TIME (0-25.5 SEC).............0.0
HOLD-OVER TIME (0-25.5 SEC).........0.0
ASSIGNMENT SELECTION:
NOT ENABLED.....................
VEHICLE DETECTOR (1-64).............
PEDESTRIAN DETECTOR (1-16).........
ALTERNATE PED DETECTOR (1-16).......
PREEMPT (1-10)......................
INVERTED PREEMPT (1-10).............
STOP TIME (Y/N).....................
FLASH SENSE (Y/N)...................
DOOR OPEN (Y/N).....................
MANUAL CONTROL ENABLE (Y/N).........
MANUAL CONTROL ADVANCE (Y/N)........
SPECIAL FUNCTION ALARM (1-8)........
TOD HOUR SYNCHRONIZATION (0-23).....
FORCE OFF RING (1-4)................
HOLD PHASES (1-16)..................
PLAN (65=FLSH,66=FREE)...  OFFSET#..
CHANGE PHASE SEQUENCE PAGE (1-12)...
CHANGE PHASE TIMING PAGE (1-4)......
CHANGE PHASE CONTROL PAGE (1-4).....
CHANGE OVERLAP CONTROL PAGE (1-4)...
CHANGE INPUT PAGE (1-4).............
CHANGE OUTPUT PAGE (1-4)............
OVERRIDE PHASE CONTROL FUNCTION (Y).Y
```

Ⓕ — Ⓕ

PROGRAMMING COMPLETE

Leading Pedestrian Interval - No Startup Ped Call With Pretimed Peds (cont.)

Ⓒ OMIT PHASE AT "STARTUP" Detail - The programming detail illustrates the steps required to override the ped 6 pedestrian movement at controller startup.

Ⓓ Input Assignment - This is any controller input that is not in use that can be assigned as a 'phase override' that will be used by the logic processor to omit the ped 6 movement at controller startup.

Ⓔ OVERRIDE PHASE CONTROL FUNCTION - When this selection is made, the phase control screen will appear. The diagram below represents a portion of that screen where the 'OMIT PEDESTRIAN' entry is made for the desired phase.

```
 PHASE CONTROL SET: PAGE1 (NEXT: PAGES)
PHASE#            |123456789101112131415 16
PERMITTED         | X X X X
.                 |
.                 |
.                 |
VARIABLE INITIAL  |
GAP REDUCTION     |
OMIT PEDESTRIAN   |     X
TIME WALK 2       |
TIME FDWALK 2     |
.                 |
.                 |
.                 |
```

Ⓕ After the omit pedestrian programming phase has been entered, the programming may be verified by observing that the input function displays "OVERRIDE PHASE CONTROL" and that the "OVERRIDE PHASE CONTROL FUNCTION" has a 'Y' entered.

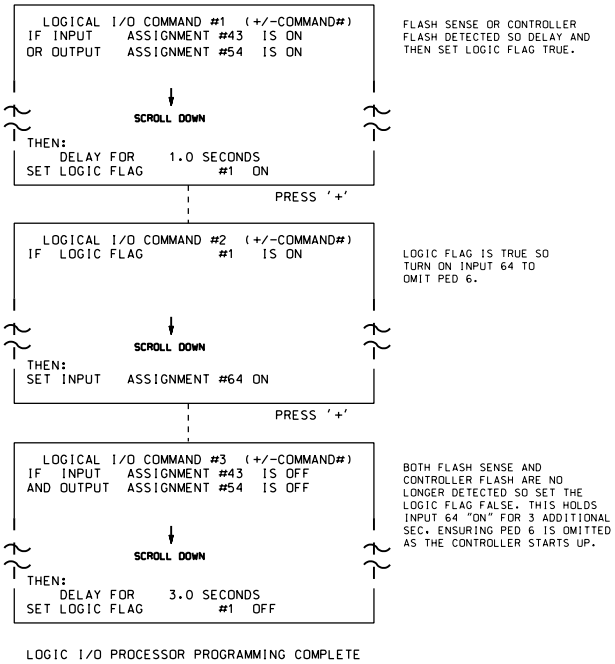
(continued on next page)

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO OMIT PED 6 AT STARTUP Ⓖ

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, AND 3.

2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

OUTPUT REFERENCE SCHEDULE

USE TO INTERPRET LOGIC PROCESSOR

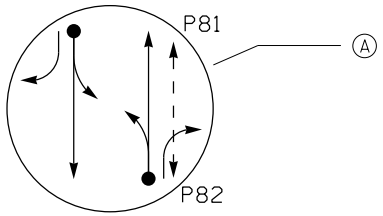
OUTPUT 54 = Controller Flash
INPUT 43 = Flash Sense
INPUT 64 = Omit Ped 6

Note: See sheet x for Input 64 Input Assignment details.

Leading Pedestrian Interval - No Startup Ped Call With Pretimed Peds (cont.)

Ⓖ In order to implement the phase control override that was programmed to omit the pedestrian movement at startup, a series of logic processor steps must be programmed. The controller will check to see if flash sense is "ON" (cabinet flash) or controller flash is "ON", and if so the controller will turn input 64 "ON" so that the desired pedestrian movement will be omitted when the controller comes out of flash and starts running. A delay is built in to hold input 64 "ON" for three seconds after the controller starts to prevent the controller from possibly skipping the ped omit due to a controller internal race condition.

2070 Oasis Leading Pedestrian Interval Exceptions – No Startup Ped Call



Ø4+8

P81,82
(actuated)

OASIS 2070 TIMING CHART				
	PHASE			
FEATURE	2	4	6	8
Min Green 1 *	12	7	12	7
Extension 1 *	6.0	1.0	6.0	1.0
Max Green 1 *	90	25	90	25
Yellow Clearance	4.6	4.3	4.6	4.3
Red Clearance	1.6	2.7	1.6	2.7
Walk 1 *	-	7	-	7
Don't Walk 1	-	12	-	12
Walk Advance Time *	-	5	-	5
Seconds Per Actuation *	1.5	-	1.5	-
Max Variable Initial *	34	-	34	-
Time Before Reduction *	15	-	15	-
Time To Reduce *	45	-	45	-
Minimum Gap	3.0	-	3.0	-
Recall Mode	MIN RECALL	-	MIN RECALL	-
Vehicle Call Memory	YELLOW	-	YELLOW	-
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

Ⓑ Ⓒ

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

PEDESTRIAN DETECTOR ASSIGNMENT PROGRAMMING DETAIL — Ⓓ

(program controller as shown below)

FROM MAIN MENU PRESS '7' (DETECTORS), THEN '2' (PEDESTRIAN DETECTOR ASSIGNMENTS). PRESS '+' UNTIL PED DETECTOR # 8 IS REACHED.

Ⓓ

```
PED DETECTOR #8  SETTINGS    (+/- DET)
PHASE#          :123456789101112131415 16
PHASES ASSIGNED :    X    X
SETTING:                          (Y/N)
ENABLE DETECTOR.....................Y
ENABLE LOGGING......................N
ENABLE DIAGNOSTICS..................N
RECALL IF FAILED....................N
MAX CALLS/MINUTE (0-255)............255
MAX CALLS/DIAG PERIOD (0-255).......0
MAX OCCUPANCY % (0-100%)............100
```

Leading Pedestrian Interval - Opposing Dummy Ped Phase

When an adjacent through vehicle movement is being held red during a leading ped interval, care must be taken to ensure that no other vehicle movement could encroach upon a pedestrian in the crosswalk. In the phase diagram shown to the left, phase 8 vehicles will be held in red during the advanced walk period but a phase 4 vehicle would not be held in red. This means a phase 4 vehicle could potentially make a permitted left turn into the crosswalk during the advanced walk period.

The remedy for this situation is to create a dummy ped movement for phase 4. All phase 4 ped times will be identical to those of phase 8, including the walk advance time. There will be no actual ped signal heads for phase 4. The ped push buttons for ped 8 will have to be programmed to call ped 4 and ped 8 when pressed. What this does is hold vehicle phase 4 red for the same walk advance time as phase 8 giving the pedestrian a leading ped interval without the possibility of vehicle interference. The vehicle phase 4 heads will turn green at the end of the walk advance time just like the phase 8 vehicle heads.

Ⓐ Phase diagram from the signal plan illustrating the pedestrian movement on phase 8 on the side street, and the opposing vehicle move phase 4 with a permitted left turn and no ped movement.

Ⓑ Oasis timing chart from the signal chart showing that the pedestrian phase should be programmed for advance walk.

Ⓒ Dummy ped times assigned to phase 4, identical to those for phase 8.

Ⓓ Pedestrian Detector Assignment Programming Detail - This programming screen assigns the specific ped phases that will be called by the ped detector buttons. For ped detector 8, be sure to include ped phase 4 to run the dummy ped phase.

2070 Oasis Leading Pedestrian Interval Exceptions – Opposing Dummy Ped Phase

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TRANSPORTATION MOBILITY AND SAFETY DIVISION
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OASIS 2070 TIMING CHART				
	PHASE			
FEATURE	2	4	6	8
Min Green 1 *	12	7	12	7
Extension 1 *	6.0	1.0	6.0	1.0
Max Green 1 *	90	25	90	25
Yellow Clearance	4.6	4.3	4.6	4.3
Red Clearance	1.6	2.7	1.6	2.7
Walk 1 *	-	7	-	7
Don't Walk 1	-	12	-	12
Walk Advance Time *	-	5	-	5
Seconds Per Actuation *	1.5	-	1.5	-
Max Variable Initial *	34	-	34	-
Time Before Reduction *	15	-	15	-
Time To Reduce *	45	-	45	-
Minimum Gap	3.0	-	3.0	-
Recall Mode	MIN RECALL	-	MIN RECALL	-
Vehicle Call Memory	YELLOW	-	YELLOW	-
Dual Entry	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON

Ⓐ

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

PEDESTRIAN DETECTOR ASSIGNMENT PROGRAMMING DETAIL — Ⓑ

(program controller as shown below)

FROM MAIN MENU PRESS '7' (DETECTORS). THEN '2' (PEDESTRIAN DETECTOR ASSIGNMENTS). PRESS '+' UNTIL PED DETECTOR # 4 IS REACHED.

```
PHASE#            ¦123456789101112131415 16
PHASES ASSIGNED   ¦   X   X
SETTING:                          (Y/N)
ENABLE DETECTOR.....................Y
ENABLE LOGGING......................N
ENABLE DIAGNOSTICS..................N
RECALL IF FAILED....................N
MAX CALLS/MINUTE (0-255).............255
MAX CALLS/DIAG PERIOD (0-255).......0
MAX OCCUPANCY % (0-100%).............100
```

PEDESTRIAN DETECTOR ASSIGNMENT PROGRAMMING DETAIL — Ⓑ

(program controller as shown below)

FROM MAIN MENU PRESS '7' (DETECTORS). THEN '2' (PEDESTRIAN DETECTOR ASSIGNMENTS). PRESS '+' UNTIL PED DETECTOR # 8 IS REACHED.

```
PHASE#            ¦123456789101112131415 16
PHASES ASSIGNED   ¦   X   X
SETTING:                          (Y/N)
ENABLE DETECTOR.....................Y
ENABLE LOGGING......................N
ENABLE DIAGNOSTICS..................N
RECALL IF FAILED....................N
MAX CALLS/MINUTE (0-255).............255
MAX CALLS/DIAG PERIOD (0-255).......0
MAX OCCUPANCY % (0-100%).............100
```

Leading Pedestrian Interval - Opposing Ped Phase

When an adjacent through vehicle movement is being held red during a leading ped interval, care must be taken to ensure that no other vehicle movement could encroach upon a pedestrian in the crosswalk. In the phase diagram shown below, if one ped move is being served but the other is not, vehicles with the advance walk will be held in red for the advance walk period. The opposing vehicle move, however, would be free to make a permitted left turn and possibly encroach upon a pedestrian during the leading ped interval.

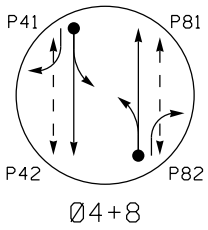
The remedy for this situation is to program the ped buttons to call their respective phases and to also call the opposing ped phase. The result is that both vehicle moves will be held in red during the advance walk time whenever a ped call is placed even if the ped call is not on the same approach as the vehicle move.

Ⓐ Oasis timing chart from the signal plan showing that the pedestrian phases should be programmed for advance walk.

Ⓑ Pedestrian Detector Assignment Programming Detail - This programming screen assigns the specific ped phases that will be called by the ped detector buttons. Each ped detector is programmed to call its own ped phase as well as the opposing ped phase.

Ⓒ Phase diagram from the signal plan illustrating the pedestrian movements on phases 4 and 8 on the side street, and the opposing vehicle moves that each have a through move and a permitted left turn move.

Ⓐ



Ø4+8

P41,42
(actuated)

P81,82
(actuated)

2070 Oasis Leading Pedestrian Interval Exceptions – Opposing Ped Phases

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STD. NO.
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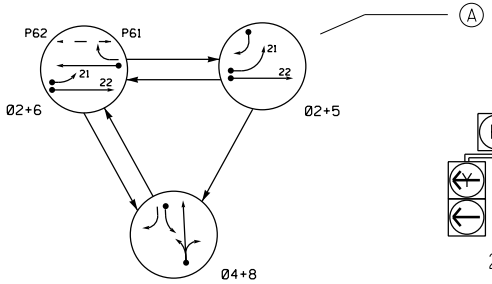
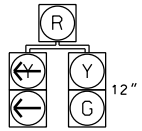
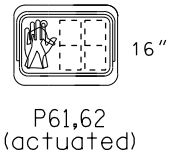
SHEET 2 OF 2







OASIS 2070 TIMING CHART					
	PHASE				
FEATURE	2	4	5	6	8
Min Green 1 *	12	7	7	12	7
Extension 1 *	6.0	1.0	1.0	6.0	1.0
Max Green 1 *	90	25	25	90	25
Yellow Clearance	4.6	4.3	4.3	4.6	4.3
Red Clearance	1.6	2.7	2.7	1.6	2.7
Walk 1 *	7	-	-	7	-
Don't Walk 1	12	-	-	12	-
Walk Advance Time *	5	-	-	5	-
Seconds Per Actuation *	1.5	-	-	1.5	-
Max Variable Initial *	34	-	-	34	-
Time Before Reduction *	15	-	-	15	-
Time To Reduce *	45	-	-	45	-
Minimum Gap	3.0	-	-	3.0	-
Recall Mode	MIN RECALL	-	-	MIN RECALL	-
Vehicle Call Memory	YELLOW	-	-	YELLOW	-
Dual Entry	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON

B

C

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

BACKUP PROTECTION NOTE

D

(program controller as shown below)

From Main Menu press '2' (Phase Control), then '1' (Phase Control Functions). Program phase 2 for 'Backup Protect'. Make sure the Red Revert times shown on the Signal Design Plans are programmed in the 'Phase Timing' menu.

Leading Pedestrian Interval - Five Section Heads

When an adjacent through vehicle movement is being held red during a leading ped interval, care must be taken to ensure that no other vehicle movement could encroach upon a pedestrian in the crosswalk. In the phase diagram shown to the left, phase 6 vehicles will be held in red during the advanced walk period but a phase 2 vehicle would not be held in red. This means a phase 2 vehicle could potentially make a permitted left turn into the crosswalk during the advance walk period.

The remedy for this situation is to create a dummy ped movement for phase 2. All phase 2 ped times will be identical to those of phase 6, including the walk advance time. There will be no actual ped signal heads for phase 2. Logic is used to place a call to ped 2 when there is a call on ped 6.

In this phasing arrangement, phase 5 must always lag and all red backup protect for phase 2 must be programmed. This ensures that the leading pedestrian interval will run correctly.

Ⓐ Phase diagram from the signal plan illustrating the pedestrian movement on phase 6 on the main street, and the opposing vehicle move phase 2 with five section protected and permitted left turn head and no pedestrian movement.

Ⓑ Oasis timing chart from the signal chart showing that the pedestrian phase should be programmed for advance walk.

Ⓒ Dummy ped times assigned to phase 2, identical to those for phase 6.

Ⓓ Backup Protection Note - Make sure this note is on the electrical detail when five section heads are used in this type of leading pedestrian interval application.

(continued on next page)

2070 Oasis Leading Pedestrian Interval Exceptions – Five Section Heads

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TRANSPORTATION MOBILITY AND SAFETY DIVISION
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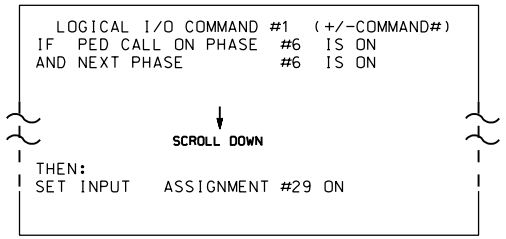
STD. NO.
12.4

LOGICAL I/O PROCESSOR PROGRAMMING TO CALL PHASE 2 DUMMY PED WHEN PHASE 6 PED IS CALLED — Ⓔ

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMAND 1.

2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



NOTE: IF EXISTING CALL ON PHASE 6 PED THEN CALL PHASE 2 PED.

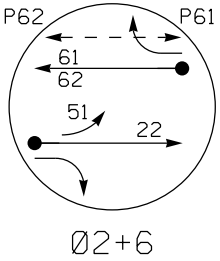
LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

OUTPUT REFERENCE SCHEDULE

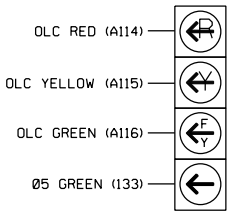
INPUT 29 = Phase 2 PED Call

Leading Pedestrian Interval - Five Section Heads

Ⓔ Logic processor programming to call the phase 2 dummy ped. This logic ensures the dummy ped call on phase 2 is served at the appropriate time. Without this logic, the dummy ped call on phase 2 could be served before the ped call on phase 6.



Ⓐ



Ⓑ

P61,62
(actuated)

LOGICAL I/O PROCESSOR PROGRAMMING FOR FYA SUPPRESSION DURING THE ADVANCE WALK PERIOD

Ⓒ

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMAND 1.
2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).

```
LOGICAL I/O COMMAND #1   (+/-COMMAND#)
IF  OUTPUT ASSIGNMENT  #26  IS ON
AND OUTPUT ASSIGNMENT  #29  IS OFF
                                        <- LOGIC STATEMENT FOR ADVANCE WALK WITH FYA's. TURN FYA HEAD 51 OFF DURING PED 6 ADVANCE WALK.
          SCROLL DOWN
THEN:
SET OUTPUT  ASSIGNMENT #44 OFF
SET OUTPUT  ASSIGNMENT #43 OFF
SET OUTPUT  ASSIGNMENT #42 ON
```

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

OUTPUT REFERENCE SCHEDULE

OUTPUT 26 = 6 PED Walk
OUTPUT 29 = Vehicle 6 Green
OUTPUT 42 = Overlap C Red
OUTPUT 43 = Overlap C Yellow
OUTPUT 44 = Overlap C Green

Leading Pedestrian Interval - Flashing Yellow Arrows

When an adjacent through vehicle movement is being held red during a leading ped interval, care must be taken to ensure that no other vehicle movement could encroach upon a pedestrian in the crosswalk. When flashing yellow arrows are being used for the vehicle approach that opposes the ped move, care must be taken to suppress the flashing yellow arrow output, which is the permitted movement, during the leading ped interval. The logic processor is used to accomplish this as shown on this sheet. The same logic is applied to main street and side street three section permitted only flashing yellow arrows. The phase diagram shown to the left is used for the explanation.

Ⓐ Phase diagram from a signal plan illustrating the pedestrian movement on phase 6 on the main street, and the opposing vehicle move phase 2 with no ped and a protected/permitted left turn via the flashing yellow arrow. Note that the ped 6 movement can be omitted at startup by omitting it as a startup ped call, thus avoiding the MUTCD startup violation.

Ⓑ Signal head 51 is a protected and permitted flashing yellow arrow that has overlap parent phases of 5+6 (phase 6 is the opposing through move).

Ⓒ To suppress the signal head 51 flashing yellow arrow during the leading pedestrian interval, the logic processor is required. When ped 6 is timing the advanced walk, the phase 6 vehicle move is held red. When the logic processor sees that the ped 6 movement is "ON" and the phase 6 vehicle move is "OFF", it prevents the flashing yellow arrow from turning on by holding the overlap red (head 51) while at the same time allowing the phase 2 through movement (head 22) to be served. After the walk advance time has expired, the logic statement is no longer TRUE and the phase 6 vehicle movement will turn "ON", at which time the flashing yellow arrow signal face will also turn "ON" and begin to flash.

This logic is used whenever a flashing yellow signal head opposes a pedestrian movement that has a leading pedestrian interval whether it happens to be a three section permitted only or a four section protected and permitted head.

2070 Oasis Leading Pedestrian Interval Exceptions – Flashing Yellow Arrows

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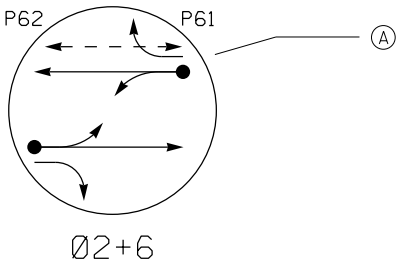

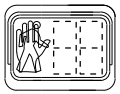

Leading Pedestrian Interval - Startup in Green With Actuated Peds

ASC/3-2070 software provides a startup option that allows the controller to start the specified phases in Green, or to start the specified phases in Walk if they have ped movements. Specific programming instructions regarding startup are found in the 'NOTES' section of the electrical detail.

To eliminate a potential MUTCD violation at controller startup, any startup phase with a ped movement that also has a delayed green time (the leading pedestrian interval) should be programmed to start in Green and not in Walk. This ensures the leading pedestrian interval will not be served at startup.

NOTES

5. Program controller to start up in phase 2 Green and 6 Green.

NOTE THAT PHASE 6 DOES NOT START IN WALK!

TIMING CHART
ASC/3-2070 CONTROLLER

PHASE	Ø2	Ø4	Ø5	Ø6	Ø8
MINIMUM GREEN *	12 SEC.	7 SEC.	7 SEC.	12 SEC.	7 SEC.
VEHICLE EXT. *	6.0 SEC.	2.0 SEC.	1.0 SEC.	6.0 SEC.	– SEC.
GUAR MIN OVL GREEN	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
YELLOW CHANGE INT.	4.7 SEC.	3.0 SEC.	3.0 SEC.	4.7 SEC.	3.0 SEC.
RED CLEARANCE	1.9 SEC.	3.2 SEC.	3.4 SEC.	1.9 SEC.	3.2 SEC.
MAX. 1 *	100 SEC.	60 SEC.	30 SEC.	100 SEC.	35 SEC.
RECALL POSITION	MIN. RECALL	NONE	NONE	MIN. RECALL	NONE
LOCK DET.	ON	OFF	OFF	ON	OFF
DELAYED GREEN	– SEC.	– SEC.	– SEC.	5 SEC.	– SEC.
WALK *	– SEC.	– SEC.	– SEC.	7 SEC.	– SEC.
PED. CLEAR	– SEC.	– SEC.	– SEC.	12 SEC.	– SEC.
VOLUME DENSITY	ON	OFF	OFF	ON	OFF
ACTUATION B4 ADD *	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MAX. INITIAL *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME B4 REDUCTION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME TO REDUCE *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MINIMUM GAP	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
DUAL ENTRY	OFF	ON	OFF	OFF	OFF
SIMULTANEOUS GAP	ON	ON	ON	ON	ON

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

Ⓐ Phase diagram from the signal plan illustrating the pedestrian movement on one of the main street phases, phase 6 in this example.

Ⓑ One of the notes in the standard notes section specifies how the startup phases should be programmed. In order to prevent the MUTCD flash to right of way violation, this is where startup phases with ped movements that have leading pedestrian intervals should be programmed to start in Green and not in Walk. If there is more than one pedestrian phase in use, only the phases causing violation should be specified to start in Green. Do this for both actuated and pretimed locations.

Ⓒ ASC/3-2070 timing chart from the signal chart showing that the phase 6 should be programmed for delayed green.

ASC/3–2070 Leading Pedestrian Interval Exceptions – Startup in Green

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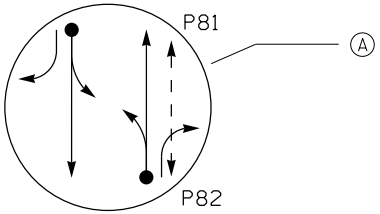
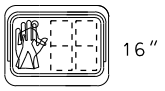
STD. NO.
12.6
SHEET 1 OF 1



Ø4+8



P81,82
(actuated)

TIMING CHART
ASC/3-2070 CONTROLLER

PHASE	Ø2	Ø4	Ø5	Ø6	Ø8
MINIMUM GREEN *	12 SEC.	7 SEC.	7 SEC.	12 SEC.	7 SEC.
VEHICLE EXT. *	6.0 SEC.	2.0 SEC.	1.0 SEC.	6.0 SEC.	– SEC.
GUAR MIN OVL GREEN	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
YELLOW CHANGE INT.	4.7 SEC.	3.0 SEC.	3.0 SEC.	4.7 SEC.	3.0 SEC.
RED CLEARANCE	1.9 SEC.	3.2 SEC.	3.4 SEC.	1.9 SEC.	3.2 SEC.
MAX. 1 *	100 SEC.	60 SEC.	30 SEC.	100 SEC.	35 SEC.
RECALL POSITION	MIN. RECALL	NONE	NONE	MIN. RECALL	NONE
LOCK DET.	ON	OFF	OFF	ON	OFF
DELAYED GREEN	– SEC.	5 SEC.	– SEC.	– SEC.	5 SEC.
WALK *	– SEC.	7 SEC.	– SEC.	– SEC.	7 SEC.
PED. CLEAR	– SEC.	12 SEC.	– SEC.	– SEC.	12 SEC.
VOLUME DENSITY	ON	OFF	OFF	ON	OFF
ACTUATION B4 ADD *	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MAX. INITIAL *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME B4 REDUCTION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME TO REDUCE *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MINIMUM GAP	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
DUAL ENTRY	OFF	ON	OFF	OFF	OFF
SIMULTANEOUS GAP	ON	ON	ON	ON	ON

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

Ⓑ

Ⓒ

ECONOLITE ASC/3-2070 PED 8 PROGRAMMING ASSIGNMENT DETAIL

Ⓓ

(program controller as shown)

1. From Main Menu select [6. DETECTORS]
2. From DETECTOR Submenu select [3. PED DETECTOR INPUT ASSIGNMENT]

```
PED DET PHASE ASSIGNMENT MODE:  NTCIP

   PHASE  1  2  3  4  5  6  7  8
DETECTOR  0  2  0  8  0  6  0  8   <- NOTICE PED DETECTOR 8
                                      ASSIGNED TO PHASES 4 & 8
   PHASE  9 10 11 12 13 14 15 16
DETECTOR  0  0  0  0  0  0  0  0
```

Ⓓ

Leading Pedestrian Interval - Opposing Dummy Ped Phase

When an adjacent through vehicle movement is being held red during a leading ped interval, care must be taken to ensure that no other vehicle movement could encroach upon a pedestrian in the crosswalk. In the phase diagram shown to the left, phase 8 vehicles will be held in red during the delayed green period but a phase 4 vehicle would not be held in red. This means a phase 4 vehicle could potentially make a permitted left turn into the crosswalk during the delayed green period.

The remedy for this situation is to create a dummy ped movement for phase 4. All phase 4 ped times will be identical to those of phase 8, including the delayed green time. There will be no actual ped signal heads for phase 4. The ped push buttons for ped 8 will have to be programmed to call ped 4 and ped 8 when pressed. What this does is hold vehicle phase 4 red for the same delayed green time as phase 8 giving the pedestrian a leading ped interval without the possibility of vehicle interference. The vehicle phase 4 heads will turn green at the end of the delayed green time just like the phase 8 vehicle heads.

Ⓐ Phase diagram from the signal plan illustrating the pedestrian movement on phase 8 on the side street, and the opposing vehicle move phase 4 with a permitted left turn and no ped movement.

Ⓑ ASC/3-2070 timing chart from the signal chart showing that the pedestrian phase should be programmed for delayed green.

Ⓒ Dummy ped times assigned to phase 4, identical to those for phase 8.

Ⓓ Pedestrian Detector Assignment Programming Detail - This programming screen assigns the specific ped phases that will be called by the ped detector buttons. For ped detector 8, be sure to include ped phase 4 to run the dummy ped phases.

ASC/3–2070 Leading Pedestrian Interval Exceptions – Opposing Dummy Ped Phase

SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

10-18

STD. NO. 12.7

TIMING CHART
ASC/3-2070 CONTROLLER

PHASE	02	04	05	06	08
MINIMUM GREEN *	12 SEC.	7 SEC.	7 SEC.	12 SEC.	7 SEC.
VEHICLE EXT. *	6.0 SEC.	2.0 SEC.	1.0 SEC.	6.0 SEC.	– SEC.
GUAR MIN OVL GREEN	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
YELLOW CHANGE INT.	4.7 SEC.	3.0 SEC.	3.0 SEC.	4.7 SEC.	3.0 SEC.
RED CLEARANCE	1.9 SEC.	3.2 SEC.	3.4 SEC.	1.9 SEC.	3.2 SEC.
MAX. 1 *	100 SEC.	60 SEC.	30 SEC.	100 SEC.	35 SEC.
RECALL POSITION	MIN. RECALL	NONE	NONE	MIN. RECALL	NONE
LOCK DET.	ON	OFF	OFF	ON	OFF
DELAYED GREEN	– SEC.	5 SEC.	– SEC.	– SEC.	5 SEC.
WALK *	– SEC.	7 SEC.	– SEC.	– SEC.	7 SEC.
PED. CLEAR	– SEC.	12 SEC.	– SEC.	– SEC.	12 SEC.
VOLUME DENSITY	ON	OFF	OFF	ON	OFF
ACTUATION B4 ADD *	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MAX. INITIAL *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME B4 REDUCTION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME TO REDUCE *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MINIMUM GAP	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
DUAL ENTRY	OFF	ON	OFF	OFF	OFF
SIMULTANEOUS GAP	ON	ON	ON	ON	ON

Ⓐ

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

ECONOLITE ASC/3-2070 PEDESTRIAN DETECTOR PHASE ASSIGNMENT PROGRAMMING DETAIL

Ⓑ

(program controller as shown)

1. From Main Menu select [6. DETECTORS]
2. From DETECTOR Submenu select [3. PED DETECTOR INPUT ASSIGNMENT]
3. Press the TOGGLE key to select [ECONOLITE MODE] and press ENTER.

```
PED DET PHASE ASSIGNMENT MODE:ECONOLITEv
PHASE  1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
  D  1 X . . . . . . . . . . . . . . .
  E  2 . X . . . . . . . . . . . . . .
  T  3 . . X . . . . . . . . . . . . .
  E  4 . . . X . . . X . . . . . . . .
  C  5 . . . . X . . . . . . . . . . .
  T  6 . . . . . X . . . . . . . . . .
  O  7 . . . . . . X . . . . . . . . .
  R  8 . . . X . . . X . . . . . . . .
     9 . . . . . . . . X . . . . . . .
    10 . . . . . . . . . X . . . . . .
    11 . . . . . . . . . . X . . . . .
    12 . . . . . . . . . . . X . . . .
    13 . . . . . . . . . . . . X . . .
    14 . . . . . . . . . . . . . X . .
    15 . . . . . . . . . . . . . . X .
    16 . . . . . . . . . . . . . . . X
```

"." = No assignment, disabled
X = Assigns Pedestrian Push Button (PPB) to call the phase or phases
2 = Call for Ped timing 2
B = Allows for the PPB to call for Min Green 2 (BIKE GREEN)

Leading Pedestrian Interval - Opposing Ped Phases

When an adjacent through vehicle movement is being held red during a leading ped interval, care must be taken to ensure that no other vehicle movement could encroach upon a pedestrian in the crosswalk. In the phase diagram shown below, if one ped move is being served but the other is not, vehicles with the delayed green will be held in red for the delayed green period. The opposing vehicle move, however, would be free to make a permitted left turn and possibly encroach upon a pedestrian during the leading ped interval.

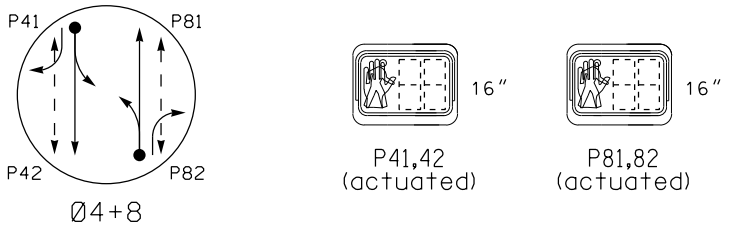
The remedy for this situation is to program the ped buttons to call their respective phases and to also call the opposing ped phase. The result is that both vehicle moves will be held in red during the delayed green whenever a ped call is placed even if the ped call is not on the same approach as the vehicle move.

Ⓐ ASC/3-2070 timing chart from the signal plan showing that the pedestrian phase should be programmed for delayed green.

Ⓑ Pedestrian Detector Assignment Programming Detail - This programming screen assigns the specific ped phases that will be called by the ped detector buttons. Each ped detector is programmed to call its own ped phase as well as the opposing ped phase.

Ⓒ Phase diagram from the signal plan illustrating the pedestrian movements on phases 4 and 8 on the side street, and the opposing vehicle moves that each have a through move and a permitted left turn move.

Ⓒ

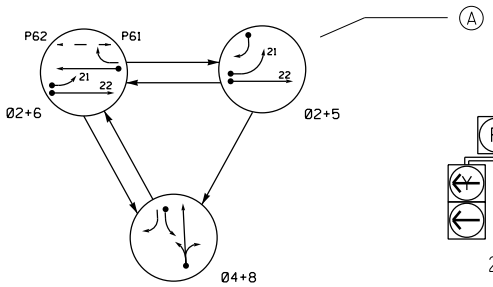


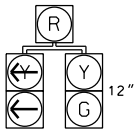
ASC/3–2070 Leading Pedestrian Interval Exceptions – Opposing Ped Phases

SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

10-18

STD. NO.
12.7
SHEET 2 OF 2





21

P61,62
(actuated)

Leading Pedestrian Interval - Five Section Heads

When an adjacent through vehicle movement is being held red during a leading ped interval, care must be taken to ensure that no other vehicle movement could encroach upon a pedestrian in the crosswalk. In the phase diagram shown to the left, phase 6 vehicles will be held in red during the delayed green period but a phase 2 vehicle would not be held in red. This means a phase 2 vehicle could potentially make a permitted left turn into the crosswalk during the delayed green period.

The remedy for this situation is to create a dummy ped movement for phase 2. All phase 2 ped times will be identical to those of phase 6, including the delayed green time. There will be no actual ped signal heads for phase 2. Logic is used to place a call to ped 2 when there is a call on ped 6.

In this phasing arrangement, phase 5 must always lag and all red backup protect for phase 2 must be programmed. This ensures that the leading pedestrian interval will run correctly.

TIMING CHART
ASC/3-2070 CONTROLLER

PHASE	02	04	05	06	08
MINIMUM GREEN *	12 SEC.	7 SEC.	7 SEC.	12 SEC.	7 SEC.
VEHICLE EXT. *	6.0 SEC.	2.0 SEC.	1.0 SEC.	6.0 SEC.	– SEC.
GUAR MIN OVL GREEN	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
YELLOW CHANGE INT.	4.7 SEC.	3.0 SEC.	3.0 SEC.	4.7 SEC.	3.0 SEC.
RED CLEARANCE	1.9 SEC.	3.2 SEC.	3.4 SEC.	1.9 SEC.	3.2 SEC.
MAX. 1 *	100 SEC.	60 SEC.	30 SEC.	100 SEC.	35 SEC.
RECALL POSITION	MIN. RECALL	NONE	NONE	MIN. RECALL	NONE
LOCK DET.	ON	OFF	OFF	ON	OFF
DELAYED GREEN	5 SEC.	– SEC.	– SEC.	5 ~~SEC.~~	– ~~SEC.~~
WALK *	7 ~~SEC.~~	– ~~SEC.~~	– ~~SEC.~~	7 ~~SEC.~~	– ~~SEC.~~
PED. CLEAR	12 SEC.	– SEC.	– SEC.	12 SEC.	– SEC.
VOLUME DENSITY	ON	OFF	OFF	ON	OFF
ACTUATION B4 ADD *	– VEH.	– VEH.	– VEH.	– VEH.	– VEH.
SEC. PER ACTUATION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MAX. INITIAL *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME B4 REDUCTION *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
TIME TO REDUCE *	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
MINIMUM GAP	– SEC.	– SEC.	– SEC.	– SEC.	– SEC.
DUAL ENTRY	OFF	ON	OFF	OFF	OFF
SIMULTANEOUS GAP	ON	ON	ON	ON	ON

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

Ⓐ Phase diagram from the signal plan illustrating the pedestrian movement on phase 6 on the main street, and the opposing vehicle move phase 2 with five section protected and permitted left turn head and no pedestrian movement.

Ⓑ ASC/3-2070 timing chart from the signal chart showing that the pedestrian phase should be programmed for advance walk.

Ⓒ Dummy ped times assigned to phase 2, identical to those for phase 6.

(continued on next page)

ASC/3–2070 Leading Pedestrian Interval Exceptions – Five Section Heads

SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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STD. NO.
12.8

ECONOLITE ASC/3-2070 BACKUP PROTECTION ENABLE PROGRAMMING — Ⓓ

(program controller as shown)

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [1. CONTROLLER SEQ]
3. From CONTROLLER SEQUENCE Submenu select [3. BACKUP PREVENT PHASES]

Follow programming as shown below. On the 'ENABLE BACKUP PREVENT' screen move cursor to the appropriate field and press 'YES/NO' on the controller keypad to toggle field value between 'X', 'B', 'C' and 'OFF'.

```
ENABLE BACKUP PREVENT
TMG/BKUP 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
       1   . . . . . . . . . . . . . . . .
       2 .   . . . . . . . . . . . . . . .
       3 . .   . . . . . . . . . . . . . .
       4 . . .   . . . . . . . . . . . . .
       5 . . . .   B . . . . . . . . . . .
       6 . . . . .   . . . . . . . . . . .
       7 . . . . . .   . . . . . . . . . .
       8 . . . . . . .   . . . . . . . . .
       9 . . . . . . . .   . . . . . . . .
      10 . . . . . . . . .   . . . . . . .
      11 . . . . . . . . . .   . . . . . .
      12 . . . . . . . . . . .   . . . . .
      13 . . . . . . . . . . . .   . . . .
      14 . . . . . . . . . . . . .   . . .
      15 . . . . . . . . . . . . . .   . .
      16 . . . . . . . . . . . . . . .   .
```

END PROGRAMMING

ECONOLITE ASC/3-2070 LOGIC PROCESSOR PROGRAMMING TO CALL PHASE 2 DUMMY PED WHEN PHASE 6 PED IS CALLED — Ⓔ

(program controller as shown)

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From LOGIC PROCESSOR Submenu select [2. LOGIC STATEMENTS]

ENTER A "1" IN THE LP# FIELD. PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   1  COPY FROM:   1  ACTIVE:  M   (T/F)
IF    VEH RED ON PHASE      5   IS  ON
AND   CTR PHASE TIMING      5   IS  ON
OR    CTR PH NEXT ON PHS    6   IS  ON
AND   CTR PED CALL ON PH    6   IS  ON

THEN  DET SET PED           2       ON
ELSE
```

NOTE: IF CONTROLLER IS IN 2+5 GOING TO 2+6, OR IN 4+8 GOING TO 2+6, AND A PED CALL EXISTS ON PHASE 6, PUT DUMMY PED CALL ON PHASE 2.

END PROGRAMMING

Leading Pedestrian Interval - Five Section Heads

Ⓓ Backup Protection Note - This programming will ensure that the controller will not progress from 2+5 to 2+6 without first going to all red.

Ⓔ Logic processor programming to call the phase 2 dummy ped. This logic ensures the dummy ped call on phase 2 is served at the appropriate time.

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From LOGIC PROCESSOR Submenu select [1. LOGIC STATEMENT CONTROL]

ENABLE LOGIC PROCESSOR STATEMENT 1 BY POSITIONING THE CURSOR OVER THE FIELDS SHOWN BELOW AND USING THE TOGGLE KEY TO ENABLE IT.

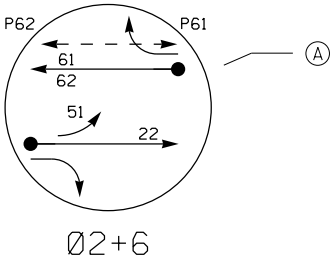
```
LOGIC STATEMENT CONTROL
          1  2  3  4  5  6  7  8  9  0  1  2  3  4  5
LP 1-15   E  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 16-30  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 31-45  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 46-60  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 61-75  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
LP 76-90  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
```

END PROGRAMMING

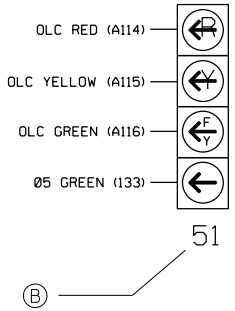
ASC/3–2070 Leading Pedestrian Interval Exceptions – Five Section Heads

SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

STD. NO. 12.8



Ⓐ



Ⓑ

P61,62
(actuated)

ECONOLITE ASC/3-2070 LOGIC PROCESSOR PROGRAMMING FOR FYA SUPPRESSION DURING THE DELAYED GREEN PERIOD — Ⓒ

(program controller as shown)

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From the LOGIC PROCESSOR Submenu select [2. LOGIC STATEMENTS]

ENTER A "1" IN THE LP# FIELD. PRESS 'ENTER', AND PROGRAM AS SHOWN.

LP#:	1	COPY FROM:	1	ACTIVE:	M	(T/F)
IF	PED ON PH WALK		6	IS	ON	
AND	VEH GREEN ON PH		6	IS	OFF	
THEN	SIG SET OLP RED		3		ON	
	SIG SET OLP YELLOW		3		OFF	
	SIG SET OVLP GREEN		3		OFF	
ELSE						

← LOGIC STATEMENT FOR ADVANCE WALK WITH FYA's. TURN FYA HEAD 51 OFF DURING PED 6 ADVANCE WALK.

END PROGRAMMING

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From the LOGIC PROCESSOR Submenu select [1. LOGIC STATEMENT CONTROL]

ENABLE LOGIC PROCESSOR STATEMENT 1 BY POSITIONING THE CURSOR OVER THE FIELDS SHOWN BELOW AND USING THE TOGGLE KEY TO ENABLE IT .

LOGIC STATEMENT CONTROL

	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6
LP 1-15	E	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
LP 16-30	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
LP 31-45	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
LP 46-60	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
LP 61-75	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
LP 76-90	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

END PROGRAMMING

Leading Pedestrian Interval - Flashing Yellow Arrows

When an adjacent through vehicle movement is being held red during a leading ped interval, care must be taken to ensure that no other vehicle movement could encroach upon a pedestrian in the crosswalk. When flashing yellow arrows are being used for the vehicle approach that opposes the ped move, care must be taken to suppress the flashing yellow arrow output, which is the permitted movement, during the leading ped interval. The logic processor is used to accomplish this as shown on this sheet. The same logic is applied to main street and side street three section permitted only flashing yellow arrows. The phase diagram shown to the left is used for the explanation.

Ⓐ Phase diagram from a signal plan illustrating the pedestrian movement on phase 6 on the main street, and the opposing vehicle move phase 2 with no ped and a protected/permitted left turn via the flashing yellow arrow. Ped 6 is not served at startup and no MUTCD startup violation will occur because phase 6 is programmed to start in green. Refer to STD 12.6 sheet 1.

Ⓑ Signal head 51 is a protected and permitted flashing yellow arrow that has overlap parent phases of 5+6 (phase 6 is the opposing through move).

Ⓒ To suppress the signal head 51 flashing yellow arrow during the leading pedestrian interval, the logic processor is required. When ped 6 is timing the delayed green, the phase 6 vehicle move is held red. When the logic processor sees that the ped 6 movement is "ON" and the phase 6 vehicle move is "OFF", it prevents the flashing yellow arrow from turning on by holding the overlap red (head 51) while at the same time allowing the phase 2 through movement (head 22) to be served. After the delayed green time has expired, the logic statements are no longer TRUE and the phase 6 vehicle movement will turn "ON", at which time the flashing yellow arrow signal face will also turn "ON" and begin to flash.

This logic is used whenever a flashing yellow signal head opposes a pedestrian movement that has a leading pedestrian interval whether it happens to be a three section permitted only or a four section protected and permitted head.

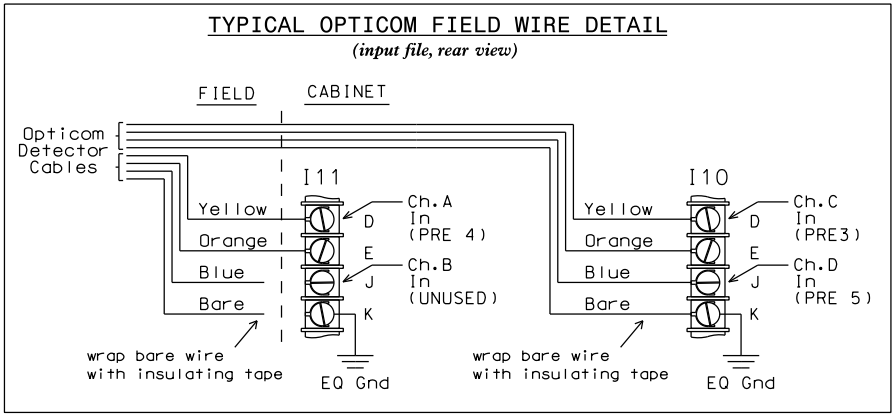
ASC/3–2070 Leading Pedestrian Interval Exceptions – Flashing Yellow Arrows

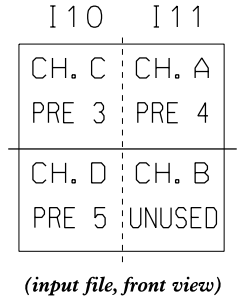
SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Optical Emergency Vehicle Detection (Opticom)

Opticom optical detection systems are typically used for emergency vehicle detection. The detector cards plug into the "I" file and "J" file of the 336 pole mounted and 332 base mounted 170 cabinets respectively. Cards are available in both two channel and four channel configurations. The two channel cards can be used in either of the designated emergency vehicle preemption slots of the 332 or 336 cabinets but are normally used in the leftmost slot. The four channel cards come equipped with a doublewide faceplate and must plugged into the rightmost preempt slot. See STD. NO. 8.0 sheets 1 and 2 to see the preempt slot locations in the input files for the 332 and 336 cabinets.

336 Pole Mounted Cabinet (uses ("I file")

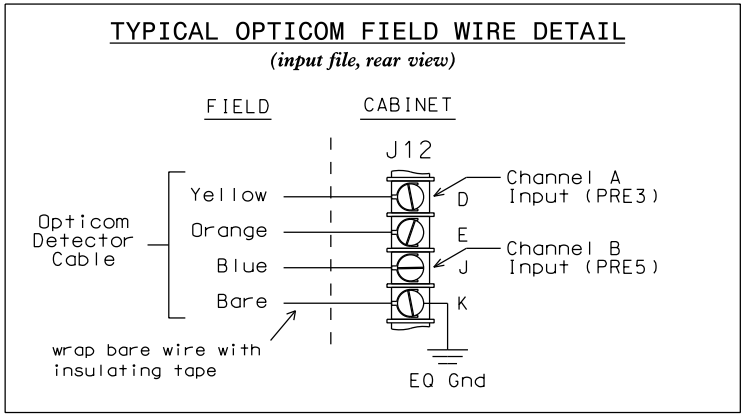


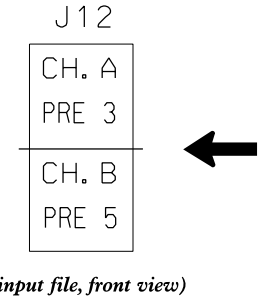


(input file, front view)

4 CHANNEL OPTICOM CARD
INSERT CARD INTO SLOT I11
FOR USE WITH PRE3, 4, 5

332 Base Mounted Cabinet (uses "J File")





(input file, front view)

2 CHANNEL OPTICOM CARD
INSERT CARD INTO SLOT J12
FOR USE WITH PRE3 & PRE5

Detection – Typical Optical Emergency Vehicle (Opticom)

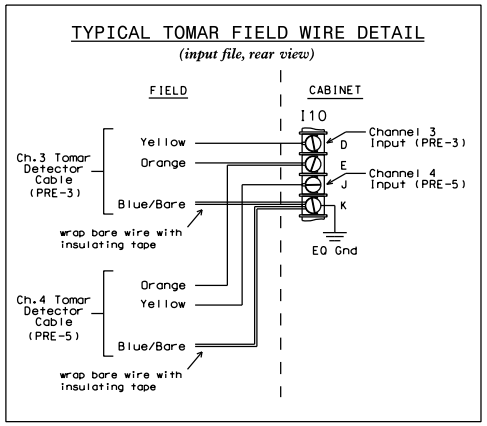
SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

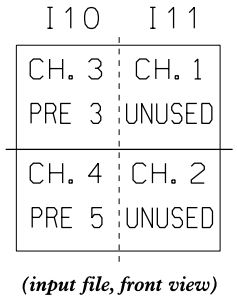
STD. NO.
13.0

Optical Emergency Vehicle Detection (Tomar)

Tomar optical detection systems are typically used for emergency vehicle detection. The detector cards plug into the "I" file and "J" file of the 336 pole mounted and 332 base mounted 170 cabinets respectively. Cards are equipped with four preemption inputs and have a doublewide faceplate for use with 170 cabinets. As such, the card should always be plugged into the rightmost preemption slot whether it is used in a 332 or a 336 cabinet. See STD. NO. 8.0 sheets 1 and 2 to see the preempt slot locations in the input file for the 332 base mounted cabinet and 336 pole mounted cabinet.

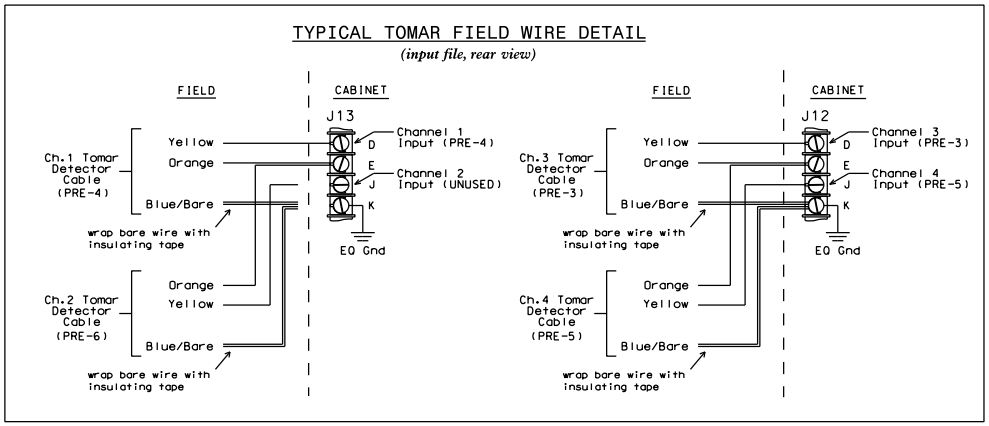
336 Pole Mounted Cabinet (uses ("I file")

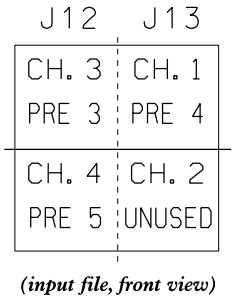




4 CHANNEL TOMAR CARD
INSERT CARD INTO SLOT I11
FOR USE WITH PRE3 & PRE5

332 Base Mounted Cabinet (uses "J File")





4 CHANNEL TOMAR CARD
INSERT CARD INTO SLOT J13
FOR USE WITH PRE3, 4, 5

Detection – Typical Optical Emergency Vehicle (Tomar)

SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

GPS Emergency Vehicle Detection

GPS systems can be used for emergency vehicle detection. The detector system is installed in the "J" file in a 332 base mounted cabinet and in the "I" file in a 336 pole mounted cabinet. The diagram below shows the typical representation of the GPS emergency vehicle preemption system deployed in a 332 base mounted cabinet in slots 12 and 13 of the "J" file. The same typical application in a 336 pole mounted cabinet would have the preempt input interface installed in slots 10 and 11 of the "I" file.

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø 1 1A	Ø 2 2A	Ø 2 2C	Ø 2 2E	Ø 3 3A	Ø 4 4A	Ø 4 4C	Ø 4 4E	SYS. DET. S1	SLOT EMPTY	SLOT EMPTY	Ø2 PED DC ISOLATOR	Ø6 PED DC ISOLATOR	FS DC ISOLATOR
	L	NOT USED	Ø 2 2B	Ø 2 2D	NOT USED	NOT USED	Ø 4 4B	Ø 4 4D	NOT USED	SYS. DET. S2			Ø4 PED DC ISOLATOR	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	Ø 5 5A	Ø 6 6A	Ø 6 6C	Ø 6 6E	Ø 7 7A	Ø 8 8A	Ø 8 8C	Ø 8 8E	SYS. DET. S3	SLOT EMPTY	SLOT EMPTY	* GPS EVP		SLOT EMPTY
	L	NOT USED	Ø 6 6B	Ø 6 6D	NOT USED	NOT USED	Ø 8 8B	Ø 8 8D	NOT USED	SYS. DET. S4					

EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME

* See GPS Preemption Installation note below.

GPS PREEMPTION INSTALLATION NOTE

Install a GPS preemption system. Perform installation according to manufacturer's directions and NCDOT engineer approved mounting location to accomplish the preemption schemes shown on the Signal Design Plans.

Detection – Typical GPS Emergency Vehicle Detection

SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

STD. NO.
13.0

Microwave Pulse Detection

Microwave motion detectors can be used for vehicle pulse detection. When a vehicle enters the detection zone defined by the microwave head, the equipment will trigger a single momentary input to a DC Isolator located in the input file and register a true input to the controller. Based on the requirements of the signal design, the controller might use the input to lock a vehicle call, extend a phase, register a system count, or similar. The following sheets illustrate a typical pulse detection application.

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	Ø1 1A	Ø2 2A,2B	SLOT EMPTY	SLOT EMPTY	Ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L		Ø1 1B	Ø2 2C,2D			Ø4 4B								ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	Ø6 6A DC ISOLATOR	Ø6 6B,6C	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L		NOT USED	NOT USED											

EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME

Ⓐ

Ⓐ INPUT FILE LAYOUT - In this example the DC isolator used with the pulse detector is located in slot J2-U and is used for loop 6A.

! Note: Install a model 242 DC isolator in slot J2 for use with microwave detector. See the Microwave Detector Wiring Details on sheet 2.

! IMPORTANT: For proper operation of the microwave detector, remove surge protection from TB3-5 and TB3-6, and from TB3-7 and TB3-8.

INPUT FILE CONNECTION & PROGRAMMING CHART

Ⓑ

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-5,6	I2U	39	1	2	1	Y	Y			
1B	TB2-7,8	I2L	43	5	12	1	Y	Y			
2A,2B	TB2-9,10	I3U	63	25	32	2	Y	Y		1.8	
2C,2D	TB2-11,12	I3L	76	38	42	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			15
★ 6A	TB3-5,6	J2U	40	2	-	6	Y	Y		1.2	
6B,6C	TB3-9,10	J3U	64	26	36	6	Y	Y			

Ⓑ

★ Microwave pulse detector. See wiring and programming detail on sheet 2.

INPUT FILE POSITION LEGEND: J2L
- FILE J
- SLOT 2
- LOWER

Ⓑ INPUT FILE CONNECTION - Details for loop 6A are found in this chart. When a vehicle enters the microwave zone, a phase 6 call is placed, phase 6 is extended if it is timing, and stretch detection is implemented.

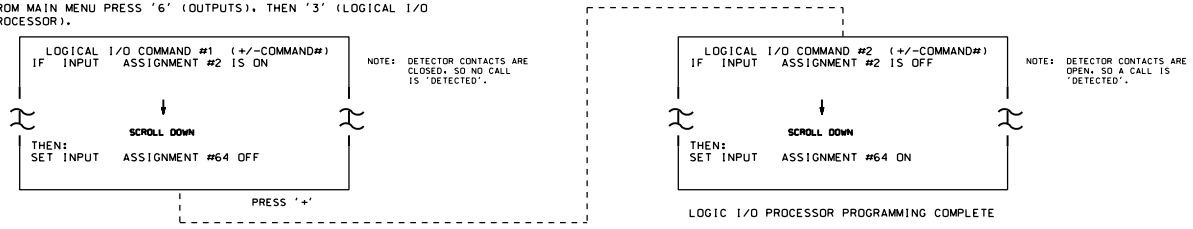
(continued on next page)

Microwave Pulse Detection

ECONOLITE OASIS LOGICAL I/O PROCESSOR PROGRAMMING DETAIL FOR MICROWAVE DETECTOR INPUT PROCESSING

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1 AND 2.
2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).

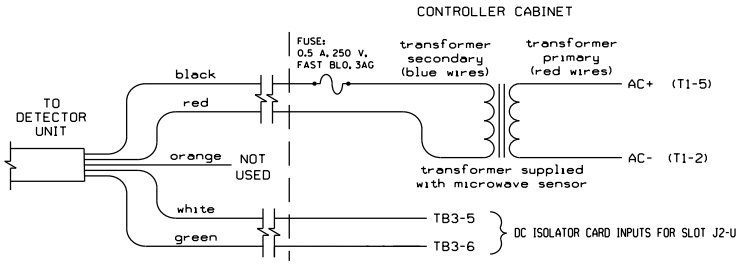


OUTPUT REFERENCE SCHEDULE

INPUT 2 = Detector Physical Input (Not Enabled)
INPUT 64 = Dummy Detector Input (Detector 6)

TYPICAL MICROWAVE PULSE DETECTOR WIRING DETAIL

(wire as shown)



MICROWAVE DETECTOR WIRE LIST

COLOR	FUNCTION
black	12V to 24V AC/DC (no polarity)
red	12V to 24V AC/DC (no polarity)
orange	Output Relay Normally Open
white	Output Relay Normally Closed
green	Output Relay Common

NOTES:

1. Sensor is a microwave motion detector mounted on poles as indicated on the Signal Design Plans.
2. Microwave wiring shown above will cause a permanent call unless the Input Assignment Programming and Logical I/O Processor Programming details are entered as shown on this sheet. These programming details will cause a call to be placed upon opening the Normally Closed contact on the microwave detector.
3. DC Isolator's LED will be ON when no call is present and will be OFF when a call is present.
4. Important: For proper operation of the microwave detector, remove surge protection from TB3-5, TB3-6, TB3-7, and TB3-8 and insert 242 DC Isolator in slot J2.

INPUT ASSIGNMENT PROGRAMMING DETAIL FOR MICROWAVE DETECTOR INPUT

(program controller as shown below)

FROM MAIN MENU PRESS '5' (INPUTS), THEN '+' UNTIL INPUT 2 (PIN 40) IS REACHED. MODIFY DEFAULT CONDITIONS AS INDICATED BY ARROWS.

```
PAGE: 1 C1 PIN:40  NOT ENABLED
INPUT ASSIGNMENT #.....................2
DEBOUNCE TIME (0-25.5 SEC).............0.5
DELAY TIME (0-25.5 SEC)................0.0
HOLD-OVER TIME (0-25.5 SEC)............0.0
ASSIGNMENT SELECTION:
NOT ENABLED (Y/N)......................Y
VEHICLE DETECTOR (1-64)................_
PEDESTRIAN DETECTOR (1-16).............._
ALTERNATE PED DETECTOR (1-16)..........._
PREEMPT (1-10).........................._
INVERTED PREEMPT (1-10)................_
STOP TIME (Y/N)........................_
FLASH SENSE (Y/N)......................_
DOOR OPEN (Y/N)........................_
MANUAL CONTROL ENABLE (Y/N)............_
MANUAL CONTROL ADVANCE (Y/N)..........._
SPECIAL FUNCTION ALARM (1-8)..........._
TOD HOUR SYCHRONIZATION (0-23).........._
FORCE OFF RING (1-4)...................._
HOLD PHASES (1-16)......................_
PLAN (65=FLSH,66=FREE)...  OFFSET#...._
CHANGE PHASE SEQUENCE PAGE (1-12)......_
CHANGE PHASE TIMING PAGE (1-4).........._
CHANGE PHASE CONTROL PAGE (1-4)........_
CHANGE OVERLAP CONTROL PAGE (1-4)......_
CHANGE INPUT PAGE (1-4)................_
CHANGE OUTPUT PAGE (1-4)................_
OVERRIDE PHASE CONTROL FUNCTION (Y)._
```

ENTER 'YES' for Not Enabled

```
PAGE: 1 C1 PIN:0  VEHICLE DETECTOR
INPUT ASSIGNMENT #.....................64
DEBOUNCE TIME (0-25.5 SEC).............0.5
DELAY TIME (0-25.5 SEC)................0.0
HOLD-OVER TIME (0-25.5 SEC)............0.0
ASSIGNMENT SELECTION:
NOT ENABLED (Y/N)......................_
VEHICLE DETECTOR (1-64)................6
PEDESTRIAN DETECTOR (1-16).............._
ALTERNATE PED DETECTOR (1-16)..........._
PREEMPT (1-10).........................._
INVERTED PREEMPT (1-10)................_
STOP TIME (Y/N)........................_
FLASH SENSE (Y/N)......................_
DOOR OPEN (Y/N)........................_
MANUAL CONTROL ENABLE (Y/N)............_
MANUAL CONTROL ADVANCE (Y/N)..........._
SPECIAL FUNCTION ALARM (1-8)..........._
TOD HOUR SYCHRONIZATION (0-23).........._
FORCE OFF RING (1-4)...................._
HOLD PHASES (1-16)......................_
PLAN (65=FLSH,66=FREE)..65 OFFSET#...._
CHANGE PHASE SEQUENCE PAGE (1-12)......_
CHANGE PHASE TIMING PAGE (1-4).........._
CHANGE PHASE CONTROL PAGE (1-4)........_
CHANGE OVERLAP CONTROL PAGE (1-4)......_
CHANGE INPUT PAGE (1-4)................_
CHANGE OUTPUT PAGE (1-4)................_
OVERRIDE PHASE CONTROL FUNCTION (Y)._
```

ENTER '6' for Vehicle Detector

PROGRAMMING COMPLETE

PRESS '-' until Input Assignment #64 is reached

NOTE:

This remapping removes the default detector from the microwave's physical input and reassigns it to unused INPUT 64. The Logical I/O Processor Programming Detail on this sheet will invert the disabled input and control INPUT 64 and the reassigned detector.

Detection – Microwave Pulse (Oasis)

SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

10-18

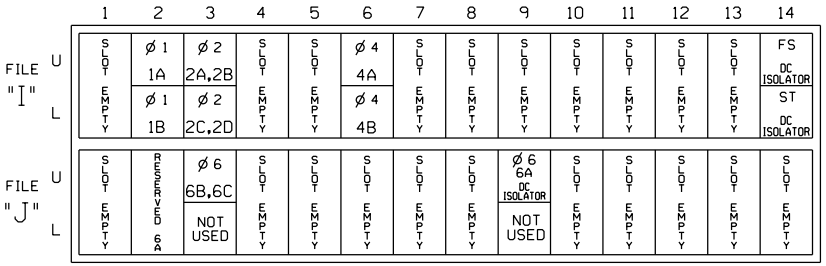
STD. NO. 13.1

Microwave Pulse Detection (ASC/3-2070)

Microwave motion detectors can be used for vehicle pulse detection. When a vehicle enters the detection zone defined by the microwave head, the equipment will trigger a single momentary input to a DC Isolator located in the input file. Using the logic processor, and based on the requirements of the signal design, the controller might then use the input to lock a vehicle call, extend a phase, register a system count, or similar. The following sheets illustrate a typical pulse detection application.

INPUT FILE POSITION LAYOUT

(front view)



EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME

Note: Install a model 242 DC isolator in slot J9 for use with microwave detector. See the Microwave Detector Wiring Details on sheet 2.

IMPORTANT: For proper operation of the microwave detector, remove surge protection from TB7-9 and TB7-10, and from TB7-11 and TB7-12.

Ⓐ INPUT FILE LAYOUT - In this example the DC isolator used with the pulse detector is located in slot J9-U, which by default is detector 15. It will have no phase assigned.

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
1A	TB2-7,8	I2L	43	12	1	YES				S
1B	TB2-9,10	I3U	63	32	1	YES				S
2A,2B	TB2-11,12	I3L	76	42	2	YES	1.8			S
2C,2D	TB4-1,2	I4U	47	22	2	YES				S
4A	TB4-9,10	I6U	41	4	4	YES				S
4B	TB4-11,12	I6L	45	14	4	YES		15		S
✳ 6A	-	J2U	40	6	6	YES	1.2		X	N
	TB7-9,10	J9U	59	★ 15	-	NO				
6B,6C	TB3-9,10	J3U	64	36	6	YES				S

Ⓑ INPUT FILE CONNECTION - Details for loop 6A are found in this chart. When a vehicle enters the microwave detection zone, the logic processor sees an input on the logical detector 15 input but will not place a call to the controller via that input. The logic will instead place a call to the controller via detector 6, which is a phase 6 detector. In this example, if phase 6 is green, 1.2 seconds of extend will be timed if a vehicle passes through the detection zone.

✳ Microwave pulse detector. See wiring and programming detail on sheet 2.

★ 6A logical detector. See Logic Processor Programming Detail for Microwave Detector Input Processing on sheet 2.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

(continued on next page)

ECONOLITE ASC/3-2070 LOGIC PROCESSOR PROGRAMMING DETAIL FOR MICROWAVE DETECTOR INPUT PROCESSING

(program controller as shown)

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From the LOGIC PROCESSOR Submenu select [2. LOGIC STATEMENTS]

ENTER A "1" IN THE LP# FIELD, PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   1  COPY FROM:   1  ACTIVE:  M   (T/F)
IF    DET                  15     IS   ON

THEN  DET SET VEH  1-16     6          OFF

ELSE
```

NOTE: DETECTOR CONTACTS ARE CLOSED, SO NO CALL IS 'DETECTED'.

ENTER A "2" IN THE LP# FIELD, PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   2  COPY FROM:   2  ACTIVE:  M   (T/F)
IF    DET                  15     IS   OFF

THEN  DET SET VEH  1-16     6          ON

ELSE
```

NOTE: DETECTOR CONTACTS ARE OPEN, SO A CALL IS 'DETECTED'.

END PROGRAMMING

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From the LOGIC PROCESSOR Submenu select [1. LOGIC STATEMENT CONTROL]

ENABLE LOGIC PROCESSOR STATEMENTS 1 AND 2 BY POSITIONING THE CURSOR OVER THE FIELDS SHOWN BELOW AND USING THE TOGGLE KEY TO ENABLE THEM.

```
LOGIC STATEMENT CONTROL
          1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
LP 1-15   E E . . . . . . . . . . . . . . .
LP 16-30  . . . . . . . . . . . . . . . . .
LP 31-45  . . . . . . . . . . . . . . . . .
LP 46-60  . . . . . . . . . . . . . . . . .
LP 61-75  . . . . . . . . . . . . . . . . .
LP 76-90  . . . . . . . . . . . . . . . . .
```

END PROGRAMMING

ECONOLITE ASC/3-2070 VEHICLE DETECTOR SETUP PROGRAMMING DETAIL FOR LOGICAL DETECTOR 15

1. From Main Menu select [6. DETECTORS]
2. From DETECTOR Submenu select [2. VEHICLE DETECTOR SETUP]

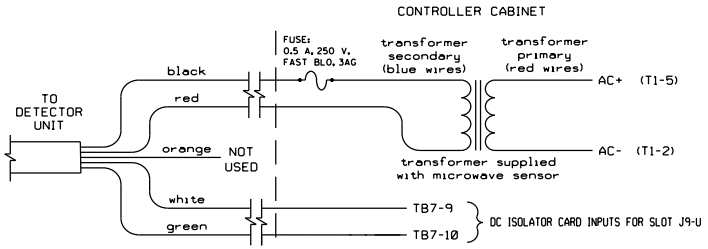
- Place cursor in VEH DETECTOR [ ] position and enter "15".
- Set PH to "0" and CALL OPTION to "NO"

```
VEH DETECTOR [15]   VEH DET PLAN [ 1]
TYPE: N-NTCIP
TS2 DETECTOR..... . ECPI LOG.......   NO
DET PH - 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
15  0    . . . . . . . . . . . . . . .
CALL OPTION....  NO
EXT OPTION. PASSAGE EXTENTION TIME.  0.0
USE ADDED INITIAL . CROSS SWICTH PH..  0
```

PH = 0 →
CALL = NO →

TYPICAL MICROWAVE PULSE DETECTOR WIRING DETAIL

(wire as shown)



MICROWAVE DETECTOR WIRE LIST

COLOR	FUNCTION
black	12V to 24V AC/DC (no polarity)
red	12V to 24V AC/DC (no polarity)
orange	Output Relay Normally Open
white	Output Relay Normally Closed
green	Output Relay Common

NOTES:

1. Sensor is a microwave motion detector mounted on poles as indicated on the Signal Design Plans.
2. Microwave wiring shown above will cause a permanent call unless the Input Assignment Programming and Logical I/O Processor Programming details are entered as shown on this sheet. These programming details will cause a call to be placed upon opening the Normally Closed contact on the microwave detector.
3. DC Isolator's LED will be ON when no call is present and will be OFF when a call is present.
4. Important: For proper operation of the microwave detector, remove surge protection from TB7-9, TB7-10, TB7-11, and TB7-12 and insert 242 DC Isolator in slot J9.

Detection – Microwave Pulse (ASC/3–2070)

SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

10-18

STD. NO. 13.1

Microwave Presence Detection

Microwave (radar) motion detectors can be used for vehicle presence detection. When a vehicle enters the detection zone defined by the microwave head, the equipment will send a presence signal to the detection equipment located in the input file and register a true input to the controller for as long as the vehicle remains in the detection zone. Based on the requirements of the signal design, the controller might use the input to lock a vehicle call, extend a phase, register a system count, or similar. The following illustrates a typical presence detection application.

INPUT FILE POSITION LAYOUT

(front view)

Ⓐ

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SLOT EMPTY	RADAR DETECTOR 1	Ø2 2C	SLOT EMPTY	SLOT EMPTY	Ø4 4A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	FS DC ISOLATOR
	L			NOT USED			Ø4 4B								ST DC ISOLATOR
FILE "J"	U	SLOT EMPTY	RADAR DETECTOR 2	Ø6 6C	SLOT EMPTY	SLOT EMPTY	Ø8 8A	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
	L			NOT USED			Ø8 8B								

EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME

Ⓐ INPUT FILE LAYOUT - In this example the radar detection cards are located in input file slots I2 and J2.

INPUT FILE CONNECTION & PROGRAMMING CHART

Ⓑ

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2C	TB2-9,10	I3U	63	25	32	2	Y	Y	Y		3
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			5
4B	TB4-11,12	I6L	45	7	14	4	Y	Y			15
6C	TB3-9,10	J3U	64	26	36	6	Y	Y	Y		3
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			5
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			15

INPUT FILE POSITION LEGEND: J2L

FILE J
SLOT 2
LOWER

Ⓑ INPUT FILE CONNECTION - Details for the radar detection system setup are found on the signal plan and not on the electrical detail. Installation and setup is left to field personnel, the manufacturer, and the manufacturer's representative.

SPECIAL DETECTOR NOTE

Ⓒ

Install a radar detection system for vehicle detection for zones 2A, 2B, 6A, and 6B. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

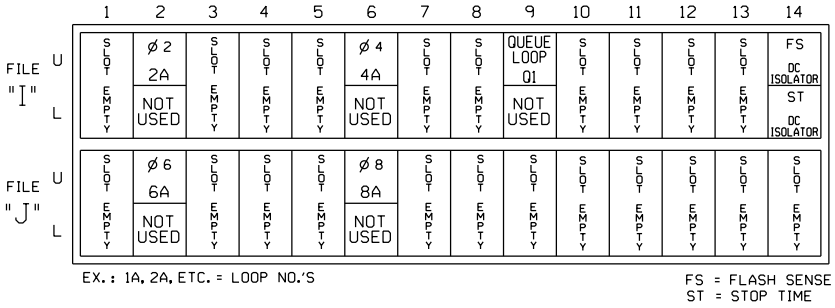
Ⓒ SPECIAL DETECTOR NOTE - Refers the installer to the manufacturer for specifics regarding installation and setup of the equipment, and to the NCDOT engineering staff for other operational guidance. The zones specified in the note are taken directly from the signal plan.

Multizone Microwave Detection

Multizone Microwave Detectors can be used for vehicle pulse or presence detection. When multizone microwave detectors are used for presence detection and a vehicle enters the detection zone defined by the microwave head, a signal is sent to the detection equipment located in the cabinet and registers a true input to the controller for as long as the vehicle remains in the detection zone. Depending on the requirements of the signal design and the microwave equipment configuration, the controller might use the input to lock a vehicle call, extend a phase, register a system count, or similar.

INPUT FILE POSITION LAYOUT

(front view)



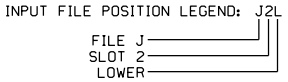
Ⓐ

Ⓐ INPUT FILE LAYOUT - In this example the loop and detector installation chart on the signal plan showed microwave presence detection zone on a bridge deck labeled as "Q1" and all other detectors were inductive loops in the pavement. The electrical detail shows no specific placement or installation instructions for the microwave equipment, but instead instructs the installer to follow manufacturer and engineer approved guidelines via a Special Detector Note.

INPUT FILE CONNECTION & PROGRAMMING CHART

Ⓑ

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			3



Ⓑ INPUT FILE CONNECTION - Details for the multizone microwave detection system setup are found on the signal plan and not on the electrical detail. Installation and setup is left to field personnel, the manufacturer, the manufacturer's representative, and NCDOT engineering.

SPECIAL DETECTOR NOTE

Ⓒ

Install a multizone microwave detection system for vehicle detection for zone Q1. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

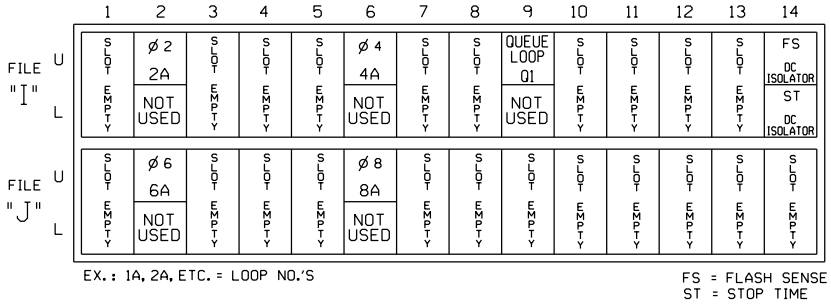
Ⓒ SPECIAL DETECTOR NOTE - Refers the installer to the manufacturer for specifics regarding installation and setup of the equipment, and to the NCDOT engineering staff for other operational guidance.

Video Detection

Video Detectors can be used for vehicle pulse or presence detection. When video detectors are used for presence detection and a vehicle enters the detection zone defined by the video equipment, a signal is sent to the detection equipment located in the cabinet and registers a true input to the controller for as long as the vehicle remains in the detection zone. Depending on the requirements of the signal design and the video equipment configuration, the controller might use the input to lock a vehicle call, extend a phase, register a system count, or similar.

INPUT FILE POSITION LAYOUT

(front view)



EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME

Ⓐ

Ⓐ INPUT FILE LAYOUT - In this example the loop and detector installation chart on the signal plan showed video presence detection zone on a bridge deck labeled as "Q1" and all other detectors were inductive loops in the pavement. The electrical detail shows no specific placement or installation instructions for the video equipment but instead instructs the installer to follow manufacturer and engineer approved guidelines via a Special Detector Note.

INPUT FILE CONNECTION & PROGRAMMING CHART

Ⓑ

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
2A	TB2-5,6	I2U	39	1	2	2	Y	Y			
4A	TB4-9,10	I6U	41	3	4	4	Y	Y			3
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			3

INPUT FILE POSITION LEGEND: J2L

FILE J
SLOT 2
LOWER

Ⓑ INPUT FILE CONNECTION - Details for the video detection system such as zone location and type, are found on the signal plan and not on the electrical detail. Installation and setup is left to field personnel, the manufacturer, the manufacturer's representative, and NCDOT engineering.

SPECIAL DETECTOR NOTE

Ⓒ

Install a video detection system for vehicle detection for zone Q1. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

Ⓒ SPECIAL DETECTOR NOTE - Refers the installer to the manufacturer for specifics regarding installation and setup of the equipment, and to the NCDOT engineering staff for other operational guidance.

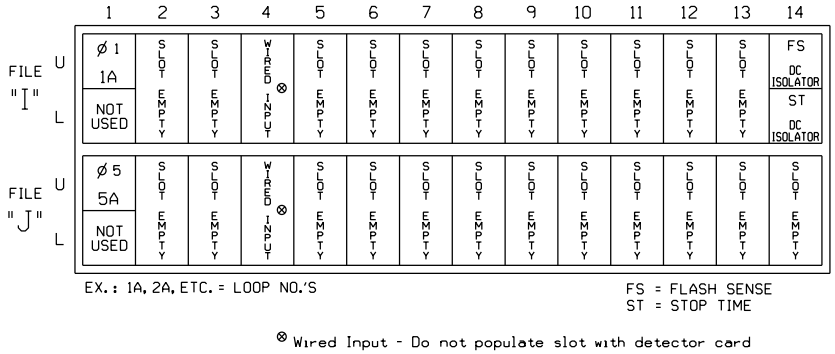
Presence Detection and Wired Inputs

Loops and/or zones that are referred to as "wired inputs" typically place a call for a protected turning movement and also place a call to the adjacent through movement. While installation instructions and zone locations in the Input File are not usually provided on an electrical detail for Multizone Microwave or Video detection systems, the location of detectors for wired input programming to function properly is critical for wired inputs. As such, a set of special Detector Notes is provided on electrical details for signal plans that have wired inputs to ensure proper detector operation and timing. Certain slots are "reserved" for proper functionality and are shown in the layout, programming chart, and notes. More information about wired inputs and the jumpers is found in STD. NO. 8.1.

For the example shown below, all detection was accomplished using a video detection system where the signal plan had default phasing only. Detection zones 1A and 5A each call two phases and are installed as a wired input. Their specific locations in the Input File need to be as shown so the detector programming is correct and the phasing runs properly.

INPUT FILE POSITION LAYOUT

(front view)



⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A[1]	TB2-1,2	I1U	56	18	1	1	Y	Y			15
	-	J4U	48	10	26	6	Y	Y	Y		3
5A[2]	TB3-1,2	J1U	55	17	5	5	Y	Y			15
	-	I4U	47	9	22	2	Y	Y	Y		3

[1] Add jumper from J1-W to J4-W, on rear of input file.

[2] Add jumper from J1-W to I4-W, on rear of input file.

INPUT FILE POSITION LEGEND: J2L
- FILE J
- SLOT 2
- LOWER

SPECIAL DETECTOR NOTE

Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

For Detection Zones 1A and 5A, the equipment placement and slots reserved for wired inputs are typical for a NCDOT installation.

Detection – Presence Detection and Wired Inputs (Default Phasing)

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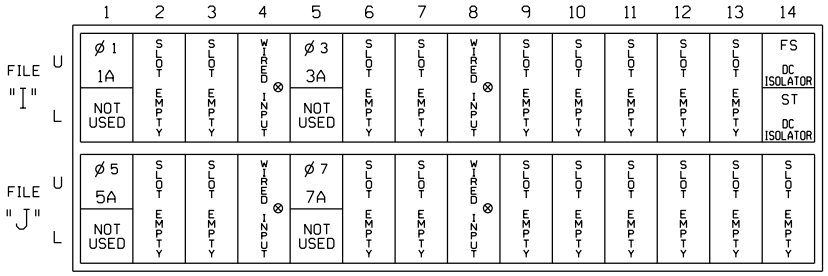
Presence Detection and Wired Inputs

For the example shown below, all detection was accomplished using a video detection system where the signal plan had both default phasing and alternate phasing. Detection zones 1A, 3A, 5A, and 7A each call two phases and are installed as wired inputs. Their specific locations in the Input File need to be as shown so the detector programming is correct and the phasing runs properly during the default and alternate phasing periods. The Special Detector Notes and the programming chart are different than those shown for the electrical detail that only runs default phasing due to the fact that detector operation is reprogrammed during the alternate period and the notes make a reference to instructions found on other sheets of the electrical detail.

The Input File Connection & Programming Chart shown below is for an Oasis design. The detector programming details for alternate phasing are found in STD. NO. 11.5. Designs that have alternate phasing and use ASC/3-2070 software implement detection in the same way and the Input File Connection & Programming Chart and detector programming details are shown in STD. NO. 11.10.

INPUT FILE POSITION LAYOUT

(front view)



EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART (Oasis)

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A[1]	TB2-1,2	I1U	56	18	1	1	Y	Y			15
	-	J4U	48	10★	26	6	Y	Y	Y		3
	-	I1U	56	18★	51	1	Y	Y			
3A[1]	TB4-5,6	I5U	58	20	3	3	Y	Y			15
	-	J8U	50	12★	28	8	Y	Y			3
	-	I5U	58	20★	53	3	Y	Y			
5A[2]	TB3-1,2	J1U	55	17	5	5	Y	Y			15
	-	I4U	47	9★	22	2	Y	Y	Y		3
	-	J1U	55	17★	55	5	Y	Y			
7A[2]	TB5-5,6	J5U	57	19	7	7	Y	Y			15
	-	I8U	49	11★	24	4	Y	Y			3
	-	J5U	57	19★	57	7	Y	Y			

[1] Add jumper from I1-W to J4-W, on rear of input file.
[2] Add jumper from I5-W to J8-W, on rear of input file.
[3] Add jumper from J1-W to I4-W, on rear of input file.
[4] Add jumper from J5-W to I8-W, on rear of input file.

★ See Input Page Assignment programming details on sheets 3 and 4.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

SPECIAL DETECTOR NOTES

1) Install a video detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plans.

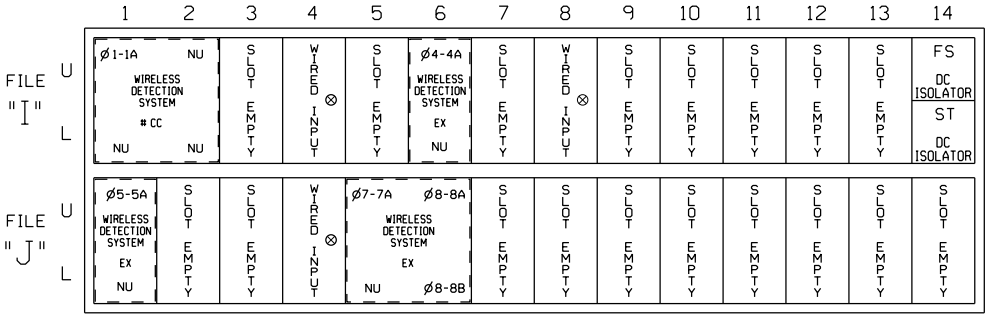
2) For detection zones 1A, 3A, 5A, and 7A, detector card placement and slots reserved for wired inputs are typical for a NCDOT installation. Inputs associated with these slots are compatible with time of day instructions located on sheets 3 and 4 of this electrical detail.

In Pavement Wireless Detection

In pavement wireless detection systems make use of wireless sensors, repeaters, an access point, and special contact closure cards to implement a vehicle detection system. Wireless sensors are installed beneath the pavement surface and transmit detector information to repeaters that communicate the information to the cabinet via an access point mounted on a pole in the intersection. Each system must have one master CC contact closure card in the input file. Expansion contact closure cards (EX) are available in two and four channel configurations. The details shown below illustrate how a typical in pavement wireless detection system would be represented on an electrical detail.

INPUT FILE POSITION LAYOUT

(front view)



EX.: 1A, 2A, ETC. = LOOP NO.'S

NU = CHANNEL NOT USED

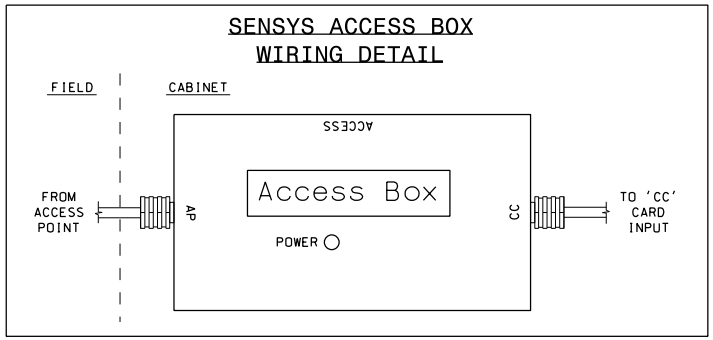
FS = FLASH SENSE

ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

See Sensys Access Box Wiring Detail below.

SENSYS ACCESS BOX WIRING DETAIL



INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
* 1A	-	I1U	56	18	1	1	Y	Y	Y		15
* 4A	-	I6U	41	3	4	4	Y	Y			3
* 5A	-	J1U	55	17	5	5	Y	Y	Y		15
* 7A	-	J5U	57	19	7	7	Y	Y			15
* 8A	-	J6U	42	4	8	8	Y	Y			3
* 8B	-	J6L	46	8	18	8	Y	Y			15

* WIRELESS DETECTION SYSTEM

1. Install a Wireless Vehicle Detection System for vehicle detection. Perform installation according to manufacturer's directions and NCDOT Engineer-approved mounting locations to accomplish the detection schemes shown on the signal design plans.

2. Ensure that the Wireless Vehicle Detection System is fully compatible with equipment manufactured in accordance with the specifications for the type 2070 controller.

INPUT FILE POSITION LEGEND: J2L

FILE J
SLOT 2
LOWER

Detection – In Pavement Wireless

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13.4
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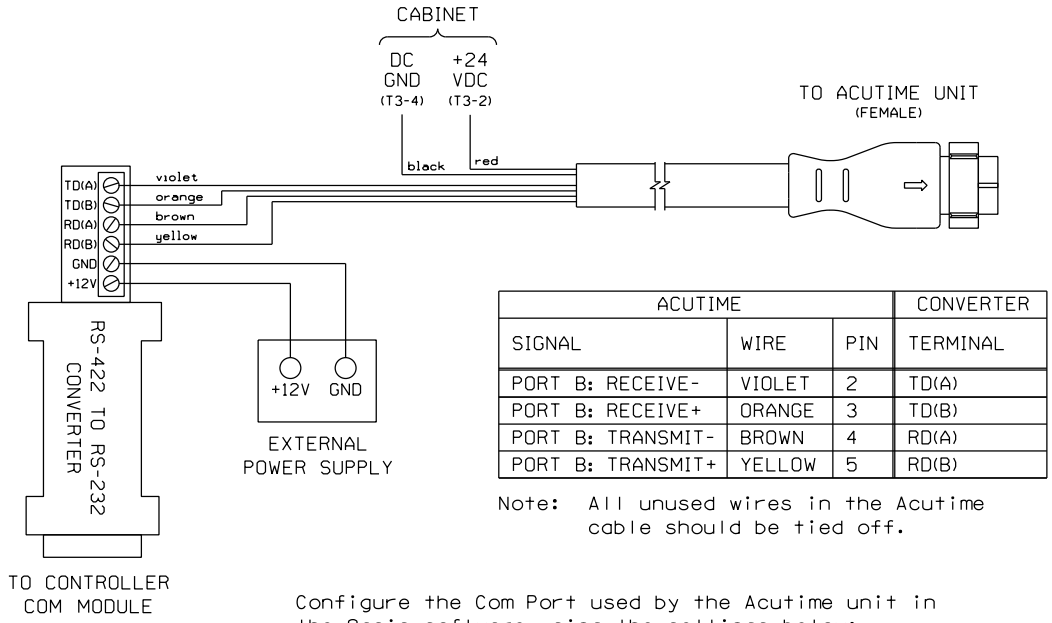
Detection - GPS Clock Reference

Some systems must derive a clock reference from a satellite by using a GPS antenna. A typical GPS antenna wiring reference that would be shown on an electrical detail is shown below.

CONNECTOR WIRING DETAIL FOR ACUTIME GPS ANTENNA WITH RS-422 INTERFACE

(make connections as shown)



ACUTIME			CONVERTER
SIGNAL	WIRE	PIN	TERMINAL
PORT B: RECEIVE-	VIOLET	2	TD(A)
PORT B: RECEIVE+	ORANGE	3	TD(B)
PORT B: TRANSMIT-	BROWN	4	RD(A)
PORT B: TRANSMIT+	YELLOW	5	RD(B)

Note: All unused wires in the Acutime cable should be tied off.

Configure the Com Port used by the Acutime unit in the Oasis software using the settings below:

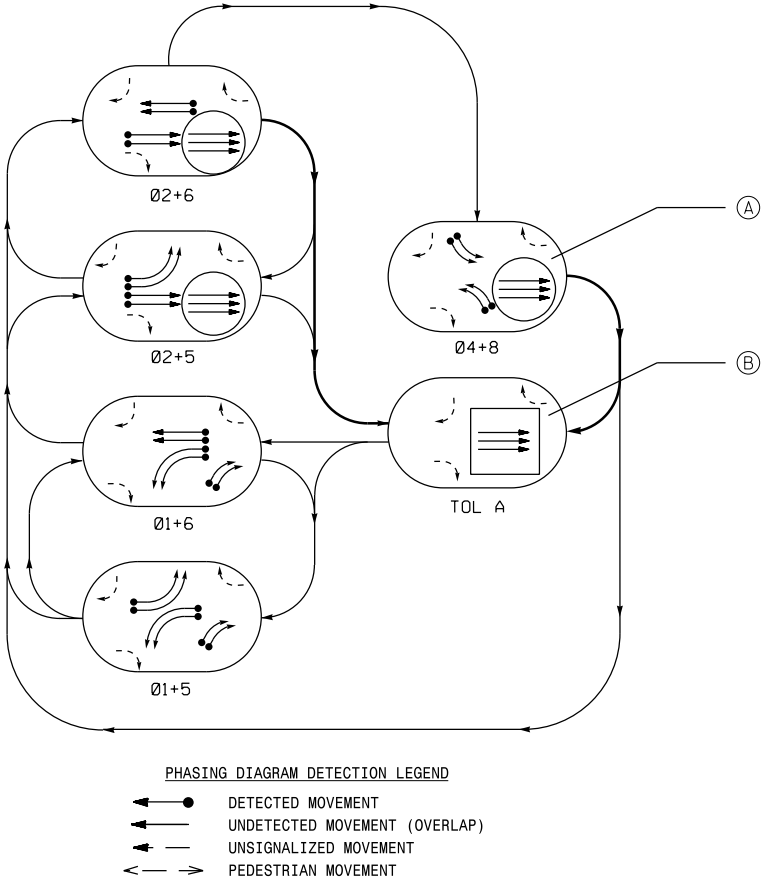
* 9600 Baud
* 8 Data Bits
* 1 Stop Bit
* Odd Parity
* Trimble TSIP GPS Protocol

Be sure to enable the "GET TIME FROM GPS" option under D-1 (Set Clock) menu.

Timed Overlap

A timed overlap is a movement that has additional green time added and will continue to run after its parent phase(s) have timed out or gapped out. Timed overlaps are typically used where upstream traffic needs additional time to move downstream in order to clear out a zone between signals to make room for vehicles coming from side streets, or to give vehicles moving from freeway ramps time to clear a downstream signal before it clears. When the side street is served, the upstream signal(s) on the main street begin their clearance while the downstream signal(s) time their additional green time so the zone between the two signals can be cleared of vehicles before the side street begins moving. Once the extended green time has been served, the overlap clears to yellow and red.

PHASING DIAGRAM



Ⓐ In the example shown to the left, overlap 'A' is a vehicle through move on the main street located between the upstream and downstream signal. Its parent phases are 2 and 4 and the overlap is active whenever parent phase 2 or 4 is the active phase.

Ⓑ Whenever either parent phase clears, the vehicle move that is "Timed Overlap A" (TOL A) will begin to time the extended green time as the parent phase(s) clear from yellow to red. After the extended green time is up, the overlap will time its programmed yellow and red clear times and the controller will proceed to the next phase in the sequence.

Programming details for Oasis and ASC/3-2070 for example shown to the left can be found on sheets 2 and 3 of STD. NO. 14.

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

```
 PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
 PHASE:          |1234567891011121314151 6
VEH OVL PARENTS: |  X X ------------------ (A)
VEH OVL NOT VEH: |
VEH OVL NOT PED: |
VEH OVL GRN EXT: |  X X ------------------ (B)
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  _ GREEN
-------------------------------------------
SELECT VEHICLE OVERLAP OPTIONS:   (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC).........5  ---- (C)
YELLOW CLEAR (0=PARENT,3-25.5 SEC)..3.4 --- (D)
RED CLEAR (0=PARENT,0.1-25.5 SEC)...2.0 --- (E)
OUTPUT AS PHASE # (0=NONE, 1-16)....0
```

OVERLAP PROGRAMMING COMPLETE

Ⓐ VEH OVL PARENTS will provide service when any of the selected parent phases are active. When the last active parent phase terminates, the overlap will terminate. Overlaps will time the Green extension, Yellow clearance, and Red clearance specified in the overlap programming detail. If one of these elements is not specified, the overlap will use the same clearances as the terminating parent as shown on the timing chart on the signal plan.

Ⓑ VEH OVL GRN EXT designates which phase(s) will start the extension timer when the parent phase(s) terminates.

Ⓒ GREEN EXTENSION designates the time the overlap will extend its green interval beyond the green termination of the parent phase(s) designated in the VEH OVL GRN EXT field.

Ⓓ YELLOW CLEAR designates the yellow clearance interval for the overlap.

Ⓔ RED CLEAR designates the red clearance interval for the overlap.

ECONOLITE ASC/3-2070 OVERLAP PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [2. CONTROLLER]
2. From CONTROLLER Submenu select [2. VEHICLE OVERLAPS]

OVERLAP A

Select TMG VEH OVLP [A] and 'OTHER/ECONOLITE'

```
TMG VEH OVLP...[A] TYPE:[OTHER/ECONOLITE]
  PHASES 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
INCLUDED . X . X . . . . . . . . . . . . .   (A)
PROTECT  . . . . . . . . . . . . . . . .
PED PRTC . . . . . . . . . . . . . . . .
NOT OVLP . . . . . . . . . . . . . . . .
FLSH GRN . . . . . . . . . . . . . . . .
LAG X PH . X . X . . . . . . . . . . . .   (B)
LAG 2 PH . . . . . . . . . . . . . . . .

LAG GRN 5.0 YEL 3.4 RED 2.0 ADV GRN 0.0 --- (C)(D)(E)
```

END PROGRAMMING

Ⓐ INCLUDED phases specify the phases whose timing state is used to derive the state of the overlap. Generally, when any included phase is timing its green interval or the controller is advancing from one included phase to another included phase, the overlap will be green.

Ⓑ LAG (Trailing) X PH identifies which phases are to time programmed trailing green, yellow, and red. If trailing phases are defined, only those phases will time trailing green, yellow, and red when they advance to yellow change and no other included phase is timing or a phase next selection. If no Trailing phases are defined, then trailing green, yellow, and red are disabled.

ⒸⒹⒺ Normally, if an included phase is terminating and no other included phase is timing or a phase next selection, the terminating included phase's yellow and red are also output to the overlap.

LAG (Trailing) Green, Yellow, Red times provide a means of extending the overlap's green and then timing a specified yellow and red. When the last timing overlap included phase begins its yellow change, the overlap's green interval is extended by the specified Trailing Green time. After Trailing Green has timed, Trailing Yellow and Trailing Red times are used to time the overlap's yellow change and red clearance intervals.

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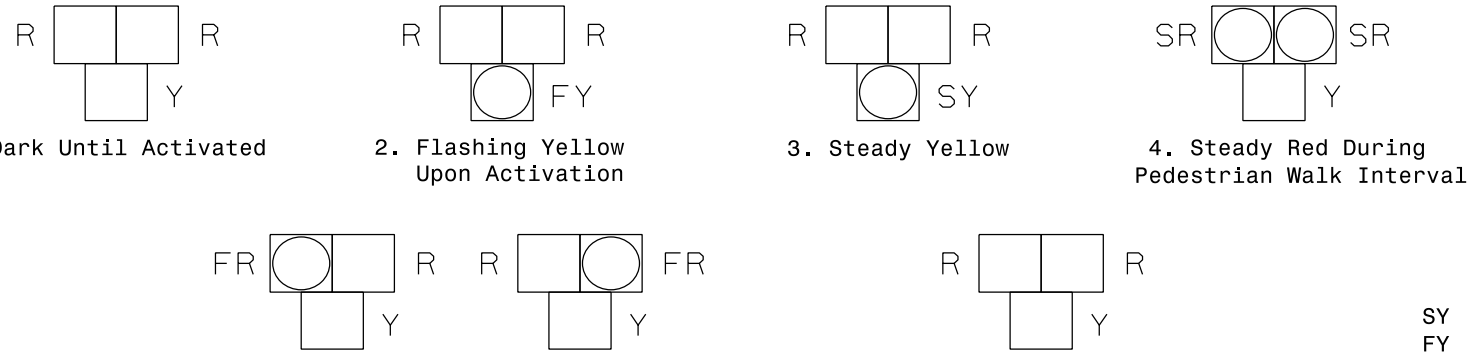
Pedestrian Hybrid Beacon

A Pedestrian Hybrid Beacon is a pedestrian crossing that utilizes a three section signal head to display a unique sequence to vehicle traffic when pedestrians are given right of way. When no peds are being served the ped signal heads display the don't walk ("hand") indication and the vehicle signal heads are dark. When a ped call is received by the controller and the sequence begins the yellow vehicle signal face will flash for a designated time, then the yellow signal face will display steady yellow for a designated time after which both of the red signal faces will display steady red. After the vehicle red clearance has finished timing, right of way transfers to the pedestrian movements and the controller turns on the ped signal head walk ("man") indication. When the ped clearance starts and begins to flash the don't walk ped signal head indication, the red vehicle signal faces change from steady red to alternating flashing red and will continue to do so until the end of the ped interval. At this time the ped signal heads will display the steady don't walk indication and the flashing red vehicle heads will go dark. Right of way at this point is returned to vehicle traffic until another ped call is received by the controller and the Pedestrian Hybrid Beacon sequence is initiated again.

The timing specifics for the Pedestrian Hybrid Beacon can be found in the Signal Design section of the Design Manual in STD. NO. 7.2. Timing for Oasis, ASC/3-2070, and SE-PAC2070 softwares are shown there but the Signals Management portion of the Design Manual will only discuss the details for Oasis and ASC/3-2070 Pedestrian Hybrid Beacon applications.

From MUTCD 2009 Edition Part 4 Figure 4F-3. Sequence for a Pedestrian Hybid Beacon



LEGEND

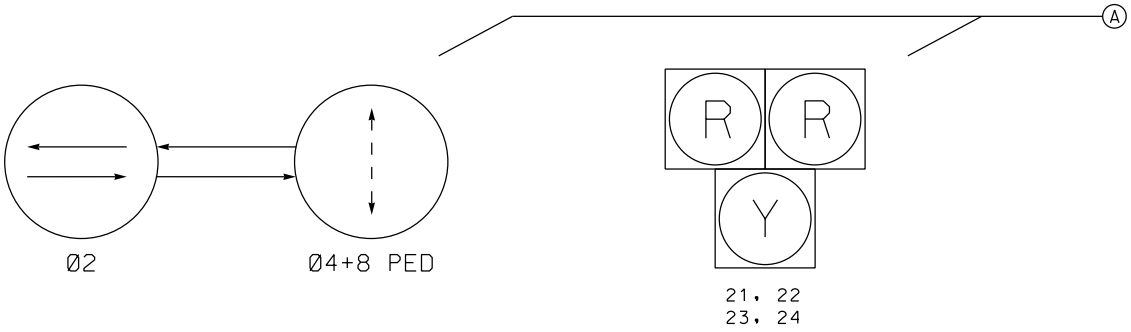
SY Steady Yellow
FY Flashing Yellow
SR Steady Red
FR Flashing Red

Pedestrian Hybrid Beacon Sequence

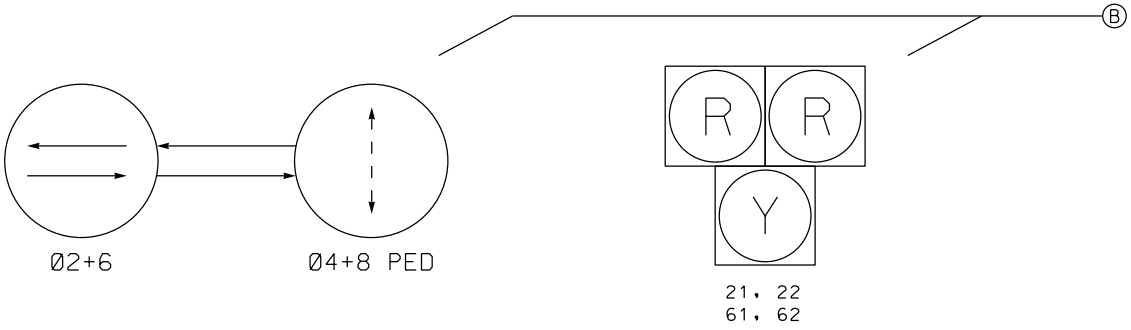
SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

12-20

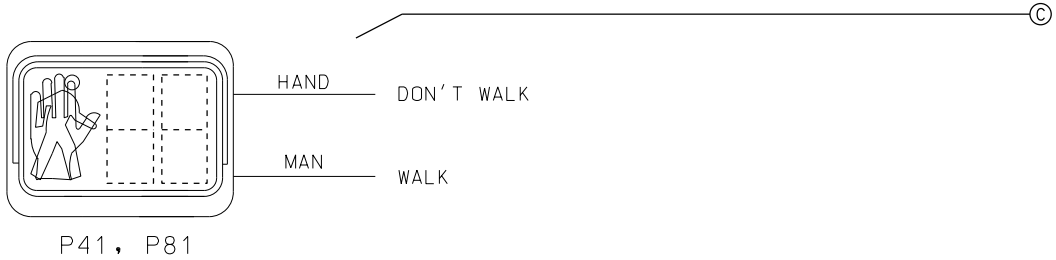
STD. NO.
15.0
SHEET 1 OF 2



Phasing Diagram and typical signal head configuration for Pedestrian Hybrid Beacon running Oasis software in a 170 cabinet. See STD. NO. 15.1



Phasing Diagram and typical signal head configuration for Pedestrian Hybrid Beacon running ASC/3-2070 software in a NEMA cabinet or 170 cabinet. See STD. NO. 15.2 and STD. NO. 15.3



Typical countdown pedestrian signal head used for Oasis or ASC/3-2070 Pedestrian Hybrid Beacon signal.

Pedestrian Hybrid Beacon Sequence

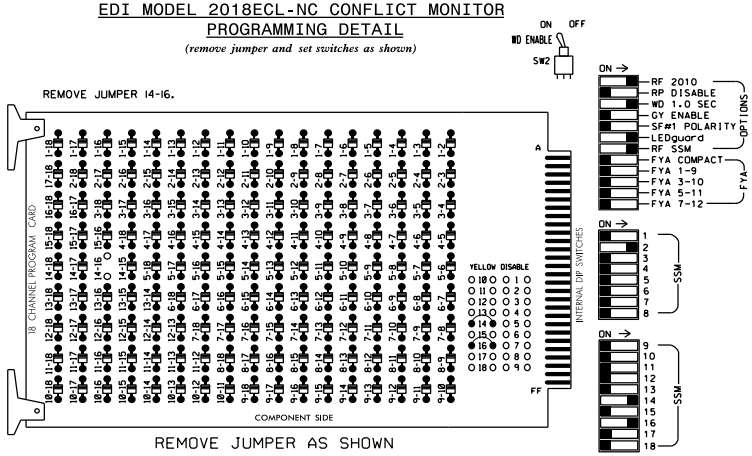
SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

12-20

STD. NO.
15.0
SHEET 2 OF 2

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumper and set switches as shown)



REMOVE JUMPER AS SHOWN

■ = DENOTES POSITION OF SWITCH

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.
5. BE SURE TO INSTALL YELLOW DISABLE JUMPER FOR CHANNELS 14 (4 PED) AND 16 (8PED).

NOTES

1. Insert yellow flash program blocks for phases 1 and 2. Insert red flash program blocks for all remaining unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program Phases 4 and 8 for Ped Yellow Clear.
3. Program phase 2 for Startup In Green.
4. Program phases 4 and 8 for Startup Ped Call.
5. Program Phase 2 for Yellow Flash.
6. The cabinet and controller are part of the (insert) System.

EQUIPMENT INFORMATION

CONTROLLER.....2070
CABINET.....332
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S1,S2,S6,S12
PHASES USED.....2,4*,8*,4PED,8PED
OVERLAP "A".....2**
OVERLAP "B".....NONE
OVERLAP "C".....NONE
OVERLAP "D".....NONE

* Phase used for timing purposes only.
** Used to control clearance intervals.

PROJECT REFERENCE NO.	SHEET NO.
	Sig.

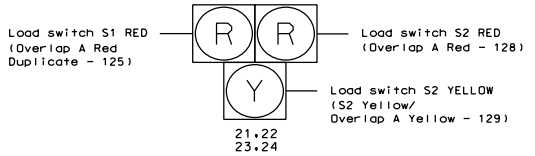
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16
PHASE	OLA DUP.	2 / OLA	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	21,22 23,24	21,22 23,24	NU	NU	NC	P41	NU	NU	NU	NU	NC	P81
RED	125	128										
YELLOW	*	129										
GREEN	*	*										
RED ARROW												
YELLOW ARROW												
GREEN ARROW												
✋						104						110
🚶						106						112

NU = Not Used
NC = Not Connected
* Denotes install load resistor. See load resistor installation detail on sheet 3.

SIGNAL HEAD WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SDET EXIT	SDET EXIT	SDET EXIT	SDET EXIT	SDET EXIT	SDET EXIT	SDET EXIT	SDET EXIT	SDET EXIT	SDET EXIT	SDET EXIT	NOT USED	NOT USED	FS DC ISOLATOR
	L												Ø4 PED DC ISOLATOR	Ø8 PED DC ISOLATOR	ST DC ISOLATOR
FILE "J"	U	SDET EXIT	SDET EXIT	SDET EXIT	SDET EXIT	SDET EXIT	SDET EXIT	SDET EXIT	SDET EXIT	SDET EXIT	SDET EXIT	SDET EXIT	SDET EXIT	SDET EXIT	SDET EXIT
	L														

EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
PED PUSH BUTTONS											
P41	TB8-5,6	I12L	69	31	PED 4	4/8 PED *					
P81	TB8-8,9	I13L	70	32	PED 8	8/4 PED *					

NOTE: INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

INPUT FILE POSITION LEGEND: I2L
FILE 1
SLOT 2
LOWER

* See Pedestrian Detector Programming Detail on Sheet 3.

OPERATIONAL NOTES

1. In order for the controller to perform the "Pedestrian Hybrid Beacon" (aka. HAWK signal) sequence, special logic and output programming is necessary. See programming details on sheet 2 of this electrical detail.
2. The modified Phase 2 Yellow output is used to produce the flashing yellow clearance. The Overlap 'A' yellow output has been remapped to the phase 2 yellow output to produce the steady yellow clearance interval and time for this interval shall be implemented in Overlap 'A' Yellow Clear timing. See the signal plan for timing values.
3. Phase 2 Yellow Clear and Overlap 'A' GREEN EXTENSION times must be equal. This is necessary so that when flashing yellow clear ends the steady yellow clear begins.
4. Phases 4 and 8 Red Clear times must be set to 0.0 sec.
5. The Ped 4 push button is programmed to call Ped 4 and Ped 8, and the Ped 8 push button is programmed to call Ped 8 and Ped 4.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN:
DESIGNED:
SEALED:
REVISED:

Electrical Detail - Sheet 1 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Mobility and Safety Division
"Keep North Carolina Moving"

750 N.Greenfield Pkwy.Garner,NC 27529

PLAN DATE:	REVIEWED BY:
PREPARED BY:	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL

SIGNATURE DATE

SIG. INVENTORY NO.

Oasis Typical Pedestrian Hybrid Beacon (170 Cabinet)

SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

12-20

STD. NO.
15.1
SHEET 1 OF 3

PROJECT REFERENCE NO.	SHEET NO.
	Sig.

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL PEDESTRIAN HYBRID BEACON SEQUENCE

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL). THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2 AND 3.
2. FROM MAIN MENU PRESS '6' (OUTPUTS). THEN '3' (LOGICAL I/O PROCESSOR).

```
LOGICAL I/O COMMAND #1  (+/-COMMAND#)
IF  PED CLEAR ON PHASE #4  IS ON
AND OUTPUT  ASSIGNMENT #1  IS ON
        SCROLL DOWN
THEN:
SET OUTPUT  ASSIGNMENT #11 OFF
```

NOTE: LOGIC TO PRODUCE ALTERNATING FLASHING RED INDICATIONS ON HEADS 21, 22, 23, 24 DURING PED 4+8 CLEAR.

PRESS '+'

```
LOGICAL I/O COMMAND #2  (+/-COMMAND#)
IF  PED CLEAR ON PHASE #4  IS ON
AND OUTPUT  ASSIGNMENT #1  IS OFF
        SCROLL DOWN
THEN:
SET OUTPUT  ASSIGNMENT #14 OFF
```

NOTE: LOGIC TO PRODUCE ALTERNATING FLASHING RED INDICATIONS ON HEADS 21, 22, 23, 24 DURING PED 4+8 CLEAR.

PRESS '+'

```
LOGICAL I/O COMMAND #3  (+/-COMMAND#)
IF  VEH CALL ON PHASE  #4  IS ON
OR  VEH CALL ON PHASE  #8  IS ON
        SCROLL DOWN
THEN:
SET INPUT   ASSIGNMENT  #31 ON
```

NOTE: LOGIC TO ENSURE THAT PHASE 4 PED AND PHASE 8 PED ARE ALWAYS SERVED WITH PHASE 4 VEHICLE AND PHASE 8 VEHICLE

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

I/O REFERENCE SCHEDULE

OUTPUT 1 = PHASE 4 DON'T WALK
OUTPUT 11 = OLA RED
OUTPUT 14 = OLA RED (DUPLICATE)
INPUT 31 = PHASE 4 & 8 PED CALL

OUTPUT REMAPPING DETAIL FOR SPECIAL PEDESTRIAN HYBRID BEACON SEQUENCE

(program controller as shown)

NOTE: THIS CHANGE REASSIGNS THE PHASE 2 VEHICLE RED OUTPUT AS OVERLAP 'A' RED AND IS USED TO DRIVE LOAD SWITCH S2 RED.

FROM MAIN MENU PRESS '6' (OUTPUTS). THEN '1' (OUTPUT ASSIGNMENTS). WITH CURSOR IN "OUTPUT ASSIGNMENT#" POSITION, ENTER "11"

```
PAGE:1  C1 PIN:12  VEHICLE PHASE
OUTPUT ASSIGNMENT #.................11
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID,1=FLASH)..............0
SELECT ASSIGNMENT:
NOT ENABLED.....................
VEHICLE PHASE.....................Y
PEDESTRIAN PHASE.....................
VEHICLE OVERLAP.....................Y
PEDESTRIAN OVERLAP.....................
WATCHDOG.....................
DETECTOR RESET.....................
ADVANCE BEACON.....................
OUT OF PHASE FLASHER.....................
CONTROLLER FLASH.....................
RUN FREE.....................
RESERVED.....................
PREEMPT.....................
SOFT PREEMPT.....................
ANY PREEMPT.....................
COORDINATION PLAN.....................
OFFSET.....................
PHASE CHECK.....................
PHASE ON.....................
PHASE NEXT.....................
```

THIS OUTPUT IS DEFAULTED AS A VEHICLE PHASE. THIS SETTING WILL REMAIN UNTIL CHANGE IS MADE.

ENTER A "Y" FOR VEHICLE OVERLAP.

```
PAGE:1  C1 PIN:12  VEHICLE PHASE
SELECT VEHICLE OVERLAP (A=1,P=16)...1
SELECT COLOR(0=RED,1=YEL,2=GRN).....0
```

WHEN A 'Y' IS ENTERED FOR 'VEHICLE OVERLAP' THE SCREEN SHOWN ABOVE WILL APPEAR. ENTER DATA AS SHOWN.

PRESS THE 'ENT' KEY AFTER ENTERING DATA. THEN 'ESC'.

PRESS "+" KEY TO ADVANCE TO OUTPUT 12

NOTE: THIS CHANGE MODIFIES THE PHASE 2 YELLOW LOAD SWITCH OUTPUT TO FLASH AND WILL PRODUCE THE OUTPUT FOR THE FLASHING YELLOW CLEARANCE INTERVAL.

```
PAGE:1  C1 PIN:13  VEHICLE PHASE
OUTPUT ASSIGNMENT #.................12
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...1.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...50
MODE (0=SOLID,1=FLASH)..............1
SELECT ASSIGNMENT:
NOT ENABLED.....................
VEHICLE PHASE.....................Y
PEDESTRIAN PHASE.....................
VEHICLE OVERLAP.....................
PEDESTRIAN OVERLAP.....................
WATCHDOG.....................
DETECTOR RESET.....................
ADVANCE BEACON.....................
OUT OF PHASE FLASHER.....................
CONTROLLER FLASH.....................
RUN FREE.....................
RESERVED.....................
PREEMPT.....................
SOFT PREEMPT.....................
ANY PREEMPT.....................
COORDINATION PLAN.....................
OFFSET.....................
PHASE CHECK.....................
PHASE ON.....................
PHASE NEXT.....................
```

MODIFY DATA AS SHOWN TO MAKE OUTPUT 12 (PHASE 2 YELLOW) A FLASHING OUTPUT

PRESS "+" KEY TWICE TO ADVANCE TO OUTPUT 14

NOTE: THIS CHANGE REASSIGNS THE PHASE 1 VEHICLE RED OUTPUT AS OVERLAP 'A' RED DUPLICATE AND IS USED TO DRIVE LOAD SWITCH S1 RED.

```
PAGE:1  C1 PIN:16  VEHICLE PHASE
OUTPUT ASSIGNMENT #.................14
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID,1=FLASH)..............0
SELECT ASSIGNMENT:
NOT ENABLED.....................
VEHICLE PHASE.....................Y
PEDESTRIAN PHASE.....................
VEHICLE OVERLAP.....................Y
PEDESTRIAN OVERLAP.....................
WATCHDOG.....................
DETECTOR RESET.....................
ADVANCE BEACON.....................
OUT OF PHASE FLASHER.....................
CONTROLLER FLASH.....................
RUN FREE.....................
RESERVED.....................
PREEMPT.....................
SOFT PREEMPT.....................
ANY PREEMPT.....................
COORDINATION PLAN.....................
OFFSET.....................
PHASE CHECK.....................
PHASE ON.....................
PHASE NEXT.....................
```

THIS OUTPUT IS DEFAULTED AS A VEHICLE PHASE. THIS SETTING WILL REMAIN UNTIL CHANGE IS MADE.

ENTER A "Y" FOR VEHICLE OVERLAP.

```
PAGE:1  C1 PIN:16  VEHICLE PHASE
SELECT VEHICLE OVERLAP (A=1,P=16)...1
SELECT COLOR(0=RED,1=YEL,2=GRN).....0
```

WHEN A 'Y' IS ENTERED FOR 'VEHICLE OVERLAP' THE SCREEN SHOWN ABOVE WILL APPEAR. ENTER DATA AS SHOWN.

PRESS THE 'ENT' KEY AFTER ENTERING DATA. THEN 'ESC'.

PRESS "+" KEY MULTIPLE TIMES TO ADVANCE TO OUTPUT 51

CHANGE C1 PIN NUMBER FROM 98 TO 13 AS SHOWN

NOTE: THIS CHANGE REMAPS THE OVERLAP 'A' YELLOW OUTPUT TO THE SAME C1 PIN AS PHASE 2 YELLOW AND WILL PRODUCE THE OUTPUT FOR THE STEADY YELLOW CLEARANCE.

```
PAGE:1  C1 PIN:13  VEHICLE OVERLAP
OUTPUT ASSIGNMENT #.................51
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID,1=FLASH)..............0
SELECT ASSIGNMENT:
NOT ENABLED.....................
VEHICLE PHASE.....................
PEDESTRIAN PHASE.....................
VEHICLE OVERLAP.....................Y
PEDESTRIAN OVERLAP.....................
WATCHDOG.....................
DETECTOR RESET.....................
ADVANCE BEACON.....................
OUT OF PHASE FLASHER.....................
CONTROLLER FLASH.....................
RUN FREE.....................
RESERVED.....................
PREEMPT.....................
SOFT PREEMPT.....................
ANY PREEMPT.....................
COORDINATION PLAN.....................
OFFSET.....................
PHASE CHECK.....................
PHASE ON.....................
PHASE NEXT.....................
```

OUTPUT PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN:
DESIGNED:
SEALED:
REVISED:

Electrical Detail - Sheet 2 of 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION — Transportation Mobility and Safety Division — Signals Management

750 N.Greenfield Pkwy.Garner,NC 27529

SEAL

PLAN DATE:	REVIEWED BY:
PREPARED BY:	REVIEWED BY:

REVISIONS	INIT.	DATE

SIGNATURE DATE

SIG. INVENTORY NO.

Oasis Typical Pedestrian Hybrid Beacon (170 Cabinet)

SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

12-20

STD. NO. 15.1

SHEET 2 OF 3

PROJECT REFERENCE NO.	SHEET NO.
	Sig.

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS). THEN '1' (VEHICLE OVERLAP SETTINGS).

```
 PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
 PHASE:          :1234567891011121314151 6
VEH OVL PARENTS:: X
VEH OVL NOT VEH::
VEH OVL NOT PED::
VEH OVL GRN EXT:: X
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  _ GREEN
SELECT VEHICLE OVERLAP OPTIONS:   (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC).........5
YELLOW CLEAR (0=PARENT,3-25.5 SEC)..4.2
RED CLEAR (0=PARENT,0.1-25.5 SEC)...5.0
OUTPUT AS PHASE # (0=NONE, 1-16)....0
```

NOTICE TIMING INTERVALS ← THESE COME FROM THE SIGNAL PLAN

OVERLAP PROGRAMMING COMPLETE

PEDESTRIAN DETECTOR ASSIGNMENT PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '7' (DETECTORS). THEN '2' (PEDESTRIAN DETECTOR ASSIGNMENTS). PRESS '+' UNTIL PED DETECTOR #4 IS REACHED.

```
PED DETECTOR #4  SETTINGS   (+/- DET)
PHASE#          :1234567891011121314151 6
PHASES ASSIGNED :   X   X
SETTING:                        (Y/N)
ENABLE DETECTOR.....................Y
ENABLE LOGGING......................Y
ENABLE DIAGNOSTICS..................N
RECALL IF FAILED....................Y
MAX CALLS/MINUTE (0-255)............255
MAX CALLS/DIAG PERIOD (0-255).......0
MAX OCCUPANCY % (0-100%)............100
```

PRESS '+' UNTIL PED DETECTOR #8 IS REACHED

```
PED DETECTOR #8  SETTINGS   (+/- DET)
PHASE#          :1234567891011121314151 6
PHASES ASSIGNED :   X   X
SETTING:                        (Y/N)
ENABLE DETECTOR.....................Y
ENABLE LOGGING......................Y
ENABLE DIAGNOSTICS..................N
RECALL IF FAILED....................Y
MAX CALLS/MINUTE (0-255)............255
MAX CALLS/DIAG PERIOD (0-255).......0
MAX OCCUPANCY % (0-100%)............100
```

PROGRAMMING COMPLETE

TIMING INTERVAL

PHASE 2 GREEN REST = Dark Display

PHASE 2 YELLOW CLEAR TIME = Flashing Yellow Display

OVERLAP 'A' YELLOW CLEAR TIME = Steady Yellow Display

OVERLAP 'A' RED CLEAR TIME = Steady Red Display

PHASE 4+8 WALK = Steady Red Display

PHASE 4+8 PED CLEAR = Alternating Flashing Red Display

PHASE 4+8 VEH YEL CLR = Alternating Flashing Red Display

PHASE 4+8 VEH RED CLR = Alternating Flashing Red Display

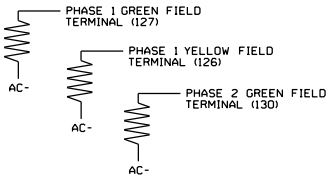
COUNTDOWN PEDESTRIAN SIGNAL OPERATION

Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

ACCEPTABLE VALUES	
VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN:
DESIGNED:
SEALED:
REVISED:

Electrical Detail - Sheet 3 of 3

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:

NCDOT Traffic Engineering Branch

750 N.Greenfield Pkwy.Garner,NC 27529

PLAN DATE: | REVIEWED BY:
PREPARED BY: | REVIEWED BY:

REVISIONS	INIT.	DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL

SIGNATURE | DATE

SIG. INVENTORY NO.

Oasis Typical Pedestrian Hybrid Beacon (170 Cabinet)

SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

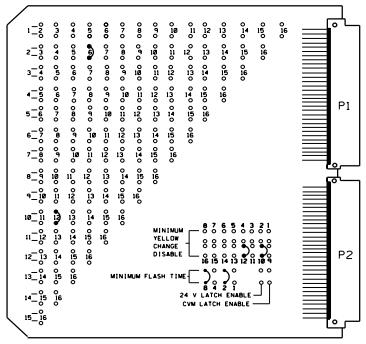
12-20

STD. NO. 15.1

SHEET 3 OF 3

EDI MODEL MMU2-16LEip
MALFUNCTION MANAGEMENT UNIT
PROGRAMMING DETAIL

(program card and tables as shown below)



MMU PROGRAMMING CARD

FIELD CHECK ENABLE DUAL IND ENABLE RED FAIL ENABLE	
CHANNEL NUMBER	ENABLE/ DISABLE
1	DISABLE
* 2	ENABLE
3	DISABLE
4	DISABLE
5	DISABLE
6	DISABLE
7	DISABLE
8	DISABLE
9	DISABLE
10	ENABLE
11	DISABLE
12	ENABLE
13	DISABLE
14	DISABLE
15	DISABLE
16	DISABLE

UNIT OPTIONS	
OPTION	SETTING
RECURRENT PULSE	ON
WALK DISABLE	OFF
LOG CVM FAULTS	ON
EXTERN WATCHDOG	OFF
24V-2=12VDC	OFF
PGM CARD MEMORY	ON
LEDguard	ON
FORCE TYPE 16	OFF
TYPE12-SDLC	OFF
VM 3x/Day Latch	ON

FLASHING YELLOW ARROW	
CONFIG MODE	B
ENABLE CHANNEL PAIR, FYA	
CH 1-13	OFF
CH 3-14	OFF
CH 5-15	OFF
CH 7-16	OFF
RED/YEL INPUT ENABLE	
CH 1	OFF
CH 3	OFF
CH 5	OFF
CH 7	OFF
FLASH RATE FAULT	OFF
FYA TRAP DETECT	OFF

MMU PROGRAMMING NOTE

ENSURE YELLOW CHANGE PLUS RED CLEARANCE MONITORING IS ENABLED FOR ALL CHANNELS.

* Only enable R-Y Dual Indication for this channel. During the Flashing Yellow Clearance interval, channel 2 Green will be active at the same time the logic is instructed to turn on channel 2 Yellow (a G-Y Dual Indication). Enabling G-Y Dual Indication would result in a self made flash condition.

NOTES

1. To prevent "flash-conflict" problems, wire all unused load switches to flash red. Verify that signal heads flash in accordance with the signal plans.
2. To prevent red failures on unused monitor channels, tie unused load switch red outputs 1,3,4,5,7,8,9,11,13,14,15, and 16 to load switch AC+ by inserting a jumper plug in the unused load switch socket from pin 1 (LS AC+) to pin 3 (RED out). Make sure all flash transfer relays are in place.
3. Program controller to start up in phase 2 Walk and 6 Walk.
4. Set power-up flash time to 10 seconds and implement on the Malfunction Management Unit. Set controller power-up flash time to 0 seconds.
5. Enable simultaneous gap-out feature for all phases.
6. Program phases 2 and 6 for Rest In Walk.
7. Program phase 2 and 6 for Ped Recall.
8. Program phases 4 and 8 for PED>CLR RED.

EQUIPMENT INFORMATION

CONTROLLER.....2070LNX2
CABINET TS-2
SOFTWARE .....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
LOADBAY POSITIONS.....16
LOAD SWITCHES USED.....2,6,10,12
PHASES USED.....2,2PED*,4*,4PED,6,6PED*,8*,8PED
OVERLAPS.....NONE
* Used for timing purposes only.

PROJECT REFERENCE NO.	SHEET NO.
	Sig.

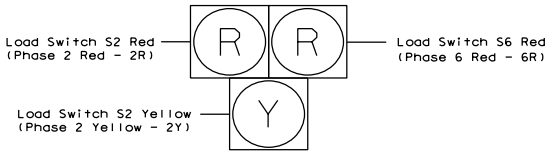
SIGNAL HEAD HOOK-UP CHART

PHASE	1	2	3	4	5	6	7	8	2 PED	4 PED	6 PED	8 PED	OLA	OLB	OLC	OLD
SIGNAL HEAD NO.	NU	21,22 61,62	NU	NC	NU	21,22 61,62	NU	NC	NC	P41	NC	P81	NU	NU	NU	NU
RED		2R				6R										
YELLOW		2Y				*										
GREEN		*				*										
RED ARROW																
YELLOW ARROW																
FLASHING YELLOW ARROW																
GREEN ARROW																
✋										10R		12R				
🚶										10G		12G				

NU = Not Used
NC = Not Connected
* Denotes install load resistor. See Load Resistor Installation Detail on this sheet.

SIGNAL HEAD WIRING DETAIL

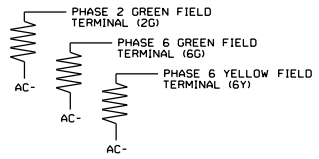
(wire signal heads as shown)



LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

ACCEPTABLE VALUES	
VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



ECONOLITE ASC/3-2070 PEDESTRIAN DETECTOR PHASE ASSIGNMENT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [6. DETECTORS]
2. From DETECTOR Submenu select [3. PED DETECTOR INPUT ASSIGNMENT]
3. Press the TOGGLE key to select [ECONOLITE MODE] and press ENTER.

```
PED DET PHASE ASSIGNMENT MODE:ECONOLITEv
PHASE  1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
  D  1 X . . . . . . . . . . . . . . . .
  E  2 . X . . . . . . . . . . . . . . .
  T  3 . . X . . . . . . . . . . . . . .
  E  4 . . . X . . . X . . . . . . . . .
  C  5 . . . . X . . . . . . . . . . . .
  T  6 . . . . . X . . . . . . . . . . .
  O  7 . . . . . . X . . . . . . . . . .
  R  8 . . . X . . . X . . . . . . . . .
     9 . . . . . . . . X . . . . . . . .
    10 . . . . . . . . . X . . . . . . .
    11 . . . . . . . . . . X . . . . . .
    12 . . . . . . . . . . . X . . . . .
    13 . . . . . . . . . . . . X . . . .
    14 . . . . . . . . . . . . . X . . .
    15 . . . . . . . . . . . . . . X . .
    16 . . . . . . . . . . . . . . . X .
```

"." = No assignment, disabled
X = Assigns Pedestrian Push Button (PPB) to call the phase or phases
2 = Call for Ped timing 2
B = Allows for the PPB to call for Min Green 2 (BIKE GREEN)

OPERATIONAL NOTES

1. In order for the controller to perform the Pedestrian Hybrid Beacon (HAWK signal) sequence, special logic programming is necessary. Refer to sheet 2 for the Econolite ASC/3-2070 Logic Processor Programming Detail.
2. For operational purposes, Phase 2 and Phase 6 both run dummy pedestrian phases that are required to produce the correct HAWK signal sequence. There are no Phase 2 or Phase 6 pedestrian heads.
3. The only Phase 6 load switch output that is being used drives one of the red signal faces of each signal head.
4. The Logic Processor flashes Phase 2 Yellow during the Phase 2 pedestrian clearance phase, and Phase 2 Yellow drives the solid Yellow signal faces during Phase 2 vehicle Yellow clear.
5. The Phase 2 and Phase 6 Red outputs drive the solid Red displays during Phase 2 and 6 Red. The Logic Processor flashes the Phase 2 and Phase 6 Red outputs in a wig-wag pattern during Phase 4+8 Ped Clear and thru Phase 4+8 vehicle Yellow and Red clear.
6. The controller must be programmed for Ped Clear Thru Red for Pedestrian Phases 4 and 8 so that the Red displays continue to flash during Phases 4 and 8 Yellow Clear and Red clear.
7. Make sure that all Phase 2 and Phase 6 timings match each other, and that all Phase 4 and Phase 8 timings match each other.
8. The Ped 4 push button is programmed to call Ped 4 and Ped 8, and the Ped 8 push button is programmed to call Ped 8 and Ped 4.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN:
DESIGNED:
SEALED:
REVISED:

Electrical Detail - Sheet 1 of 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Transportation Mobility and Safety Division
Signals Management Section

750 N.Greenfield Pkwy.,Garner,NC 27529

PLAN DATE: | REVIEWED BY:
PREPARED BY: | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL

SIGNATURE DATE

SIG. INVENTORY NO.

ASC/3–2070 Typical Pedestrian Hybrid Beacon (NEMA Cabinet)

SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

12-20

STD. NO. 15.2

SHEET 1 OF 2

ECONOLITE ASC/3 LOGIC PROCESSOR PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From LOGIC PROCESSOR Submenu select [2. LOGIC STATEMENTS]

ENTER A "1" IN THE LP# FIELD. PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   1  COPY FROM:   1  ACTIVE:  M   (T/F)
IF     PED ON PH PED CLR     2      IS  ON
AND    LP COB CODE ON                   546
THEN   SIG SET PH YELLOW     2          ON

ELSE
```

LOGIC TO FLASH YELLOW SIGNAL FACES AFTER A PED CALL IS PLACED.

ENTER A "2" IN THE LP# FIELD. PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   2  COPY FROM:   1  ACTIVE:  M   (T/F)
IF     PED ON PH PED CLR     4      IS  ON
AND    LP COB CODE ON                   546
THEN   SIG SET PHASE RED     2          OFF

ELSE
```

LOGIC TO PRODUCE ALTERNATING FLASHING RED INDICATIONS ON HEADS 21, 22, 61, 62 DURING PED 4+8 CLEAR (FORCES PHASE 2 RED OFF).

ENTER A "3" IN THE LP# FIELD. PRESS 'ENTER', AND PROGRAM AS SHOWN.

```
LP#:   3  COPY FROM:   1  ACTIVE:  M   (T/F)
IF     PED ON PH PED CLR     4      IS  ON
AND    LP COB CODE OFF                  546
THEN   SIG SET PHASE RED     6          OFF

ELSE
```

LOGIC TO PRODUCE ALTERNATING FLASHING RED INDICATIONS ON HEADS 21, 22, 61, 62 DURING PED 4+8 CLEAR (FORCES PHASE 6 RED OFF).

END PROGRAMMING

NOTE: COB CODE 546 is a 1Hz 50% Duty Cycle internal logic processor reference.

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From LOGIC PROCESSOR Submenu select [1. LOGIC STATEMENT CONTROL]

ENABLE LOGIC PROCESSOR STATEMENTS 1-3 BY POSITIONING THE CURSOR OVER THE FIELDS SHOWN BELOW AND USING THE TOGGLE KEY TO ENABLE THEM.

```
LOGIC STATEMENT CONTROL
          1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
LP 1-15   E E E . . . . . . . . . . . . . .
LP 16-30  . . . . . . . . . . . . . . . . .
LP 31-45  . . . . . . . . . . . . . . . . .
LP 46-60  . . . . . . . . . . . . . . . . .
LP 61-75  . . . . . . . . . . . . . . . . .
LP 76-90  . . . . . . . . . . . . . . . . .
```

END PROGRAMMING

ECONOLITE ASC/3-2070 LOAD SWITCH ASSIGNMENT DETAIL

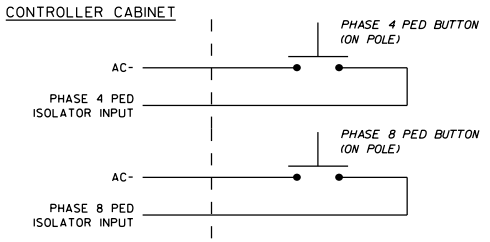
(program controller as shown)

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [3. LOAD SW ASSIGN]

```
LD SWITCH ASSIGN
    PHASE        DIMMING ---FLASH---
    /OVLP TYPE R Y G D PWR AUT TGR
1     1    V    . . . + A    R    X
2     2    V    . . . + A    Y    .
3     3    V    . . . + A    R    X
4     4    V    . . . + A    R    .
5     5    V    . . . - A    R    .
6     6    V    . . . - A    Y    X
7     7    V    . . . - A    R    .
8     8    V    . . . - A    R    X
9     2    P    . . . + A    R    .
10    4    P    . . . + A    R    .
11    6    P    . . . - A    R    .
12    8    P    . . . - A    R    .
13    1    O    . . . + A    .    X
14    2    O    . . . - A    .    X
15    3    O    . . . + A    .    .
16    4    O    . . . - A    .    .
```

PEDESTRIAN PUSH BUTTON WIRING DETAIL

(wire push buttons as shown)



COUNTDOWN PEDESTRIAN SIGNAL OPERATION

Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

TIMING INTERVAL

PHASE 2+6 WALK = Dark Display
PHASE 2+6 PED CLEAR = Flashing Yellow Display
PHASE 2+6 VEH YEL CLR = Steady Yellow Display
PHASE 2+6 RED CLEAR = Steady Red Display
PHASE 4+8 WALK = Steady Red Display
PHASE 4+8 PED CLEAR = Alternating Flashing Red Display
PHASE 4+8 VEH YEL CLR = Alternating Flashing Red Display
PHASE 4+8 VEH RED CLR = Alternating Flashing Red Display

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN:
DESIGNED:
SEALED:
REVISED:

Electrical Detail - Sheet 2 of 2

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for the Offices of:

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Mobility and Safety Division
Signals Management Unit

750 N.Greenfield Pkwy.,Garner,NC 27529

PLAN DATE: | REVIEWED BY:
PREPARED BY: | REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL

SIGNATURE DATE

SIG. INVENTORY NO.

PROJECT REFERENCE NO. | SHEET NO.
Sig.

ASC/3–2070 Typical Pedestrian Hybrid Beacon (NEMA Cabinet)

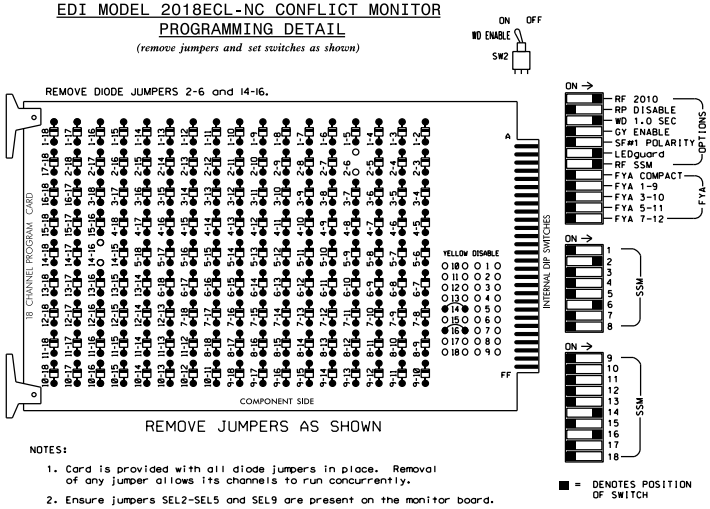
SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

12-20

STD. NO.
15.2
SHEET 2 OF 2

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, wire all unused load switches to flash red. Verify that signal heads flash in accordance with the signal plans. Insert yellow flash program blocks for load switches S2 and S8.
2. Program controller to start up in phases 2 Walk and 6 Walk.
3. Enable simultaneous gap-out for all phases.
4. Program phases 2 and 6 for Rest In Walk.
5. Program phases 2 and 6 for Ped Recall.
6. Program phases 4 and 8 for PED>CLR RED.

EQUIPMENT INFORMATION

CONTROLLER.....2070
CABINET.....332
SOFTWARE.....OASIS ASC/3-2070
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...12
LOAD SWITCHES USED.....S2,S3,S8,S9
PHASES USED.....2,2PED*,4*,4PED,6,6PED*,8*,8PED
OVERLAPS.....NONE

* Used for timing purposes only.

PROJECT REFERENCE NO.	SHEET NO.
	Sig.

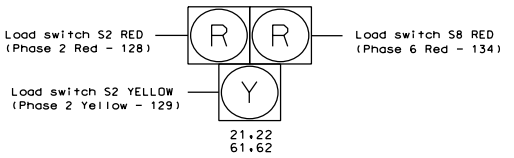
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	7	8	8 PED
SIGNAL HEAD NO.	NU	21,22 61,62	NC	NU	NC	P41	NU	21,22 61,62	NC	NU	NC	P81
RED		128						134				
YELLOW		129						*				
GREEN		*						*				
RED ARROW												
YELLOW ARROW												
GREEN ARROW												
✋						104						110
🚶						106						112

NU = Not Used
NC = Not Connected
* Denotes install load resistor. See load resistor installation detail this sheet.

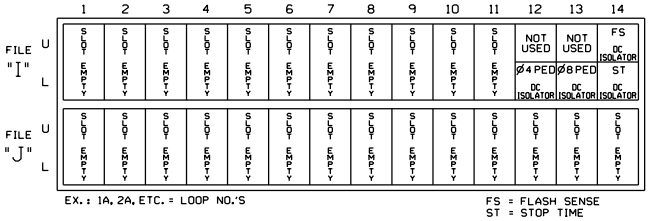
SIGNAL HEAD WIRING DETAIL

(wire signal heads as shown)



INPUT FILE POSITION LAYOUT

(front view)



INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND TIME	DELAY TIME	ADDED INITIAL	DETECTOR TYPE
PED PUSH BUTTONS										
P41,P42	T88-5,6	I12L	69	PED 4	4/8 PED					
P81,P82	T88-8,9	I13L	70	PED 8	4/8 PED					

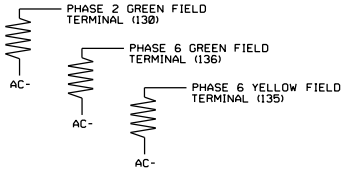
NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12 AND I13.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

ACCEPTABLE VALUES	
VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN:
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Electrical Detail - Sheet 1 of 3

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ELECTRICAL AND PROGRAMMING DETAILS FOR:

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Transportation Mobility and Safety Division
Signals Management Section

750 N.Greenfield Pkwy.Garner,NC 27529

PLAN DATE: | REVIEWED BY:
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SIG. INVENTORY NO.

ASC/3–2070 Typical Pedestrian Hybrid Beacon (170 Cabinet)

SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

12-20

STD. NO.
15.3
SHEET 1 OF 3

PROJECT REFERENCE NO.	SHEET NO.
	Sig.

ECONOLITE ASC/3 LOGIC PROCESSOR PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From LOGIC PROCESSOR Submenu select [2. LOGIC STATEMENTS]

ENTER A "1" IN THE LP# FIELD. PRESS 'ENTER'. AND PROGRAM AS SHOWN.

```
LP#:   1  COPY FROM:   1  ACTIVE:  M   (T/F)
IF     PED ON PH PED CLR     2     IS  ON
AND    LP COB CODE ON                  546
THEN   SIG SET PH YELLOW     2         ON
ELSE
```

LOGIC TO FLASH YELLOW SIGNAL FACES AFTER A PED CALL IS PLACED.

ENTER A "2" IN THE LP# FIELD. PRESS 'ENTER'. AND PROGRAM AS SHOWN.

```
LP#:   2  COPY FROM:   2  ACTIVE:  M   (T/F)
IF     PED ON PH PED CLR     4     IS  ON
AND    LP COB CODE ON                  546
THEN   SIG SET PHASE RED     2         OFF
ELSE
```

LOGIC TO PRODUCE ALTERNATING FLASHING RED INDICATIONS ON HEADS 21, 22, 61, 62 DURING PED 4+8 CLEAR (FORCES PHASE 2 RED OFF).

ENTER A "3" IN THE LP# FIELD. PRESS 'ENTER'. AND PROGRAM AS SHOWN.

```
LP#:   3  COPY FROM:   3  ACTIVE:  M   (T/F)
IF     PED ON PH PED CLR     4     IS  ON
AND    LP COB CODE OFF                 546
THEN   SIG SET PHASE RED     6         OFF
ELSE
```

LOGIC TO PRODUCE ALTERNATING FLASHING RED INDICATIONS ON HEADS 21, 22, 61, 62 DURING PED 4+8 CLEAR (FORCES PHASE 6 RED OFF).

ENTER A "4" IN THE LP# FIELD. PRESS 'ENTER'. AND PROGRAM AS SHOWN.

```
LP#:   4  COPY FROM:   4  ACTIVE:  M   (T/F)
IF     PED ON PH PED CLR     2     IS  ON
THEN   SIG SET PH GREEN      2         OFF
ELSE
```

TURNS LOAD SWITCH 2 GREEN OFF DURING PHASE 2 PED CLEAR TO AVOID A G/Y DUAL INDICATION.

END PROGRAMMING

NOTE: COB CODE 546 is a 1Hz 50% Duty Cycle internal logic processor reference.

1. From Main Menu select [1. CONFIGURATION]
2. From CONFIGURATION Submenu select [8. LOGIC PROCESSOR]
3. From LOGIC PROCESSOR Submenu select [1. LOGIC STATEMENT CONTROL]

ENABLE LOGIC PROCESSOR STATEMENTS 1-4 BY POSITIONING THE CURSOR OVER THE FIELDS SHOWN BELOW AND USING THE TOGGLE KEY TO ENABLE THEM.

```
LOGIC STATEMENT CONTROL
          1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
LP 1-15   E E E E . . . . . . . . . . . .
LP 16-30  . . . . . . . . . . . . . . . .
LP 31-45  . . . . . . . . . . . . . . . .
LP 46-60  . . . . . . . . . . . . . . . .
LP 61-75  . . . . . . . . . . . . . . . .
LP 76-90  . . . . . . . . . . . . . . . .
```

END PROGRAMMING

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN:
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SEALED:
REVISED:

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

ECONOLITE ASC/3-2070 PEDESTRIAN DETECTOR PHASE ASSIGNMENT PROGRAMMING DETAIL

(program controller as shown)

1. From Main Menu select [6. DETECTORS]
2. From DETECTOR Submenu select [3. PED DETECTOR INPUT ASSIGNMENT]
3. Press the TOGGLE key to select [ECONOLITE MODE] and press ENTER.

```
PED DET PHASE ASSIGNMENT MODE:ECONOLITEv
PHASE  1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6
  D  1 X . . . . . . . . . . . . . . .
  E  2 . X . . . . . . . . . . . . . .
  T  3 . . X . . . . . . . . . . . . .
  E  4 . . . X . . . X . . . . . . . .
  C  5 . . . . X . . . . . . . . . . .
  T  6 . . . . . X . . . . . . . . . .
  O  7 . . . . . . X . . . . . . . . .
  R  8 . . . X . . . X . . . . . . . .
     9 . . . . . . . . X . . . . . . .
    10 . . . . . . . . . X . . . . . .
    11 . . . . . . . . . . X . . . . .
    12 . . . . . . . . . . . X . . . .
    13 . . . . . . . . . . . . X . . .
    14 . . . . . . . . . . . . . X . .
    15 . . . . . . . . . . . . . . X .
    16 . . . . . . . . . . . . . . . X
```

"." = No assignment, disabled
X = Assigns Pedestrian Push Button (PPB) to call the phase or phases
2 = Call for Ped timing 2
B = Allows for the PPB to call for Min Green 2 (BIKE GREEN)

Electrical Detail - Sheet 2 of 3

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION Mobility and Safety Division Signals Management Unit

750 N.Greenfield Pkwy.Garner,NC 27529

SEAL

PLAN DATE:	REVIEWED BY:
PREPARED BY:	REVIEWED BY:

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SIGNATURE DATE

SIG. INVENTORY NO.

ASC/3–2070 Typical Pedestrian Hybrid Beacon (170 Cabinet)

SIGNALS MANAGEMENT
TRANSPORTATION MOBILITY AND SAFETY DIVISION
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

12-20

STD. NO. 15.3

SHEET 2 OF 3

PROJECT REFERENCE NO.	SHEET NO.
	Sig.

TIMING INTERVAL

PHASE 2+6 WALK = Dark Display

PHASE 2+6 PED CLEAR = Flashing Yellow Display

PHASE 2+6 VEH YEL CLR = Steady Yellow Display

PHASE 2+6 RED CLEAR = Steady Red Display

PHASE 4+8 WALK = Steady Red Display

PHASE 4+8 PED CLEAR = Alternating Flashing Red Display

PHASE 4+8 VEH YEL CLR = Alternating Flashing Red Display

PHASE 4+8 VEH RED CLR = Alternating Flashing Red Display

OPERATIONAL NOTES

1. In order for the controller to perform the Pedestrian Hybrid Beacon (HAWK signal) sequence, special logic programming is necessary. Refer to sheet 2 for the Econolite ASC/3-2070 Logic Processor Programming Detail.
2. For operational purposes, Phase 2 and Phase 6 both run dummy pedestrian phases that are required to produce the correct HAWK signal sequence. There are no Phase 2 or Phase 6 pedestrian heads.
3. The only Phase 6 load switch output that is being used drives one of the red signal faces of each signal head.
4. The Logic Processor flashes Phase 2 Yellow during the Phase 2 pedestrian clearance phase, and Phase 2 Yellow drives the solid Yellow signal faces during Phase 2 vehicle Yellow clear.
5. The Phase 2 and Phase 6 Red outputs drive the solid Red displays during Phase 2 and 6 Red. The Logic Processor flashes the Phase 2 and Phase 6 Red outputs in a wig-wag pattern during Phase 4+8 Ped Clear and thru Phase 4+8 vehicle Yellow and Red clear.
6. The controller must be programmed for Ped Clear Thru Red for Pedestrian Phases 4 and 8 so that the Red displays continue to flash during Phases 4 and 8 Yellow Clear and Red clear.
7. Make sure that all Phase 2 and Phase 6 timings match each other, and that all Phase 4 and Phase 8 timings match each other.
8. The Ped 4 push button is programmed to call Ped 4 and Ped 8, and the Ped 8 push button is programmed to call Ped 8 and Ped 4.

THIS ELECTRICAL DETAIL IS FOR
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Electrical Detail - Sheet 3 of 3

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15.3

SHEET 3 OF 3