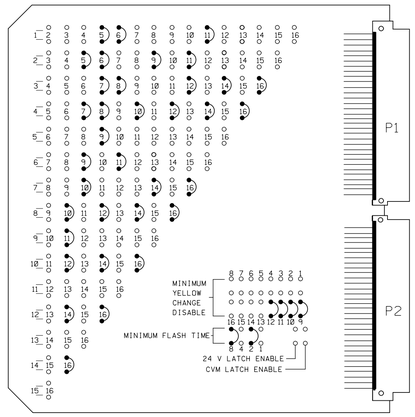
DocuSign Envelope ID: DDF446A1-D787-4E84-82F0-3D0FF9BE50D1

PROJECT REFERENCE NO.	SHEET NO.
U-5828	SIG. 15

EDI MODEL MMU2-16LEip MALFUNCTION MANAGEMENT UNIT PROGRAMMING DETAIL

(program card and tables as shown)



MMU PROGRAMMING CARD

FIELD CHECK ENABLE DUAL IND ENABLE RED FAIL ENABLE	
CHANNEL NUMBER	ENABLE/ DISABLE
1	ENABLE
2	ENABLE
3	ENABLE
4	ENABLE
5	ENABLE
6	ENABLE
7	DISABLE
8	ENABLE
9	ENABLE
10	ENABLE
11	ENABLE
12	ENABLE
13	DISABLE
14	ENABLE
15	DISABLE
16	ENABLE

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	ON
CH 5-15	OFF
CH 7-16	ON
RED/YEL INPUT ENABLE	
CH 1	OFF
CH 3	ON
CH 5	OFF
CH 7	ON
FLASH RATE FAULT	ON
FYA TRAP DETECT	ON

MMU PROGRAMMING NOTE

ENSURE YELLOW CHANGE PLUS RED CLEARANCE MONITORING IS ENABLED FOR ALL CHANNELS.

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 13 and 15 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 phases 4 and 8 for dual entry.
4. Program controller to start up in phase 2 Walk and 6 Walk.
5. Set power-up flash time to 10 seconds and implement on the Malfunction Management Unit. Set controller power-up flash time to 0 seconds.
6. Enable simultaneous gap-out feature for all phases.
7. Program detectors in accordance with the manufacturer's instructions to accomplish the detection schemes shown on the signal design plans.
8. Program detector call delay and extension timing on the controller, unless otherwise specified.
9. Set all detector card unit channels to "presence" mode.
10. Program phases 2 and 6 for volume density operation.
11. The cabinet and controller are a part of the Cary Signal System.

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.	11,12	82	21,22	22	31★	41,42	42	51	61,62	71★	81,82	P21, P22	P41, P42	P61, P62	P81, P82	NU	31★	NU	71★
RED			2R		✳	4R			6R	✳	8R								
YELLOW			2Y			4Y			6Y	✳	8Y								
GREEN			2G			4G			6G		8G								
RED ARROW	1R							5R									14R		16R
YELLOW ARROW	1Y	1Y		3Y			5Y	5Y									14Y		16Y
FLASHING YELLOW ARROW																	14G		16G
GREEN ARROW	1G	1G		3G	3G		5G	5G		7G									
✋												9R	10R	11R	12R				
🚶												9G	10G	11G	12G				

NU = Not Used

✳ Denotes install load resistor. See Load Resistor Installation Detail on sheet 3.

★ See pictorial of head wiring detail this sheet.

DETECTOR RACK SET-UP DETAIL

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

RACK #1	BIU	CH1 L3 Ø1	CH1 L1 Ø1	CH1 L7 Ø4	CH1 L5 Ø3	CH1 L11 Ø4	CH1 L9 Ø5	CH1 L15 Ø8	CH1 L13 Ø7	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY
		CH2 L4 Ø2 **	CH2 L2 Ø1	CH2 L8 Ø4	CH2 L6 Ø8	CH2 L12 Ø6 **	CH2 L10 Ø5	CH2 L16 Ø8	CH2 L14 Ø4			
RACK #2	BIU	SLOT EMPTY	CH1 L17 ØS1 ** / CH2 L18 ØS2 **	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY	SLOT EMPTY

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

	LOOP NO.	LOOP PANEL TERMINALS
	1A	L1A,L1B
	1B	L2A,L2B
	1C	L3A,L3B
	2A	L4A,L4B
ADD JUMPERS FROM: L5A TO L6A, AND L5B TO L6B	3A	L5A,L5B
		L6A,L6B
	4A	L7A,L7B
	4B	L8A,L8B
	5A	L9A,L9B
	5B	L10A,L10B
	4C	L11A,L11B
	6A	L12A,L12B
ADD JUMPERS FROM: L13A TO L14A, AND L13B TO L14B	7A	L13A,L13B
		L14A,L14B
	8A	L15A,L15B
	8B	L16A,L16B

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

CONTROLLER DETECTOR NO.	FUNCTION	TIMING FEATURE	TIMING TIME(SEC)
1	Ø1		
2	Ø1		
3	Ø1	DELAY	15
** 4	Ø2		
5	Ø3	DELAY	15
6	Ø8		
7	Ø4		
8	Ø4		
9	Ø5		
10	Ø5	DELAY	15
11	Ø4		
** 12	Ø6		
13	Ø7	DELAY	15
14	Ø4		
15	Ø8		
16	Ø8		

** Detector Type - N

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

LOOP NO.	LOOP PANEL TERMINALS
S1	L17A,L17B
S2	L18A,L18B
NU	L19A,L19B
NU	L20A,L20B
NU	L21A,L21B
NU	L22A,L22B
NU	L23A,L23B
NU	L24A,L24B
NU	L25A,L25B
NU	L26A,L26B
NU	L27A,L27B
NU	L28A,L28B
NU	L29A,L29B
NU	L30A,L30B
NU	L31A,L31B
NU	L32A,L32B

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

CONTROLLER DETECTOR NO.	FUNCTION	TIMING FEATURE	TIMING TIME(SEC)
** 17	SYSTEM		
** 18	SYSTEM		
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			

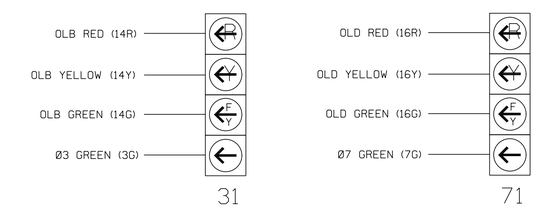
EQUIPMENT INFORMATION

CONTROLLER.....2070LN2
CABINET NC-8 TS-2
SOFTWARE .....ECONOLITE ASC/3-2070
CABINET MOUNT.....BASE
LOADBAY POSITIONS.....16
LOAD SWITCHES USED.....1,2,3,4,5,6,7,8,9,10,11,12,14,16
PHASES USED.....1,2,2PED,3,4,4PED,5,6,6PED,7,8,8PED
OLA.....NOT USED
OLB.....✳
OLC.....NOT USED
OLD.....✳

✳ See overlap programming detail on sheet 2

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE

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

LOAD SWITCH ASSIGNMENT DETAIL

(program controller according to schedule in chart below)

LOAD SWITCH NUMBER	FUNCTION
1	Ø1
2	Ø2
3	Ø3
4	Ø4
5	Ø5
6	Ø6
7	Ø7
8	Ø8
9	Ø2 PED
10	Ø4 PED
11	Ø6 PED
12	Ø8 PED
13	OLA
14	OLB
15	OLC
16	OLD

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 05-1533
DESIGNED: APRIL 2016
SEALED: 9/22/2016
REVISED: N/A

NC Dept of Transportation
Division of Highways
Final Drawing Date: 10/10/2016
DocuSigned by: 1D8B4B9D27A4494...
ITS & Signals Unit

FINAL DESIGN - SHEET 1 OF 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

SR 1002 (Aviation Parkway) at SR 3127 (McCrimmon Parkway)/ SR 3084 (Evans Road)

Division 5 Wake County Morrisville

PLAN DATE: April 2016	REVIEWED BY: SL PHILLIPS
PREPARED BY: SP PENNINGTON	REVIEWED BY:

REVISIONS	INIT.	DATE

Prepared For: Traffic Engineering and Safety Systems Branch, Signals Management Section, NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
750 N. Greenfield Pkwy, Garner, NC 27529

PLANS PREPARED IN THE OFFICE OF:
Kimley»Horn
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 032607 ENGINEER STACY L. PHILLIPS
DocuSigned by: 9/22/2016
DATE
SIG. INVENTORY NO. 05-1533

9/22/2016 9:10:07 AM susan.pennington K:\RAL_Roadway\012108004 - McCrimmon Parkway\Phase II\Plan\Signals\54 - Signal Design\15 05-1533_2016e1.dgn