



The following documentation is an electronically-submitted vendor response to an advertised solicitation from the *West Virginia Purchasing Bulletin* within the Vendor Self-Service portal at ***wvOASIS.gov***. As part of the State of West Virginia's procurement process, and to maintain the transparency of the bid-opening process, this documentation submitted online is publicly posted by the West Virginia Purchasing Division at ***WVPurchasing.gov*** with any other vendor responses to this solicitation submitted to the Purchasing Division in hard copy format.



Header 5

List View

## General Information

Contact

Default Values

Discount

Document Information

Clarification Request

Procurement Folder: 1218721

Procurement Type: Central Master Agreement

Vendor ID: 000000176550



Legal Name: PATH MASTER INC

Alias/DBA:

Total Bid: \$315,615.00

Response Date: 07/13/2023



Response Time: 11:28

Responded By User ID: Halle.VanScoyPMI



First Name: Halle

Last Name: VanScoy

Email: halle.vanscoy@pathmasterin

Phone: 330-425-4994

SO Doc Code: CRFQ

SO Dept: 0803

SO Doc ID: DOT2300000151

Published Date: 6/27/23

Close Date: 7/13/23

Close Time: 13:30

Status: Closed

Solicitation Description: TRAFFIC SIGNAL PARTS AND EQUIPMENT

Total of Header Attachments: 5

Total of All Attachments: 5





Department of Administration  
Purchasing Division  
2019 Washington Street East  
Post Office Box 50130  
Charleston, WV 25305-0130

State of West Virginia  
Solicitation Response

**Proc Folder:** 1218721  
**Solicitation Description:** TRAFFIC SIGNAL PARTS AND EQUIPMENT  
**Proc Type:** Central Master Agreement

Solicitation Closes	Solicitation Response	Version
2023-07-13 13:30	SR 0803 ESR07132300000000106	1

**VENDOR**  
000000176550  
PATH MASTER INC

**Solicitation Number:** CRFQ 0803 DOT2300000151

**Total Bid:** 315615      **Response Date:** 2023-07-13      **Response Time:** 11:28:34

**Comments:** Delivery of materials is estimated to be after the required 32 working days. Path Master, Inc. will not accept liquidated damages for material delivery.  
The lead time for quoted items is 12 - 16 Weeks, ARO.

**FOR INFORMATION CONTACT THE BUYER**

John W Estep  
304-558-2566  
john.w.estep@wv.gov

<b>Vendor Signature X</b>	<b>FEIN#</b>	<b>DATE</b>
-------------------------------	--------------	-------------

All offers subject to all terms and conditions contained in this solicitation

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
1	SIEMENS EAGLE YUNEX EPACM60 TRAFFIC CONTROLLERS	20.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments: NO BID

Extended Description:

SIEMENS EAGLE YUNEX EPACM60 TRAFFIC CONTROLLERS

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
2	SIEMENS EAGLE YUNEX EPACM60 MASTER TRAFFIC CONTROLLERS	10.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments: NO BID

Extended Description:

SIEMENS EAGLE YUNEX EPACM60 MASTER TRAFFIC CONTROLLERS

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
3	REPAIR OF EAGLE SIEMENS EPAC TRAFFIC CONTROLLERS	30.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments: NO BID

Extended Description:

REPAIR OF EAGLE SIEMENS EPAC TRAFFIC CONTROLLERS

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
4	EAGLE TS2 MODEL P38 POLE MOUNTED TRAFFIC SIGNAL CABINET	1.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments: NO BID

Extended Description:

EAGLE TS2 MODEL P38 POLE MOUNTED TRAFFIC SIGNAL CABINET

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
5	EAGLE TS2 SIZE P GROUND MOUNTED TRAFFIC SIGNAL CABINET	1.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments: NO BID

Extended Description:

EAGLE TS2 SIZE P GROUND MOUNTED TRAFFIC SIGNAL CABINET WITH ANCHOR BOLTS

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
6	ECONOLITE COBALT ATC TRAFFIC SIGANL CONTROLLER	15.00000	EA	4153.000000	62295.00

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:**

**Extended Description:**

ECONOLITE COBALT ATC TRAFFIC SIGANL CONTROLLER

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
7	REPAIR OF ECONOLITE COBALT ATC TRAFFIC SIGANL CONTROLLER	10.00000	EA	500.000000	5000.00

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:**

**Extended Description:**

REPAIR OF ECONOLITE COBALT ATC TRAFFIC SIGANL CONTROLLER

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
8	ECONOLITE TS2 MODEL P438 GROUND MOUNTED SIGNAL CABINET	1.00000	EA	14748.000000	14748.00

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:**

**Extended Description:**

ECONOLITE TS2 MODEL P438 GROUND MOUNTED SIGNAL CABINET

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
9	ECONOLITE TS2 MODEL P44 GROUND MOUNTED SIGNAL CABINET	1.00000	EA	14710.000000	14710.00

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:**

**Extended Description:**

ECONOLITE TS2 MODEL P44 GROUND MOUNTED SIGNAL CABINET

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
10	ITERIS RZ4 VEHICLE DETECTION VIDEO CAMERA	10.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:** NO BID

**Extended Description:**

ITERIS RZ4 VEHICLE DETECTION VIDEO CAMERA

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
11	REPAIR OF ITERIS RZ4 VEHICLE DETECTION VIDEO CAMERA	20.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:** NO BID

**Extended Description:**

REPAIR OF ITERIS RZ4 VEHICLE DETECTION VIDEO CAMERA

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
12	ITERIS VEHICLE DETECTION CARD	10.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:** NO BID

**Extended Description:**

ITERIS VEHICLE DETECTION CARD

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
13	REPAIR OF ITERIS VEHICLE DETECTION CARD	15.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:** NO BID

**Extended Description:**

REPAIR OF ITERIS VEHICLE DETECTION CARD

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
14	AUTOSCOPE AIS-IV MODEL 703170 VEHICLE DETECTION CAMERA	10.00000	EA	1992.000000	19920.00

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:**

**Extended Description:**

AUTOSCOPE AIS-IV MODEL 703170 VEHICLE DETECTION CAMERA

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
15	REPAIR OF AUTOSCOPE VEHICLE DETECTION CAMERA	10.00000	EA	500.000000	5000.00

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:**

**Extended Description:**

REPAIR OF AUTOSCOPE VEHICLE DETECTION CAMERA

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
16	AUTOSCOPE RACKVISION PRO 2-A-700-1030 VEHICLE DETECTION CARD	10.00000	EA	2277.000000	22770.00

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:**

**Extended Description:**

AUTOSCOPE RACKVISION PRO 2-A-700-1030 VEHICLE DETECTION CARD

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
17	REPAIR OF AUTOSCOPE VEHICLE DETECTION CARD	10.00000	EA	250.000000	2500.00

Comm Code	Manufacturer	Specification	Model #
46161500			

**Commodity Line Comments:**

**Extended Description:**

REPAIR OF AUTOSCOPE VEHICLE DETECTION CARD

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
18	WAVETRONIX SMART SENSOR MODEL SS225 RAPID PRESENCE DETECTION	1.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:** NO BID

**Extended Description:**

WAVETRONIX SMART SENSOR MODEL SS225 RAPID PRESENCE DETECTION

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
19	WAVETRONIX SMART SENSOR ADVANCE MODEL SS200E	1.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:** NO BID

**Extended Description:**

WAVETRONIX SMART SENSOR ADVANCE MODEL SS200E

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
20	WAVETRONIX SMART 2-CHANNEL CLICK 112 DETECTION CARD	0.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:** NO BID

**Extended Description:**

WAVETRONIX SMART 2-CHANNEL CLICK 112 DETECTION CARD



Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
21	WAVETRONIX 4-CHANNEL CLICK 114 VEHICLE DETECTION CARD	5.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:** NO BID

**Extended Description:**

WAVETRONIX 4-CHANNEL CLICK 114 VEHICLE DETECTION CARD

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
22	SMART MICRO STOP BAR ADVANCE MODEL TRUGRD UMRR-12 TYPE 48	1.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:** NO BID

**Extended Description:**

SMART MICRO STOP BAR ADVANCE MODEL TRUGRD UMRR-12 TYPE 48 RADAR

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
23	SMART MICRO VEHICLE DETECTION RADAR CARD MODEL TMIB AB	1.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:** NO BID

**Extended Description:**

SMART MICRO VEHICLE DETECTION RADAR CONTROLLER CONTROL PLUS CARD MODEL TMIB AB

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
24	SMART MICRO VEHICLE DETECTION RADAR DAUGHETER INTEFACE CARD	10.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:** NO BID

**Extended Description:**

SMART MICRO VEHICLE DETECTION RADAR DAUGHETER INTEFACE CARD

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
25	TOMAR PREEMPTION CONTROL SYSTEMS DETECTORS	30.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:** NO BID

**Extended Description:**

TOMAR PREEMPTION CONTROL SYSTEMS DETECTORS

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
26	TOMAR PREEMPTION CONTROL SYSTEMS DETECTION CARDS	20.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments: NO BID

Extended Description:

TOMAR PREEMPTION CONTROL SYSTEMS DETECTION CARDS

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
27	REPAIR OF TOMAR PREEMPTION CONTROL SYSTEMS CARDS	15.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments: NO BID

Extended Description:

REPAIR OF TOMAR PREEMPTION CONTROL SYSTEMS CARDS

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
28	TRAFFIC SIGNAL CONFLICT MONITOR	30.00000	EA	959.000000	28770.00

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments:

Extended Description:

TRAFFIC SIGNAL CONFLICT MONITOR

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
29	TRAFFIC SIGNAL MALFUNCTION MANAGEMNT UNIT	15.00000	EA	924.000000	13860.00

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments:

Extended Description:

TRAFFIC SIGNAL MALFUNCTION MANAGEMNT UNIT

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
30	TRAFFIC SIGNAL BUS INTERFACE UNIT	30.00000	EA	328.000000	9840.00

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments:

Extended Description:

TRAFFIC SIGNAL BUS INTERFACE UNIT

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
31	GREEN LED SIGNAL LAMP	200.00000	EA	37.000000	7400.00

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments:

Extended Description:

GREEN LED SIGNAL LAMP

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
32	YELLOW LED SIGNAL LAMP	200.00000	EA	43.000000	8600.00

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments:

Extended Description:

YELLOW LED SIGNAL LAMP

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
33	RED LED SIGNAL LAMP	200.00000	EA	38.000000	7600.00

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments:

Extended Description:

RED LED SIGNAL LAMP

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
34	GREEN ARROW LED SIGNAL LAMP	1.00000	EA	48.000000	48.00

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments:

Extended Description:

GREEN ARROW LED SIGNAL LAMP

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
35	YELLOW ARROW LED SIGNAL LAMP	1.00000	EA	45.000000	45.00

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments:

Extended Description:

YELLOW ARROW LED SIGNAL LAMP

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
36	RED ARROW LED SIGNAL LAMP	1.00000	EA	42.000000	42.00

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments:

Extended Description:  
RED ARROW LED SIGNAL LAMP

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
37	3 HEAD SIGNAL HOUSING	1.00000	EA	568.000000	568.00

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments:

Extended Description:  
3 HEAD SIGNAL HOUSING WITH HARDWARE

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
38	5 HEAD SIGNAL HOUSING	1.00000	EA	921.000000	921.00

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments:

Extended Description:  
5 HEAD SIGNAL HOUSING WITH HARDWARE

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
39	LED PEDESTRIAN SIGNAL HEAD WITH HOUSING & MOUNTING HARDWARE	30.00000	EA	338.000000	10140.00

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments:

Extended Description:  
LED PEDESTRIAN SIGNAL HEAD WITH HOUSING & MOUNTING HARDWARE

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
40	AUDIBLE PEDESTRIAN PUSH BUTTON	30.00000	EA	626.000000	18780.00

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments:

Extended Description:  
AUDIBLE PEDESTRIAN PUSH BUTTON

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
41	TS1 CABINET POWER SUPPLY	50.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments: NO BID

Extended Description:

TS1 CABINET POWER SUPPLY

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
42	TS2 CABINET POWER SUPPLY	15.00000	EA	583.000000	8745.00

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments:

Extended Description:

TS2 CABINET POWER SUPPLY

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
43	TIME CLOCKS	5.00000	EA	364.000000	1820.00

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments:

Extended Description:

TIME CLOCKS

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
44	FLASH TRANSFER RELAYS	20.00000	EA	36.000000	720.00

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments:

Extended Description:

FLASH TRANSFER RELAYS

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
45	SOLAR FLASHER CONTROLLER	5.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments: NO BID

Extended Description:

SOLAR FLASHER CONTROLLER



Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
46	SOLAR FLASHER MOTOR UNIT	5.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:** NO BID

**Extended Description:**

SOLAR FLASHER MOTOR UNIT

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
47	MULTILINK UNINTERRUPTIBLE POWER SUPPLY	2.00000	EA	2059.000000	4118.00

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:**

**Extended Description:**

MULTILINK UNINTERRUPTIBLE POWER SUPPLY

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
48	MULTILINK SAFETY AUTOMATIC TRANSFER SWITCH	2.00000	EA	759.000000	1518.00

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:**

**Extended Description:**

MULTILINK SAFETY AUTOMATIC TRANSFER SWITCH

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
49	MULTI LINK BATTERY BALANCER	2.00000	EA	136.000000	272.00

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:**

**Extended Description:**

MULTI LINK BATTERY BALANCER

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
50	BATTERIES FOR TRAFFIC SIGNAL SYSTEMS	2.00000	EA	212.000000	424.00

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:**

**Extended Description:**

BATTERIES FOR TRAFFIC SIGNAL SYSTEMS

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
51	MULTILINK BATTERY BACKUP SYSTEM CABINET	2.00000	EA	1828.000000	3656.00

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments:

Extended Description:

MULTILINK BATTERY BACKUP SYSTEM CABINET

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
52	HUBBELL TWISTLOCK POWER INLET	2.00000	EA	277.000000	554.00

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments:

Extended Description:

HUBBELL TWISTLOCK POWER INLET

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
53	ENCOM PULSE S RADIO TRANSCEIVERS	20.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments: NO BID

Extended Description:

ENCOM PULSE S RADIO TRANSCEIVERS

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
54	INTUICOM EB-X RADIO TRANSCEIVERS	10.00000	EA	1936.000000	19360.00

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments:

Extended Description:

INTUICOM EB-X RADIO TRANSCEIVERS

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
55	15 WATT CARMANAH SOLAR FLASHER ASSEMBLY	1.00000	EA	3064.000000	3064.00

Comm Code	Manufacturer	Specification	Model #
46161504			

Commodity Line Comments:

Extended Description:

15 WATT CARMANAH SOLAR FLASHER ASSEMBLY

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
56	30 WATT CARMANAH SOLAR FLASHER ASSEMBLY	1.00000	EA	3834.000000	3834.00

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:**

**Extended Description:**

30 WATT CARMANAH SOLAR FLASHER ASSEMBLY

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
57	ECONOLITE EVO RADAR VEHICLE DETECTION SENSOR KIT	1.00000	EA	8139.000000	8139.00

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:**

**Extended Description:**

ECONOLITE EVO RADAR VEHICLE DETECTION SENSOR KIT

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
58	ECONOLITE EVO RADAR VEHICLE DETECTION HUB	1.00000	EA	5834.000000	5834.00

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:**

**Extended Description:**

ECONOLITE EVO RADAR VEHICLE DETECTION HUB

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
59	ITERIS VANTAGE RADIUS RADAR SENSOR KIT	1.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:** NO BID

**Extended Description:**

ITERIS VANTAGE RADIUS RADAR SENSOR KIT

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
60	ITERIS VANTAGE RADIUS VEHICLE DETECTION CCU KIT	0.00000	EA		

Comm Code	Manufacturer	Specification	Model #
46161504			

**Commodity Line Comments:** NO BID

**Extended Description:**

ITERIS VANTAGE RADIUS VEHICLE DETECTION CCU KIT

## EXHIBIT A

Item Number	Estimated Quantity	Unit of Measure	Description	UNSPC CODE	Unit Price	Extended Extended
<b>SECTION 1</b>						
1	20	ea	Siemens Eagle (Yunex Traffic) Traffic Controller EPACM60 Series or equivalent	46161504		\$ -
2	10	ea	Siemens Eagle Master (Yunex Traffic) Traffic Controller M60 Series or equivalent	46161504		\$ -
3	30	ea	Repairs of Siemens Eagle (Yunex Traffic) EPAC Series Traffic Controllers	46161504		\$ -
4	1	ea	Eagle Traffic (Yunex Traffic) Signal TS2 M36 Size Pole Mounted Signal Cabinet or equivalent	46161504		\$ -
5	1	ea	Eagle (Yunex Traffic) TS2 Size P Ground Mounted Traffic Signal Cabinets with anchor bolts or equivalent	46161504		\$ -
<b>SECTION 2</b>						
6	15	ea	Econolite Cobalt ATC Traffic Signal Controller or equivalent	46161504	\$ 4,153.00	\$ 62,295.00
7	10	ea	Repair of Econolite Traffic Controller	46161504	\$ 500.00	\$ 5,000.00
8	1	ea	Econolite TS2 Model P38 Pole Mounted Signal Cabinet or equivalent	46161504	\$ 14,748.00	\$ 14,748.00
9	1	ea	Econolite TS2 Model P44 Ground Mounted Signal Cabinet or equivalent	46161504	\$ 14,710.00	\$ 14,710.00
<b>SECTION 3</b>						
10	10	ea	Iteris RZ4 Vehicle Detection Video Camera or equivalent	46161504		\$ -
11	20	ea	Repair of Iteris RZ4 Video Detection Camera or equivalent	46161504		\$ -
12	10	ea	Iteris Vehicle Detection Card or equivalent	46161504		\$ -
13	15	ea	Repair of Iteris Video Detection Card	46161504		\$ -

			<b>SECTION 4</b>			
14	10	ea	Autoscope AIS-IV Model 703170 Vehicle Detection Video Camera or equivalent	46161504	\$ 1,992.00	\$ 19,920.00
15	10	ea	Repair of Autoscope Vehicle Detection Cameras or equivalent	46161504	\$ 500.00	\$ 5,000.00
16	10	ea	Autoscope Rackvision Pro 2 Series Model PRO2-A700-1030 Vehicle Detection Cards or equivalent	46161504	\$ 2,277.00	\$ 22,770.00
17	10	ea	Repair of Autoscope Vehicle Detection Cards	46161504	\$ 250.00	\$ 2,500.00
			<b>SECTION 5</b>			
18	1	ea	Wavetronix Smart Sensor Matrix (Model SS225) Rapid Presence Detection or equivalent	46161504		\$ -
19	1	ea	Wavetronix Smart Sensor"Advance Model SS200E Vehicle Detection or equivalent	46161504		\$ -
20	10	ea	Wavetronix Smart 2-Channel Click 112 Series Detection Card or equivalent	46161504		\$ -
21	5	ea	Wavetronix 4-Channel Click 114 Series Vehicle DetectionCard or equivalent	46161504		\$ -
			<b>SECTION 6</b>			
22	1	ea	Smart Micro "Stop Bar"+ Advance Model TRUGRD UMRR-12 Type 48 Radar	46161504		\$ -
23	1	ea	Smart Micro Vehicle Detection Radar Controller Control Plus Interface Card Model TMIB AB	46161504		\$ -
24	10	ea	Smart Micro Vehicle Detection Radar Controller "Daughter" Interface Interface Card or equivalent	46161504		\$ -
			<b>SECTION 7</b>			
25	30	ea	TOMAR Preemption Control Systems Detectors or euqivalent	46161504		\$ -
26	20	ea	TOMAR Preemption Control Systems Detection Cards or equivalent	46161504		\$ -
27	15	ea	Repair of TOMAR Preemption Control Systems Detection Cards or euqivalent	46161504		\$ -



			SECTION 8			
28	30	ea	Traffic Signal Conflict Monitor	46161504	\$ 959.00	\$ 28,770.00
29	15	ea	Traffic Signal Malfunction Management Unit	46161504	\$ 924.00	\$ 13,860.00
30	30	ea	Traffic Signal Bus Interface Unit	46161504	\$ 328.00	\$ 9,840.00
31	200	ea	Green LED Signal Lamp	46161504	\$ 37.00	\$ 7,400.00
32	200	ea	Yellow LED Signal Lamp	46161504	\$ 43.00	\$ 8,600.00
33	200	ea	Red LED Signal Lamp	46161504	\$ 38.00	\$ 7,600.00
34	1	ea	Green Arrow LED Signal Lamp	46161504	\$ 48.00	\$ 48.00
35	1	ea	Yellow ArrowLED Signal Lamp	46161504	\$ 45.00	\$ 45.00
36	1	ea	Red Arrow LED Signal Lamp	46161504	\$ 42.00	\$ 42.00
37	1	ea	3 Head Signal Housing AND HARDWARE	46161504	\$ 568.00	\$ 568.00
38	1	ea	5 Head Signal Housing AND HARDWARE	46161504	\$ 921.00	\$ 921.00
39	30	ea	LED Pedestrian Signal Head with Housing and Mounting Hardware	46161504	\$ 338.00	\$ 10,140.00
40	30	ea	Audible Pedestrian Push Button	46161504	\$ 626.00	\$ 18,780.00
41	50	ea	TS1 Cabinet Power Supply	46161504		\$ -
42	15	ea	TS2 Cabinet Power Supply	46161504	\$ 583.00	\$ 8,745.00
43	5	ea	Time Clocks	46161504	\$ 364.00	\$ 1,820.00
44	20	ea	Flash Transfer Relays	46161504	\$ 36.00	\$ 720.00

45	5	ea	Solar Flasher Controller	46161504		\$ -
46	5	ea	Solar Flasher Motor Unit	46161504		\$ -
47	2	ea	Multilink Uninterruptible Power Supply	46161504	\$ 2,059.00	\$ 4,118.00
48	2	ea	Multilink Safety Automatic Transfer Switch	46161504	\$ 759.00	\$ 1,518.00
49	2	ea	Multilink Battery Balancer	46161504	\$ 136.00	\$ 272.00
50	2	ea	Batteries for Traffic Signal Systems	46161504	\$ 212.00	\$ 424.00
51	2	ea	Multilink Battery Backup System Cabinet	46161504	\$ 1,828.00	\$ 3,656.00
52	2	ea	Hubbell TwistLock Power Inlet	46161504	\$ 277.00	\$ 554.00

			<b>SECTION 9</b>			
53	20	ea	ENCOM Pulse S Radio Transceivers or equivalent	46161504		\$ -
			<b>SECTION 10</b>			
54	10	ea	Intuicom EB-X Radio Transceivers or equivalent	46161504	\$ 1,936.00	\$ 19,360.00
			<b>Section 11</b>			
55	1	ea	15 Watt Carmanah Solar Flasher Assembly	46161504	\$ 3,064.00	\$ 3,064.00
56	1	ea	30 Watt Carmanah Solar Flasher ASsembly	46161504	\$ 3,834.00	\$ 3,834.00

			Section 12			
57	1	ea	Econolite EVO Radar Vehicle Detection Sensor Kit or Equal	46161504	\$ 8,139.00	\$ 8,139.00
58	1	ea	Econolite EVO Radar Vehicle Detection HUB or Equal	46161504	\$ 5,834.00	\$ 5,834.00
			Section 13			
59	1	ea	Iteris Vantage Radius Radar Sensor Kit or Equal	46161504		\$ -
60	1	ea	Iteris Vantage Radius Radar Vehicle Detection CCU Kit or Equal	46161504		\$ -
					TOTAL	\$ 315,615.00

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

**SPECIFICATIONS**

1. **PURPOSE AND SCOPE:** The West Virginia Purchasing Division is soliciting bids on behalf of the West Virginia Division of Highways (WVDOH) to establish an open-end contract for Parts and Equipment for existing Traffic Signal Systems (TSS) and Intelligent Transportation Systems (ITS) infrastructure.
2. **DEFINITIONS:** The terms listed below shall have the meanings assigned to them below. Additional definitions can be found in section 2 of the General Terms and Conditions.
  - 2.1 **“Contract Item”** or **“Contract Items”** means the list of items identified in Section 3.1 below and on the Pricing Pages.
  - 2.2 **“Pricing Pages”** means the schedule of prices, estimated order quantity, and totals contained in WVOASIS or attached hereto as **Exhibit A**, and used to evaluate the Solicitation responses.
  - 2.3 **“Solicitation”** means the official notice of an opportunity to supply the State with goods or services that is published by the Purchasing Division.
  - 2.4 **“LED”** means Light Emitting Diode.
  - 2.5 **“MMU”** means Malfunctioning Monitoring Unit.
  - 2.6 **“TS1”** means NEMA Standards Publication TS 1-2003 (R2008) Traffic Controller Assemblies for Traffic Signal Systems [updated in 2003, revised in 2008].
  - 2.7 **“TS2”** means NEMA Standards Publication TS 2-2003 (R2008) Traffic Controller Assemblies for Traffic Signal Systems [updated in 2003, revised in 2008].
  - 2.8 **“RFQ”** means Request For Quotation.
  - 2.9 **“ASTM”** means American Society for Testing and Materials.
  - 2.10 **“AASHTO”** means American Association of State Highway Transportation Officials.
  - 2.11 **“NEMA”** means National Electrical Manufacturers Association.



CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

- 2.12 “Equivalent”** means equal in value, function or quality.
- 2.13** The symbol “ % ” means percent which means one part in every hundred.
- 2.14 “SEPAC®”** is a registered trade name (trademark) for a traffic signal control software program owned by Siemens/Eagle.
- 2.15 “TACTICS®”** is a registered trade name (trademark) for a traffic signal control software program owned by Siemens/Eagle.
- 2.16 “SEMARC®”** is a registered trade name (trademark) for a traffic signal control software program owned by Siemens/Eagle.
- 2.17 “BIU”** means Bus Interface Unit.
- 2.18 “RC”** means Resistive/Capacitive.
- 2.19 “DC”** means Direct Current.
- 2.20 “AC”** means Alternating Current.
- 2.21 “AWG”** means American Wire Gauge.
- 2.22 “PVC”** means PolyVinyl Chloride.
- 2.23 “SDLC”** means Synchronous Data Link Control.
- 2.24 “HACR”** means Heating, Air-Conditioning and Refrigeration.
- 2.25 “UL”** means Underwriters Laboratories.
- 2.26 “VDC”** means Volts Direct Current.
- 2.27 “VAC”** means Volts Alternating Current.
- 2.28 “GFI”** means Ground-Fault Interrupting.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

- 2.29 “ETL” means Environmental Testing Laboratories.
- 2.30 “EMTRAC” is a registered trade name (trademark) for a traffic signal control software program and system owned by STC, Inc.
- 2.31 “FPM” means Flashes Per Minute.
- 2.32 “I/O” means Input/Output.
- 2.33 “ARIES®” is a registered trade name (trademark) for a traffic signal control software program owned by Econolite.
- 2.34 “CENTRACS®” is a registered trade name (trademark) for a traffic signal control software program owned by Econolite.
- 2.35 “RTV” is a designation for high-temperature resistive silicone gasket material.
- 2.36 “GE” means General Electric.
- 2.37 “MUTCD” means Manual on Uniform Traffic Control Devices (2009 Edition with Revisions 1 and 2, May 2012).
- 2.38 “EMI” means ElectroMagnetic Interference.
- 2.39 “RFI” means Radio Frequency Interference.
- 2.40 “FCC” mean Federal Communications Commission.
- 2.41 “GHZ” means GigaHertz, a measurement of frequency.
- 2.42 “MHZ” means MegaHertz, a measurement of frequency.
- 2.43 “CPU” means Central Processing Unit.
- 2.44 “MPH” means Miles Per Hour.
- 2.45 “dB” means decibel, a unit of measuring sound power.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

**2.46 “VSWR”** means Voltage Standing Wave Ratio.

**2.47 “BUS”** is a designation for a metal strip or bar.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

**3. GENERAL REQUIREMENTS:**

**3.1 Contract Items and Mandatory Requirements:** Vendor shall provide Agency with the Contract Items listed below on an open-end and continuing basis. Contract Items must meet or exceed the mandatory requirements as shown below. The specifications of this RFQ and or any WVDOH Standards referenced in and/or attached to this RFQ may include references to specific recognized “industry standard” specifications which are issued by third parties, such as the American Society for Testing and Materials (ASTM) and the American Association of State and Highway Transportation Officials (AASHTO). Such specifications are protected by strict copyright restrictions and cannot be published as part of this RFQ. The ability to access such specifications shall be considered a mandatory requirement for participation in this RFQ process as a Vendor or as a supplier to the Vendor, as applicable.

**3.1.1 Contract Item #1 – Siemens Eagle (Yunex Traffic) Traffic Controller or Equal**

**3.1.1.1** Contract Item #1 shall be a Siemens Eagle (Yunex Traffic) EPACM60 series or Equal, 16-phase, NEMA TS2 Type 2 traffic controller with Siemens SEPAC® software or equivalent that is backwards compatible with NEMA TS1 and TS2, Type 1 controller cabinets. Controller must have an Ethernet port. An equal controller is defined as a controller that can be interchanged with the existing controllers using the SEPAC® or TACTICS® software at 100% capacity and without changes to the existing software and controllers.

**3.1.2 Contract Item #2 – Siemens Eagle Master (Yunex Traffic) Traffic Controller or Equal**

**3.1.2.1** Contract Item #2 shall be a Siemens Eagle (Yunex Traffic) EPACM60 series or Equal, 16-phase, NEMA TS2 Type 2, closed-loop, master traffic controller with Siemens SEMARC® software or equivalent that is backwards compatible with NEMA TS1 and TS2, Type 1 controller cabinets. Controller must have an Ethernet port. Controller must have either radio connection or hard-wired connection or equivalent, per purchase order. An equal controller is defined as a controller that can be interchanged with the existing controllers using the SEMARC® software at 100% capacity and without changes to the existing software and controllers.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

**3.1.3 Contract Item #3 - Repairs of Siemens Eagle (Yunex Traffic)  
Traffic Signal Controllers or Equal**

**3.1.3.1** Contract Item #3 shall be for the repair of Siemens Eagle (Yunex Traffic) EPAC series or Equal traffic controllers and master traffic controllers compatible with NEMA TS1, TS2, Type 1 and TS2, Type 2 cabinets. The repaired items shall be repaired to new working condition and with a description of the repair and certificate of repair confirming it was repaired and verifying the date of repair. Repairs must be made by a Siemens Eagle or Equal certified factory workshop and by a technician with a manufacturer's certification that they are certified to work on these items.

**3.1.4 Contract Item # 4 – Siemens Eagle (Yunex Traffic) Traffic  
Control Systems TS2 Traffic Signal Cabinet or Equal - Pole  
Mounted**

**3.1.4.1** Contract Item # 4 shall be a Siemens Eagle (Yunex Traffic) Traffic Control Systems (a division of Mobotrex) Size M36 (Model #EL704S2 or equivalent) with two (2) pole-mount brackets (UL26).

Cabinets: The following are minimum design requirements for a TS2 Type 1 or Type 2 traffic control cabinet assembly. As a minimum, the cabinet assembly shall meet all applicable sections of the NEMA Standard publication No.TS2-2003 (Revised 2008) or most recent version. Where differences occur, this specification shall govern.

Cabinet Design and Construction: The cabinet shall be constructed from type 5052-H32 aluminum with a minimum thickness of 0.090 to 0.125 inches. The cabinet shall have the following features:

1. The cabinet shall be designed and manufactured with materials that will allow rigid mounting, whether intended for pole, base or pedestal mounting.
2. The cabinet must not flex on its mount.
3. A rain channel shall be incorporated into the design of the main door opening to prevent liquids from entering the enclosure.
4. The cabinet door opening must be a minimum of 80 percent of the front surface of the cabinet.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

5. A stiffener plate shall be welded across the inside of the main door to prevent flexing.
6. Top of the cabinet shall incorporate a slope toward the rear to prevent rain accumulation.
7. The cabinet shall be supplied with a natural aluminum finish.
8. Sufficient care shall be taken in handling to ensure that scratches are minimized.
9. All surfaces shall be free from weld flash. Welds shall be smooth, neatly formed, free from cracks, blowholes and other irregularities.
10. All sharp edges shall be ground smooth.
11. All seams that are not welded shall be sealed with RTV sealant or equivalent material on the interior of the cabinet.
12. All cabinets shall be supplied with a minimum of two (2) removable shelves manufactured from 5052-H32aluminum. Shelf shall be a minimum of 10 inches deep. Shelves to be designed to accommodate a minimum 50-pound loading. The shelf shall have horizontal slots at the rear and vertical slots at the front of the turned down side flange. The shelf shall be installed securely at the rear edge of the shelf on the cabinet rear sidewall mounting studs, then lowering the shelf on the front sidewall mounting studs. The front edge of the shelf shall have holes punched every 6 inches to accommodate tie-wrapping of cables/harnesses.
13. A minimum of two (2) sets of vertical "C" channels shall be mounted on each interior wall of the cabinet for the purpose of mounting the cabinet components. The channels shall accommodate spring mounted nuts or studs. All mounting rails shall extend to within 7 inches of the top and bottom of the cabinet. Sidewall rail spacing shall be no more than 9.0 inches center-to-center. Rear wall rail spacing shall be 19.0 inches center-to-center.
14. The main door and police door-in-door shall close against a weatherproof and dust-proof, closed-cell neoprene gasket seal. The gasket material for the main door shall be a minimum of 0.250 inches thick by 1.00 inch wide. The gasket material for the police door shall be a minimum of 0.250 inches thick by 0.500 inches wide. The gaskets shall be permanently bonded to the cabinet.
15. The cabinet shall be equipped with a louvered air entrance. The air inlet shall be large enough to allow sufficient air flow per the rated fan capacity. Louvers

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

must satisfy the NEMA rod entry test for 3R ventilated enclosures. A non-corrosive, vermin- and insect-proof, removable air filter shall be secured to the air entrance. The filter shall fit snugly against the cabinet door wall. The roof of the cabinet shall incorporate an exhaust plenum with a vent screen. Perforations in the vent screen shall not exceed 0.125 inches in diameter.

16. The main door of the cabinet shall be equipped with a three-point latching mechanism. The handle on the main door of the cabinet shall be manufactured from cast aluminum or stainless steel. The handle shall include a hasp for the attachment of an optional padlock. The cabinet door handle shall rotate counterclockwise to open. The handle shall not extend beyond the perimeter of the main door at any time.
17. The lock assembly shall be positioned so that the handle shall not cause any interference with the key when opening the cabinet door.
18. The main door hinge shall be a one-piece, continuous piano hinge with a stainless-steel pin running the entire length of the door. The hinge shall be attached in such a manner that no rivets or bolts are exposed.
19. The main door shall include a mechanism capable of holding the door open at approximately 90, and/or (165 or 180) degrees under windy conditions. The main door shall be equipped with a standard Corbin No. 2 lock or exact equivalent.
20. Minimum of two keys shall be supplied.

The police door-in-door shall be provided with a treasury type lock Corbin No. R357SGS or exact equivalent and have a minimum of one key. Each cabinet shall be of sufficient size to accommodate all equipment. At a minimum, the cabinet sizes are as follows:

POLE MOUNTED EAGLE CABINETS

51.00 INCHES HEIGHT  
36.00 INCHES WIDTH  
17.00 INCHES DEPTH

Main door shall incorporate a shroud to cover the filtered louvered openings. The assembly is secured on the interior of the door over the filtered Louvers. The shroud is louvered downward and matches the door louvers. All enclosures must be constructed,

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

approved and marked in accordance with the requirements for Type 1 Industrial Control Panel Enclosures contained in UL 508A, the Standard for Industrial Control Panels. Enclosure must meet NEMA 3R rating requirements and be marked with UL approval sticker.

Terminals and Facilities/Main panel Design and Construction: The main panel shall be constructed from 5052-H32 brushed aluminum of 0.125 inch minimum thickness and installed so as to minimize flexing when plug-in components are installed. All main panels are provided with a mounting mechanism which allows access to all wiring on the rear of the panel without the removal of any cabinet shelves. Lowering of the main panel can be accomplished. Complete removal can be accomplished by use of hand tools.

The cabinet shall have the following features:

1. The terminals and facilities shall be available as a minimum in the following configuration: Sixteen load switch sockets, six flash transfer relay sockets, one flasher socket, 2-BIU sockets (expandable to 4), one 16-channel detector rack (expandable to 4) with one BIU, and one Type-16 MMU.
2. All load switch and flash transfer relay socket reference designators shall be silk-screen labeled on the front and rear of the main panel to match drawing designations. Socket pins shall be marked for reference on the rear of the panel. A maximum of eight load switch sockets may be positioned horizontally or stacked in two rows on the main panel.
3. Main panels requiring more than eight load switch sockets shall be mounted in one horizontal or two vertical rows. All load switches shall be supported by a bracket, extending at least half the length of the load switch.
4. The 16 load switch position main panels shall have all field wires contained on two rows of horizontally mounted terminal blocks. The upper row shall be wired for the pedestrian and overlap field terminations. The lower row shall be reserved for phase one through phase eight vehicle field terminations.
5. All field output circuits shall be terminated on a non-fused barrier type terminal block with a minimum rating of 10 amps.



CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

6. All field input/output (I/O) terminals shall be identified by permanent alphanumeric labels. All labels shall use standard nomenclature per the NEMA TS2 specification.
7. It shall be possible to flash either the yellow or red indication on any vehicle movement and to change from one color indication to the other by use of a screwdriver. Field terminal blocks shall be wired to use four positions per vehicle or overlap phase (green, yellow, and red, flash).
8. It shall not be necessary to de-buss field terminal blocks for flash programming. The main panel shall contain at least one flasher socket (silk screen labeled) capable of operating a 15-amp, 2-pole, NEMA solid-state flasher. The flasher shall be supported by a bracket, extending at least half its length.
9. One RC network shall be wired in parallel with each group of three flash-transfer relays and any other relay coils.
10. All logic-level, NEMA-controller and Malfunction Management Unit input and output terminations on the main panel shall be permanently labeled.
11. Cabinet prints shall identify the function of each terminal position.
12. At a minimum, three 20-position terminal blocks shall be provided at the top of the main panel to provide access to the controller unit's programmable and non-programmable I/O.
13. Terminal blocks for DC signal interfacing shall have a number 6-32 x 7/32-inch screw as minimum.

All main panel wiring shall conform to the following wire size exactly and color:

1. Green/Walk load switch output - brown wire - 14 gauge
2. Yellow load switch output - yellow wire - 14 gauge
3. Red/Don't Walk load switch - red wire output - 14 gauge
4. MMU (other than AC power) - violet wire - 22 gauge
5. Controller I/O - blue wire - 22 gauge
6. AC Line (power panel to - black wire main panel) - 8 gauge
7. AC Line (main panel) - black wire - 10 gauge

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

8. AC Neutral (power panel to - white wire main panel) - 8 gauge
9. AC Neutral (main panel) - white wire - 10 gauge
10. Earth ground (power panel) - green wire - 8 gauge
11. Logic ground - gray wire - 22 gauge
12. Flash programming - Orange wire
13. Flasher terminal - Black wire red or yellow field terminal - 14 gauge

All wiring, 14 AWG and smaller, shall conform to MIL-W-16878/1, type B/N, 600V, 19-strand tinned copper. The wire shall have a minimum of 0.010 inches thick PVC insulation with clear nylon jacket and rated to 105 degrees Celsius. All wiring shall have the following features:

1. All 12 AWG and larger wire shall have UL listed THHN/THWN-2 90 degrees Celsius, 600V, 0.020 inches thick PVC insulation and clear nylon jacketing.
2. Connecting cables shall be sleeved in a braided nylon mesh or poly-jacketed.
3. The use of exposed tie wraps or interwoven cables is unacceptable.
4. All Terminals and Facilities configurations shall be provided with BIU wiring assignments consistent with NEMA TS2-2003 specifications.
5. All Terminals and Facilities configurations shall be provided with sufficient RS-485 Port 1 communication cables to allow for the intended operation of that cabinet.
6. Each SDLC communication cable connector shall be a 15-pin metal shell D subminiature type. The cable shall be a shielded cable suitable for RS-485 communications.
7. All main panels shall be pre-wired for a Type-16 Malfunction Management Unit.
8. All wiring shall be neat in appearance.
9. All cabinet wiring shall be continuous from its point of origin to its termination point.
10. Butt type connections or splices are not acceptable.
11. All connecting cables and wire runs shall be secured by mechanical clamps. Stick-on type clamps are not acceptable.
12. The grounding system in the cabinet shall be divided into three separate circuits (AC Neutral, Earth Ground, and Logic Ground). These ground circuits

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

shall be connected together at a single point as outlined in the NEMA TS2 Standard. The main panel shall incorporate a relay, to be designed as K1, to remove +24 VDC from the common side of the load switches when the intersection is placed into mechanical flash. The relay shall have a momentary pushbutton located on the relay to apply power to the load switch inputs for ease of troubleshooting.

13. All pedestrian push button inputs from the field to the controller shall be opto-isolated through the BIU and operate at 12 VAC. All wire (size 16 AWG or smaller) at solder joints shall be hooked or looped around the eyelet or terminal block post prior to soldering to ensure circuit integrity. Lap joint soldering is not acceptable.

Power Panel Design and Construction: The power panel shall be integrated into the main panel and be located on the lower right portion of the cabinet. The power panel shall be wired to provide the necessary filtered power to the load switches, flasher(s), and power bus assembly. The power components shall be equipped with a removable plastic front cover for protection. The design will allow a technician to access the main and auxiliary breakers without removing the protective front cover. The power panel portion of the main panel shall include the following components:

- A minimum of one (1) 40-amp main breaker for 16 position cabinets. This breaker shall supply power to the controller, MMU, signals, cabinet power supply and auxiliary panels. Breakers shall be at minimum, a thermal magnetic type, UL listed for HACR service, with a minimum of 10,000 amp interrupting capacity.
- A minimum of one (1) 15-amp auxiliary breaker. This breaker shall supply power to the fan, light and GFI utility outlet.
- A HESCO/RLS, Inc. model HE1750 or exact approved equivalent surge arrester.
- A 50 amp, 125 VAC radio interference line filter.
- A normally-open, 50-amp, Solid State Relay (SSR). Shall be Crydom Model Number HA4875H or approved equal.
- A minimum of one (1) 8-position neutral bus bar capable of connecting three #12 wires per position.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

- A minimum of one (1) 6-position ground bus bar capable of connecting three #12 wires per position.
- A minimum of one (1) NEMA type 5-15R GFI utility outlet.
- The cabinet shall have a roll-out/swing-out concealable shelf/platform that can be used as platform for a laptop computer or other tools when the cabinet door is opened.

Power and SDLC Bus Panel: The Power and SDLC BUS Panel shall be manufactured from 0.090 to 0.125 inch thick, 5052-H32 aluminum. It shall provide a central location to supply filtered power for the controller, malfunction management unit, cabinet power supply, and all auxiliary equipment. It shall have the following features:

1. It shall include the SDLC Bus connecting cables wired to a barrier type terminal block. As an alternate, SDLC Bus connections may be made via an SDLC Hub Assembly.
2. All cabinet equipment requiring filtered power to operate shall be hardwired directly to the supplied barrier type terminal blocks on the Power and SDLC BUS Panel.
3. All AC+ power sources shall be protected with a removable plastic cover plate.
4. The SDLC Hub Assembly shall accommodate all D-Subminiature Female 15 (DB15) connectors as required, and a minimum of five (5) SLDC connections shall be provided.

Auxiliary Cabinet Equipment: The cabinet shall be provided with a thermostatically controlled (adjustable between 55-160 degrees Fahrenheit) ventilation fan in the top of the cabinet plenum. The fan plate shall be removable with the use of hand tools for serviceability. A minimum of one, maximum of two, exhaust fans shall be provided. The fan shall be a ball bearing type fan and shall be capable of drawing a minimum of 100 cubic feet of air per minute (CFM). The Fan/Thermostat assembly shall be connected to the Power panel by means of a 4 position plug-in cable or hardwired to an appropriate circuit breaker.

A LED cabinet lighting system may be used to illuminate the internal structure of the cabinet assembly. The LED cabinet lighting shall be a Luxembright LED module Model #770-W0013 and approved power supply or approved equivalent. This lighting system shall be wired directly to a door active switch mounted

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

near the top of the door. Alternately, a fluorescent lighting fixture shall be mounted on the inside top of the cabinet near the front edge. The fixture shall be rated to accommodate at minimum a F15T8 lamp operated from a normal power factor UL or ETL listed ballast. The lamp shall be wired on the power panel or to a door activated switch mounted near the top of the door.

A re-sealable print pouch shall be mounted to the door of the cabinet. The pouch shall be of sufficient size to accommodate one complete set of folded cabinet prints. A minimum of two sets of complete and accurate cabinet drawings shall be supplied with each cabinet.

Vehicle Detection: A minimum of one Detector rack shall be provided in each cabinet. The detector rack shall have the following features:

1. Shall support up to 16 channels of loop detection (either eight 2 channel detectors or four 4 channel detectors), two 2-channel preemption devices and one BIU.
2. All connections to the back of the detector racks to the detector cards shall be soldered to a 44 terminal, double row, 3.962 mm (0.156 in.) contact spacing, Cinch Jones card edge connector 50-44A-30M, or equivalent centered vertically for each detector module.
3. All designations shall correspond to the requirements of the TS2-2003 specification. Card guides shall be provided on the top and bottom of the card rack for each connector position.
4. Each cabinet shall contain a detector interface panel per each detector rack for the purpose of connecting field loops and vehicle detector amplifiers. The panels shall be manufactured from 0.090 or 0.125 inch thick 5052- H32 Aluminum and use barrier type terminal blocks.
5. One 16-position interface panel shall be provided for a 16-channel rack cabinet. The interface panel shall be secured to the left wall of the cabinet.
6. Each interface panel shall allow for the connection of a minimum of eight independent field detectors.
7. In the case of loop detection, a ground bus terminal shall be provided between each loop pair terminal to provide a termination for the loop lead-in cable ground wire. Each interface panel shall provide a barrier style terminal block to terminate the field wires for up to two 2-channel preemption devices.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

8. Lightning protection device mounting holes shall be provided to accommodate the potential usage of an EDCO LCA-6, lightning protection device.
9. A cable consisting of 20 AWG twisted pair wires shall be wired directly from the interface panel to the detector rack. The twisted pair wires shall be color coded red and white wire. No connectors shall be used to connect the interface panel to the detector rack.
10. All termination points shall be identified by a unique number and silk screened on the panel. Each detector rack shall accommodate rack mountable preemption devices such as EMTRAC or Opticom.

Cabinet Test Switches and Police Panel: A test switch panel shall be mounted on the inside of the main door. The test switch panel shall provide as a minimum the following:

1. SIGNALS ON/OFF SWITCH - In the OFF position, power shall be removed from signal heads in the intersection. The controller shall continue to operate. When in the OFF position, the MMU shall not conflict or require reset.
2. AUTO/FLASH SWITCH - When in the flash position, power shall be maintained to the controller and the intersection shall be placed in flash. The controller shall not be stop timed when in flash. Wired according to NEMA-TS2-2003, the MMU forces the controller to initiate the start-up sequence when exiting flash.
3. STOP TIME SWITCH - When applied, the controller shall be stop timed in the current interval.
4. CONTROL EQUIPMENT POWER ON/OFF - This switch shall control the controller, MMU, and cabinet power supply AC power. The TS2 controller to be provided with the cabinet assembly shall provide vehicular and pedestrian call inputs from its keyboard while in the standard status display.

The police door switch panel shall contain the following:

1. SIGNALS ON/OFF SWITCH - In the OFF position, power shall be removed from signal heads within the intersection. The controller shall continue to operate. When in the OFF position, the MMU shall not conflict or require reset.
2. AUTO/FLASH SWITCH – When in the flash position, power shall be maintained to the controller and the intersection shall be placed in flash. The controller shall be stop timed when in flash. Wired according to NEMA-TS2-1998, the MMU

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

forces the controller to initiate the start-up sequence when exiting flash.

3. AUTO/MANUAL SWITCH - Cabinet wiring shall include provisions for an AUTO/MANUAL switch and a momentary push button or hand cord. The AUTO/MANUAL switch and push button or hand cord shall not be provided unless it is called for in the CUSTOMER SPECIFICATION.

All toggle type switches shall be heavy duty and rated 15 amps minimum. Single- or double-pole switches may be provided, as required. Any exposed terminals or switch solder points shall be covered with a non-flexible shield to prevent accidental contact. All switch functions must be permanently and clearly labeled. All wire routed to the police door-in-door and test switch push button panel shall be adequately protected against damage from repetitive opening and closing of the main door.

Auxiliary Devices:

Load Switches: Load switches shall be solid state and shall conform to the requirements of Section 6.2 of the NEMA TS2 Standard. Signal load switches shall have a minimum rating of 10 amperes at 120 VAC for an incandescent lamp load. The front of the load switch shall be provided with three indicators to show the input signal from the controller to the load switch. Load switches shall be dedicated per phase. The use of load switches for other partial phases is not acceptable. The full complement of load switches shall be supplied with each cabinet to allow for maximum phase utilization for which the cabinet is designed.

Flashers: The flasher shall be solid state and shall conform to the requirements of section 6.3 of the NEMA TS2 Standard. Flashing of field circuits for the purpose of intersection flash shall be accomplished by a separate flasher. The flasher shall be rated at 15 amperes, double pole with a nominal flash rate of 60 FPM. A full complement of flasher shall be provided.

Flash Transfer Relays: All flash transfer relays shall meet the requirements of Section 6.4 of the NEMA TS2 Standard. The coil of the flash transfer relay must be de-energized for flash operation. The full complement of relays shall be supplied with each cabinet to allow for maximum phase utilization for which the cabinet is designed.



CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

Malfunction Management Units (MMU): Each cabinet assembly shall be supplied with one MMU as defined by the requirements of Section 4 of the NEMA TS2 Standard. Malfunction Management Units shall be a Type 16. The MMU shall be Model MMU-16 (EDI Model MMU-16LE) or approved equal.

Bus Interface Units (BIU): All BIUs shall meet the requirements of Section 8 of the NEMA TS2 Standard. A full complement of BIUs meeting Section 5.3.1.4 of the NEMA Publication No. TS2-2003 shall be supplied per cabinet. Bus Interface Units shall be supplied with each cabinet to allow for maximum phase and function utilization for which the cabinet is designed. A minimum of 3 BIUs shall be provided for each cabinet. Each BIU shall include power on, transmit and valid data indicators - all indicators shall be LEDs. A Type 1 Interface shall be as defined by Section 5.3, the controller interface shall conform to the Standard Publication No. TS2-2003.

Cabinet Power Supply: The cabinet power supply shall meet the requirements of Section 5.3.5 of the NEMA TS2 Standard. The cabinet power supply shall provide LED indicators for the line frequency, 12 VDC, 12 VAC, and 24 VDC outputs. The cabinet power supply shall provide (on the front panel) jack plugs for access to the +24 VDC for test purposes. Cabinet power supply shall be provided with each cabinet assembly per manufacturer's specifications and be wired directly to the Power Bus Assembly via a 12-pin Molex Robotic type connector Model# 54332-1270 or exact equivalent.

Testing: Each controller and cabinet assembly shall be tested as a complete entity under signal load for a minimum of 48 hours. Each assembly shall be delivered with a signed document detailing the cabinet final tests performed. The cabinet shall be assembled and tested by the controller manufacturer or authorized local distributor to ensure proper component integration and operation.

Warranty: The controller and Malfunction Management Unit shall be warranted by the manufacturer against mechanical and electrical defects for a period of two years from date of shipment. The manufacturer's warranty shall be supplied in writing with each cabinet and controller. Second party extended warranties are not acceptable. The cabinet assembly and all other components shall be warranted for a period of one year from date of shipment.



CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

Any defects shall be corrected by the manufacturer at no cost to the owner.

**3.1.5 Contract Items #5 – Siemens Eagle (Yunex Traffic) Traffic Control Systems TS 2 Traffic Signal Cabinet or Equal - Ground Mounted**

**3.1.5.1** Contract Item # 5 shall be a Siemens Eagle (Yunex Traffic) Traffic Control Systems (a division of Mobotrex) Size P (Model #EL712 or equivalent) with one (1) set [of four (4)] anchor bolts (UA242).

Cabinets: The following are minimum design requirements for a TS2 Type 1 or Type 2 traffic control cabinet assembly. As a minimum, the cabinet assembly shall meet all applicable sections of the NEMA Standard publication No.TS2-2003 (Revised 2008) or most recent version. Where differences occur, this specification shall govern.

Cabinet Design and Construction: The cabinet shall be constructed from type 5052-H32 aluminum with a minimum thickness of 0.090 to 0.125 inches. The cabinets shall have the following features:

1. The cabinet shall be designed and manufactured with materials that will allow rigid mounting, whether intended for pole, base or pedestal mounting.
2. The cabinet must not flex on its mount.
3. A rain channel shall be incorporated into the design of the main door opening to prevent liquids from entering the enclosure.
4. The cabinet door opening must be a minimum of 80 percent of the front surface of the cabinet.
5. A stiffener plate shall be welded across the inside of the main door to prevent flexing.
6. Top of the cabinet shall incorporate a slope toward the rear to prevent rain accumulation.
7. The cabinet shall be supplied with a natural aluminum finish.
8. Sufficient care shall be taken in handling to ensure that scratches are minimized.
9. All surfaces shall be free from weld flash. Welds shall be smooth, neatly formed, free from cracks, blowholes and other irregularities.
10. All sharp edges shall be ground smooth.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

11. All seams that are not welded shall be sealed with RTV sealant or equivalent material on the interior of the cabinet.
12. All cabinets shall be supplied with a minimum of two (2) removable shelves manufactured from 5052-H32aluminum. Shelf shall be a minimum of 10 inches deep. Shelves to be designed to accommodate a minimum 50-pound loading. The shelf shall have horizontal slots at the rear and vertical slots at the front of the turned down side flange. The shelf shall be installed securely at the rear edge of the shelf on the cabinet rear sidewall mounting studs, then lowering the shelf on the front sidewall mounting studs. The front edge of the shelf shall have holes punched every 6 inches to accommodate tie-wrapping of cables/harnesses.
13. A minimum of two (2) sets of vertical "C" channels shall be mounted on each interior wall of the cabinet for the purpose of mounting the cabinet components. The channels shall accommodate spring mounted nuts or studs. All mounting rails shall extend to within 7 inches of the top and bottom of the cabinet. Sidewall rail spacing shall be no more than 9.0 inches center-to-center. Rear wall rail spacing shall be 19.0 inches center-to-center.
14. The main door and police door-in-door shall close against a weatherproof and dust-proof, closed-cell neoprene gasket seal. The gasket material for the main door shall be a minimum of 0.250 inches thick by 1.00 inch wide. The gasket material for the police door shall be a minimum of 0.250 inches thick by 0.500 inches wide. The gaskets shall be permanently bonded to the cabinet.
15. The cabinet shall be equipped with a louvered air entrance. The air inlet shall be large enough to allow sufficient air flow per the rated fan capacity. Louvers must satisfy the NEMA rod entry test for 3R ventilated enclosures. A non-corrosive, vermin- and insect-proof, removable air filter shall be secured to the air entrance. The filter shall fit snugly against the cabinet door wall. The roof of the cabinet shall incorporate an exhaust plenum with a vent screen. Perforations in the vent screen shall not exceed 0.125 inches in diameter.
16. The main door of the cabinet shall be equipped with a three-point latching mechanism. The handle on the main door of the cabinet shall be manufactured from cast aluminum or stainless steel. The handle shall include a hasp for the attachment of an optional padlock. The cabinet door handle shall rotate counterclockwise to open. The handle shall not extend beyond the perimeter of the main door at any time.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

17. The lock assembly shall be positioned so that the handle shall not cause any interference with the key when opening the cabinet door.
18. The main door hinge shall be a one-piece, continuous piano hinge with a stainless-steel pin running the entire length of the door. The hinge shall be attached in such a manner that no rivets or bolts are exposed.
19. The main door shall include a mechanism capable of holding the door open at approximately 90, and/or (165 or 180) degrees under windy conditions. The main door shall be equipped with a standard Corbin No. 2 lock or exact equivalent.
20. Minimum of two keys shall be supplied.

The police door-in-door shall be provided with a treasury type lock Corbin No. R357SGS or exact equivalent and have a minimum of one key. All base mounted cabinets require anchor bolts to properly secure the cabinet to its base. The cabinet flange for securing the anchor bolts shall not protrude outward from the bottom of the cabinet. Four (4) anchor bolts shall be required for proper installation. Each cabinet shall be of sufficient size to accommodate all equipment. At a minimum, the cabinet sizes are as follows:

GROUND MOUNTED EAGLE CABINETS

56.00 INCHES HEIGHT  
44.00 INCHES WIDTH  
25.00 INCHES DEPTH

Main door shall incorporate a shroud to cover the filtered louvered openings. The assembly is secured on the interior of the door over the filtered Louvers. The shroud is louvered downward and matches the door louvers. All enclosures must be constructed, approved and marked in accordance with the requirements for Type 1 Industrial Control Panel Enclosures contained in UL 508A, the Standard for Industrial Control Panels. Enclosure must meet NEMA 3R rating requirements and be marked with UL approval sticker.

Terminals and Facilities/Main panel Design and Construction: The main panel shall be constructed from 5052-H32 brushed aluminum of 0.125 inches minimum thickness and

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

installed so as to minimize flexing when plug-in components are installed. All main panels are provided with a mounting mechanism which allows access to all wiring on the rear of the panel without the removal of any cabinet shelves. Lowering of the main panel can be accomplished. Complete removal can be accomplished by the use of hand tools.

The cabinet shall have the following features:

1. The terminals and facilities shall be available as a minimum in the following configuration: Sixteen load switch sockets, six flash transfer relay sockets, one flasher socket, 2- BIU sockets (expandable to 4), one 16-channel detector rack (expandable to 4) with one BIU, and one Type-16 MMU.
2. All load switch and flash transfer relay socket reference designators shall be silk-screen labeled on the front and rear of the main panel to match drawing designations. Socket pins shall be marked for reference on the rear of the panel. A maximum of eight load switch sockets may be positioned horizontally or stacked in two rows on the main panel.
3. Main panels requiring more than eight load switch sockets shall be mounted in one horizontal or two vertical rows. All load switches shall be supported by a bracket, extending at least half the length of the load switch.
4. The 16 load switch position main panels shall have all field wires contained on two rows of horizontally mounted terminal blocks. The upper row shall be wired for the pedestrian and overlap field terminations. The lower row shall be reserved for phase one through phase eight vehicle field terminations.
5. All field output circuits shall be terminated on a non-fused barrier type terminal block with a minimum rating of 10 amps.
6. All field input/output (I/O) terminals shall be identified by permanent alphanumerical labels. All labels shall use standard nomenclature per the NEMA TS2 specification.
7. It shall be possible to flash either the yellow or red indication on any vehicle movement and to change from one color indication to the other by use of a screwdriver. Field terminal blocks shall be wired to use four positions per vehicle or overlap phase (green, yellow, and red, flash).
8. It shall not be necessary to de-buss field terminal blocks for flash programming. The main panel shall contain at least one flasher socket (silk screen labeled) capable of operating a 15-amp, 2-pole, NEMA solid-state flasher. The flasher shall be supported by a bracket, extending at least half its length.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

9. One RC network shall be wired in parallel with each group of three flash-transfer relays and any other relay coils.
10. All logic-level, NEMA-controller and Malfunction Management Unit input and output terminations on the main panel shall be permanently labeled.
11. Cabinet prints shall identify the function of each terminal position.
12. At a minimum, three 20-position terminal blocks shall be provided at the top of the main panel to provide access to the controller unit's programmable and non-programmable I/O.
13. Terminal blocks for DC signal interfacing shall have a number 6-32 x 7/32 inch screw as minimum.

All main panel wiring shall conform to the following wire size and color:

1. Green/Walk load switch output - brown wire - 14 gauge
2. Yellow load switch output - yellow wire - 14 gauge
3. Red/Don't Walk load switch - red wire output - 14 gauge
4. MMU (other than AC power) - violet wire - 22 gauge
5. Controller I/O - blue wire - 22 gauge
6. AC Line (power panel to - black wire main panel) - 8 gauge
7. AC Line (main panel) - black wire - 10 gauge
8. AC Neutral (power panel to - white wire main panel) - 8 gauge
9. AC Neutral (main panel) - white wire - 10 gauge
10. Earth ground (power panel) - green wire - 8 gauge
11. Logic ground - gray wire - 22 gauge
12. Flash programming - Orange wire
13. Flasher terminal - Black wire red or yellow field terminal - 14 gauge

All wiring, 14 AWG and smaller, shall conform to MIL-W-16878/1, type B/N, 600V, 19-strand tinned copper. The wire shall have a minimum of 0.010 inches thick PVC insulation with clear nylon jacket and rated to 105 degrees Celsius. All wiring shall have the following features:

1. All 12 AWG and larger wire shall have UL listed THHN/THWN-2 90 degrees Celsius, 600V, 0.020 inches thick PVC insulation and clear nylon jacketed.
2. Connecting cables shall be sleeved in a braided nylon mesh or poly-jacketed.
3. The use of exposed tie wraps or interwoven cables is unacceptable.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

4. All Terminals and Facilities configurations shall be provided with BIU wiring assignments consistent with NEMA TS2-2003 specifications.
5. All Terminals and Facilities configurations shall be provided with sufficient RS-485 Port 1 communication cables to allow for the intended operation of that cabinet.
6. Each SDLC communication cable connector shall be a 15-pin metal shell D subminiature type. The cable shall be a shielded cable suitable for RS-485 communications.
7. All main panels shall be pre-wired for a Type-16 Malfunction Management Unit.
8. All wiring shall be neat in appearance.
9. All cabinet wiring shall be continuous from its point of origin to its termination point.
10. Butt type connections or splices are not acceptable.
11. All connecting cables and wire runs shall be secured by mechanical clamps. Stick-on type clamps are not acceptable.
12. The grounding system in the cabinet shall be divided into three separate circuits (AC Neutral, Earth Ground, and Logic Ground). These ground circuits shall be connected together at a single point as outlined in the NEMA TS2 Standard. The main panel shall incorporate a relay, to be designed as K1, to remove +24 VDC from the common side of the load switches when the intersection is placed into mechanical flash. The relay shall have a momentary pushbutton located on the relay to apply power to the load switch inputs for ease of troubleshooting.
13. All pedestrian push button inputs from the field to the controller shall be opto-isolated through the BIU and operate at 12 VAC. All wire (size 16 AWG or smaller) at solder joints shall be hooked or looped around the eyelet or terminal block post prior to soldering to ensure circuit integrity. Lap joint soldering is not acceptable.

Power Panel Design and Construction: The power panel shall be integrated into the main panel and be located on the lower right portion of the cabinet. The power panel shall be wired to provide the necessary filtered power to the load switches, flasher(s), and power bus assembly. The power components shall be equipped with a removable plastic front cover for protection. The design will allow a technician to access the main and auxiliary breakers without removing the protective front cover.

The power panel portion of the main panel shall include the following components:

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

1. A minimum of one (1) 40-amp main breaker for 16 position cabinets. This breaker shall supply power to the controller, MMU, signals, cabinet power supply and auxiliary panels. Breakers shall be at minimum, a thermal magnetic type, UL listed for HACR service, with a minimum of 10,000 amp interrupting capacity.
2. A minimum of one (1) 15-amp auxiliary breaker. This breaker shall supply power to the fan, light and GFI utility outlet.
3. A HESCO/RLS, Inc. model HE1750 or exact approved equivalent surge arrester.
4. A 50-amp, 125 VAC radio interference line filter.
5. A normally open, 50-amp, Solid State Relay (SSR). Shall be Crydom Model Number HA4875H or approved equal.
6. A minimum of one (1) 8-position neutral bus bar capable of connecting three #12 wires per position.
7. A minimum of one (1) 6-position ground bus bar capable of connecting three #12 wires per position.
8. A minimum of one (1) NEMA type 5-15R GFI utility outlet.
9. The cabinet shall have a roll-out/swing-out concealable shelf/platform that can be used as platform for a laptop computer or other tools when the cabinet door is opened.

**Power and SDLC Bus Panel:** The Power and SDLC BUS Panel shall be manufactured from 0.090 to 0.125 inch thick, 5052-H32 aluminum. It shall provide a central location to supply filtered power for the controller, malfunction management unit, cabinet power supply, and all auxiliary equipment. It shall have the following features:

1. It shall include the SDLC Bus connecting cables wired to a barrier type terminal block. As an alternate, SDLC Bus connections may be made via an SDLC Hub Assembly.
2. All cabinet equipment requiring filtered power to operate shall be hardwired directly to the supplied barrier type terminal blocks on the Power and SDLC BUS Panel.
3. All AC+ power sources shall be protected with a removable plastic cover plate.
4. The SDLC Hub Assembly shall accommodate all D-Subminiature Female 15 (DB15) connectors as required, and a minimum of five (5) SLDC connections shall be provided.



CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

Auxiliary Cabinet Equipment: The cabinet shall be provided with a thermostatically controlled (adjustable between 55-160 degrees Fahrenheit) ventilation fan in the top of the cabinet plenum. The fan plate shall be removable with the use of simple hand tools for serviceability. A minimum of one, maximum of two, exhaust fans shall be provided. The fan shall be a ball bearing type fan and shall be capable of drawing a minimum of 100 cubic feet of air per minute (CFM). The Fan/Thermostat assembly shall be connected to the Power panel by means of a 4 position plug-in cable or hardwired to an appropriate circuit breaker.

A LED cabinet lighting system may be used to illuminate the internal structure of the cabinet assembly. The LED cabinet lighting shall be a Luxembright LED module Model #770-W0013 and approved power supply or approved equivalent. This lighting system shall be wired directly to a door active switch mounted near the top of the door. Alternately, a fluorescent lighting fixture shall be mounted on the inside top of the cabinet near the front edge. The fixture shall be rated to accommodate at minimum a F15T8 lamp operated from a normal power factor UL or ETL listed ballast. The lamp shall be wired on the power panel or to a door activated switch mounted near the top of the door.

A re-sealable print pouch shall be mounted to the door of the cabinet. The pouch shall be of sufficient size to accommodate one complete set of folded cabinet prints. A minimum of two sets of complete and accurate cabinet drawings shall be supplied with each cabinet.

Vehicle Detection: A minimum of one Detector rack shall be provided in each cabinet.

1. Shall support up to 16 channels of loop detection (either eight 2 channel detectors or four 4 channel detectors), two 2-channel preemption devices and one BIU.
2. All connections to the back of the detector racks to the detector cards shall be soldered to a 44 terminal, double row, 3.962 mm (0.156 in.) contact spacing, Cinch Jones card edge connector 50-44A-30M, or equivalent centered vertically for each detector module.
3. All designations shall correspond to the requirements of the TS2-2003 specification. Card guides shall be provided on the top and bottom of the card rack for each connector position.
4. Each cabinet shall contain a detector interface panel per each detector rack for the purpose of connecting field loops and



CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

vehicle detector amplifiers. The panels shall be manufactured from 0.090 or 0.125 inch thick 5052- H32 Aluminum and use barrier type terminal blocks.

5. One 16-position interface panel shall be provided for a 16-channel rack cabinet. The interface panel shall be secured to the left wall of the cabinet.
6. Each interface panel shall allow for the connection of a minimum of eight independent field detectors.
7. In the case of loop detection, a ground bus terminal shall be provided between each loop pair terminal to provide a termination for the loop lead-in cable ground wire. Each interface panel shall provide a barrier style terminal block to terminate the field wires for up to two 2-channel preemption devices.
8. Lightning protection device mounting holes shall be provided to accommodate the potential usage of an EDCO LCA-6, lightning protection device.
9. A cable consisting of 20 AWG twisted pair wires shall be wired directly from the interface panel to the detector rack. The twisted pair wires shall be color coded red and white wire. No connectors shall be used to connect the interface panel to the detector rack.
10. All termination points shall be identified by a unique number and silk screened on the panel. Each detector rack shall accommodate rack mountable preemption devices such as EMTRAC or Opticom.

Cabinet Test Switches and Police Panel: A test switch panel shall be mounted on the inside of the main door. The test switch panel shall provide as a minimum the following:

1. SIGNALS ON/OFF SWITCH - In the OFF position, power shall be removed from signal heads in the intersection. The controller shall continue to operate. When in the OFF position, the MMU shall not conflict or require reset.
2. AUTO/FLASH SWITCH - When in the flash position, power shall be maintained to the controller and the intersection shall be placed in flash. The controller shall not be stop timed when in flash. Wired according to NEMA-TS2-2003, the MMU forces the controller to initiate the start-up sequence when exiting flash.
3. STOP TIME SWITCH - When applied, the controller shall be stop timed in the current interval.
4. CONTROL EQUIPMENT POWER ON/OFF - This switch shall control the controller, MMU and cabinet power supply

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

AC power. The TS2 controller to be provided with the cabinet assembly shall provide vehicular and pedestrian call inputs from its keyboard while in the standard status display.

The police door switch panel shall contain the following:

1. SIGNALS ON/OFF SWITCH - In the OFF position, power shall be removed from signal heads within the intersection. The controller shall continue to operate. When in the OFF position, the MMU shall not conflict or require reset.
2. AUTO/FLASH SWITCH – When in the flash position, power shall be maintained to the controller and the intersection shall be placed in flash. The controller shall be stop timed when in flash. Wired according to NEMA-TS2-1998, the MMU forces the controller to initiate the start-up sequence when exiting flash.
3. AUTO/MANUAL SWITCH - Cabinet wiring shall include provisions for an AUTO/MANUAL switch and a momentary push button or hand cord. The AUTO/MANUAL switch and push button or hand cord shall not be provided unless it is called for in the CUSTOMER SPECIFICATION.

All toggle type switches shall be heavy duty and rated 15 amps minimum. Single- or double-pole switches may be provided, as required. Any exposed terminals or switch solder points shall be covered with a non-flexible shield to prevent accidental contact. All switch functions must be permanently and clearly labeled. All wire routed to the police door-in-door and test switch push button panel shall be adequately protected against damage from repetitive opening and closing of the main door.

Auxiliary Devices:

Load Switches: Load switches shall be solid state and shall conform to the requirements of Section 6.2 of the NEMA TS2 Standard. Signal load switches shall have a minimum rating of 10 amperes at 120 VAC for an incandescent lamp load. The front of the load switch shall be provided with three indicators to show the input signal from the controller to the load switch. Load switches shall be dedicated per phase. The use of load switches for other partial phases is not acceptable. The full complement of load switches shall be supplied with each cabinet to allow for maximum phase utilization for which the cabinet is designed.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

Flashers: The flasher shall be solid state and shall conform to the requirements of section 6.3 of the NEMA TS2 Standard. Flashing of field circuits for the purpose of intersection flash shall be accomplished by a separate flasher. The flasher shall be rated at 15 amperes, double pole with a nominal flash rate of 60 FPM. A full complement of flasher shall be provided.

Flash Transfer Relays: All flash transfer relays shall meet the requirements of Section 6.4 of the NEMA TS2 Standard. The coil of the flash transfer relay must be de-energized for flash operation. The full complement of relays shall be supplied with each cabinet to allow for maximum phase utilization for which the cabinet is designed.

Malfunction Management Units (MMU): Each cabinet assembly shall be supplied with one MMU as defined by the requirements of Section 4 of the NEMA TS2 Standard. Malfunction Management Units shall be a Type 16. The MMU shall be Model MMU-16 (EDI Model MMU-16LE) or approved equal.

Bus Interface Units (BIU): All BIUs shall meet the requirements of Section 8 of the NEMA TS2 Standard. A full complement of BIUs meeting Section 5.3.1.4 of the NEMA Publication No. TS2-2003 shall be supplied per cabinet. Bus Interface Units shall be supplied with each cabinet to allow for maximum phase and function utilization for which the cabinet is designed. A minimum of 3 BIUs shall be provided for each cabinet. Each BIU shall include power on, transmit and valid data indicators - all indicators shall be LEDs. A Type 1 Interface shall be defined as defined by Section 5.3; the controller interface shall conform to the Standard Publication No. TS2-2003.

Cabinet Power Supply: The cabinet power supply shall meet the requirements of Section 5.3.5 of the NEMA TS2 Standard. The cabinet power supply shall provide LED indicators for the line frequency, 12 VDC, 12 VAC, and 24 VDC outputs. The cabinet power supply shall provide (on the front panel) jack plugs for access to the +24 VDC for test purposes. Cabinet power supply shall be provided with each cabinet assembly per manufacturer's specifications and be wired directly to the Power Bus Assembly via a 12-pin Molex Robotic type connector Model# 54332-1270 or exact equivalent.

Testing: Each controller and cabinet assembly shall be tested as a complete entity under signal load for a minimum of 48 hours.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

Each assembly shall be delivered with a signed document detailing the cabinet final tests performed. The cabinet shall be assembled and tested by the controller manufacturer or authorized local distributor to ensure proper component integration and operation.

Warranty: The controller and Malfunction Management Unit shall be warranted by the manufacturer against mechanical and electrical defects for a period of two years from date of shipment. The manufacturer's warranty shall be supplied in writing with each cabinet and controller. Second party extended warranties are not acceptable. The cabinet assembly and all other components shall be warranted for a period of one year from date of shipment. Any defects shall be corrected by the manufacturer at no cost to the owner.

**3.1.6 Contract Item # 6 - Econolite Cobalt ATC Traffic Signal Controller or Equal**

**3.1.6.1** Contract Item #6 shall be an Econolite Cobalt ATC series (ASC/3-2100) or Equal, 16-phase, NEMA TS2 Type 2 traffic controller with Econolite Cobalt ASC/3-LX software or equivalent which is capable of being placed in an existing traffic signal cabinet utilizing Econolite controllers and capable of NEMA TS1 and TS2 Type 1 and Type 2 environments with ARIES® software or equal. Controller shall have an Ethernet port. An equal controller is defined as a controller that can be interchanged with the existing controllers using the ARIES® or CENTRACS® software at 100% capacity and without changes to the existing software and controllers.

**3.1.7 Contract Item # 7 - Repair of Econolite Traffic Signal Controllers or Equal**

**3.1.7.1** Contract Item # 7 shall be for the repair of Econolite TS1/TS2 ASC or ATC Traffic Controllers, Econolite Mater Controllers or Equal. The repaired items shall be repaired to new working condition and with a description of the repair and certificate of repair confirming it was repaired and verifying the date of

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

repair. Repairs must be made by an Econolite or Equal certified factory workshop and by a technician with a manufacturer's certification that they are certified to work on these items.

**3.1.8 Contract Item # 8 - Econolite TS2 Traffic Signal Cabinet or Equal - Pole Mounted**

**3.1.8.1** Contract Item # 8 shall be an Econolite Control Products Model #P38 or equivalent with two (2) pole-mount brackets.

Cabinets: The following are minimum design requirements for a TS2 Type 1 or Type 2 traffic control cabinet assembly. As a minimum, the cabinet assembly shall meet all applicable sections of the NEMA Standard publication No.TS2-2003 (Revised 2008) or most recent version. Where differences occur, this specification shall govern.

Cabinet Design and Construction: The cabinet shall be constructed from type 5052-H32 aluminum with a minimum thickness of 0.090 to 0.125 inches. The cabinet shall have the following features:

1. The cabinet shall be designed and manufactured with materials that will allow rigid mounting, whether intended for pole, base or pedestal mounting.
2. The cabinet must not flex on its mount.
3. A rain channel shall be incorporated into the design of the main door opening to prevent liquids from entering the enclosure.
4. The cabinet door opening must be a minimum of 80 percent of the front surface of the cabinet.
5. A stiffener plate shall be welded across the inside of the main door to prevent flexing.
6. Top of the cabinet shall incorporate a slope toward the rear to prevent rain accumulation.
7. The cabinet shall be supplied with a natural aluminum finish.
8. Sufficient care shall be taken in handling to ensure that scratches are minimized.
9. All surfaces shall be free from weld flash. Welds shall be smooth, neatly formed, free from cracks, blowholes and other irregularities.
10. All sharp edges shall be ground smooth.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

11. All seams that are not welded shall be sealed with RTV sealant or equivalent material on the interior of the cabinet.
12. All cabinets shall be supplied with a minimum of two (2) removable shelves manufactured from 5052-H32aluminum. Shelf shall be a minimum of 10 inches deep. Shelves to be designed to accommodate a minimum 50-pound loading. The shelf shall have horizontal slots at the rear and vertical slots at the front of the turned down side flange. The shelf shall be installed securely at the rear edge of the shelf on the cabinet rear sidewall mounting studs, then lowering the shelf on the front sidewall mounting studs. The front edge of the shelf shall have holes punched every 6 inches to accommodate tie-wrapping of cables/harnesses.
13. A minimum of two (2) sets of vertical "C" channels shall be mounted on each interior wall of the cabinet for the purpose of mounting the cabinet components. The channels shall accommodate spring mounted nuts or studs. All mounting rails shall extend to within 7 inches of the top and bottom of the cabinet. Sidewall rail spacing shall be no more than 9.0 inches center-to-center. Rear wall rail spacing shall be 19.0 inches center-to-center.
14. The main door and police door-in-door shall close against a weatherproof and dust-proof, closed-cell neoprene gasket seal. The gasket material for the main door shall be a minimum of 0.250 inches thick by 1.00 inch wide. The gasket material for the police door shall be a minimum of 0.250 inches thick by 0.500 inches wide. The gaskets shall be permanently bonded to the cabinet.
15. The cabinet shall be equipped with a louvered air entrance. The air inlet shall be large enough to allow sufficient air flow per the rated fan capacity. Louvers must satisfy the NEMA rod entry test for 3R ventilated enclosures. A non-corrosive, vermin- and insect-proof, removable air filter shall be secured to the air entrance. The filter shall fit snugly against the cabinet door wall. The roof of the cabinet shall incorporate an exhaust plenum with a vent screen. Perforations in the vent screen shall not exceed 0.125 inches in diameter.
16. The main door of the cabinet shall be equipped with a three-point latching mechanism. The handle on the main door of the cabinet shall be manufactured from cast aluminum or stainless steel. The handle shall include a hasp for the attachment of an optional padlock. The cabinet door handle shall rotate counterclockwise to open. The

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

- handle shall not extend beyond the perimeter of the main door at any time.
17. The lock assembly shall be positioned so that the handle shall not cause any interference with the key when opening the cabinet door.
  18. The main door hinge shall be a one-piece, continuous piano hinge with a stainless-steel pin running the entire length of the door. The hinge shall be attached in such a manner that no rivets or bolts are exposed.
  19. The main door shall include a mechanism capable of holding the door open at approximately 90, and/or (165 or 180) degrees under windy conditions. The main door shall be equipped with a standard Corbin No. 2 lock or exact equivalent.
  20. Minimum of two keys shall be supplied.

The police door-in-door shall be provided with a treasury type lock Corbin No. R357SGS or exact equivalent and have a minimum of one key. Each cabinet shall be of sufficient size to accommodate all equipment. At a minimum, the cabinet sizes are as follows:

POLE MOUNTED ECONOLITE CABINETS

55.00 INCHES HEIGHT  
38.25 INCHES WIDTH  
26.00 INCHES DEPTH

Main door shall incorporate a shroud to cover the filtered louvered openings. The assembly is secured on the interior of the door over the filtered Louvers. The Shroud is louvered downward and matches the door louvers. All enclosures must be constructed, approved and marked in accordance with the requirements for Type 1 Industrial Control Panel Enclosures contained in UL 508A, the Standard for Industrial Control Panels. Enclosure must meet NEMA 3R rating requirements and be marked with UL approval sticker.

Terminals and Facilities/Main panel Design and Construction: The main panel shall be constructed from 5052-H32 brushed aluminum of 0.125 inch minimum thickness and installed so as to minimize flexing when plug-in components are installed. All main panels are provided with a mounting mechanism which allows access to all wiring on the rear of the



CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

panel without the removal of any cabinet shelves. Lowering of the main panel can be accomplished. Complete removal can be accomplished by the use of hand tools.

The cabinet shall have the following features:

1. The terminals and facilities shall be available as a minimum in the following configuration: Sixteen load switch sockets, six flash transfer relay sockets, one flasher socket, 2- BIU sockets (expandable to 4), one 16-channel detector rack (expandable to 4) with one BIU, and one Type-16 MMU.
2. All load switch and flash transfer relay socket reference designators shall be silk-screen labeled on the front and rear of the main panel to match drawing designations. Socket pins shall be marked for reference on the rear of the panel. A maximum of eight load switch sockets may be positioned horizontally or stacked in two rows on the main panel.
3. Main panels requiring more than eight load switch sockets shall be mounted in one horizontal or two vertical rows. All load switches shall be supported by a bracket, extending at least half the length of the load switch.
4. The 16 load switch position main panels shall have all field wires contained on two rows of horizontally mounted terminal blocks. The upper row shall be wired for the pedestrian and overlap field terminations. The lower row shall be reserved for phase one through phase eight vehicle field terminations.
5. All field output circuits shall be terminated on a non-fused barrier type terminal block with a minimum rating of 10 amps.
6. All field input/output (I/O) terminals shall be identified by permanent alphanumerical labels. All labels shall use standard nomenclature per the NEMA TS2 specification.
7. It shall be possible to flash either the yellow or red indication on any vehicle movement and to change from one color indication to the other by use of a screwdriver. Field terminal blocks shall be wired to use four positions per vehicle or overlap phase (green, yellow, and red, flash).
8. It shall not be necessary to de-buss field terminal blocks for flash programming. The main panel shall contain at least one flasher socket (silk screen labeled) capable of operating a 15-amp, 2-pole, NEMA solid-state flasher. The flasher shall be supported by a bracket, extending at least half its length.
9. One RC network shall be wired in parallel with each group of three flash-transfer relays and any other relay coils.



CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

10. All logic-level, NEMA-controller and Malfunction Management Unit input and output terminations on the main panel shall be permanently labeled.
11. Cabinet prints shall identify the function of each terminal position.
12. At a minimum, three 20-position terminal blocks shall be provided at the top of the main panel to provide access to the controller unit's programmable and non-programmable I/O.
13. Terminal blocks for DC signal interfacing shall have a number 6-32 x 7/32 inch screw as minimum.

All main panel wiring shall conform to the following wire size exactly and color:

1. Green/Walk load switch output - brown wire - 14 gauge
2. Yellow load switch output - yellow wire - 14 gauge
3. Red/Don't Walk load switch - red wire output - 14 gauge
4. MMU (other than AC power) - violet wire - 22 gauge
5. Controller I/O - blue wire - 22 gauge
6. AC Line (power panel to - black wire main panel) - 8 gauge
7. AC Line (main panel) - black wire - 10 gauge
8. AC Neutral (power panel to - white wire main panel) - 8 gauge
9. AC Neutral (main panel) - white wire - 10 gauge
10. Earth ground (power panel) - green wire - 8 gauge
11. Logic ground - gray wire - 22 gauge
12. Flash programming - Orange wire
13. Flasher terminal - Black wire red or yellow field terminal - 14 gauge

All wiring, 14 AWG and smaller, shall conform to MIL-W-16878/1, type B/N, 600V, 19-strand tinned copper. The wire shall have a minimum of 0.010 inches thick PVC insulation with clear nylon jacket and rated to 105 degrees Celsius. All wiring shall have the following features:

1. All 12 AWG and larger wire shall have UL listed THHN/THWN-2 90 degrees Celsius, 600V, 0.020 inches thick PVC insulation and clear nylon jacketed.
2. Connecting cables shall be sleeved in a braided nylon mesh or poly-jacketed.
3. The use of exposed tie wraps or interwoven cables is unacceptable.
4. All Terminals and Facilities configurations shall be provided with BIU wiring assignments consistent with NEMA TS2-2003 specifications.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

5. All Terminals and Facilities configurations shall be provided with sufficient RS-485 Port 1 communication cables to allow for the intended operation of that cabinet.
6. Each SDLC communication cable connector shall be a 15-pin metal shell D subminiature type. The cable shall be a shielded cable suitable for RS-485 communications.
7. All main panels shall be pre-wired for a Type-16 Malfunction Management Unit.
8. All wiring shall be neat in appearance.
9. All cabinet wiring shall be continuous from its point of origin to its termination point.
10. Butt type connections or splices are not acceptable.
11. All connecting cables and wire runs shall be secured by mechanical clamps. Stick-on type clamps are not acceptable.
12. The grounding system in the cabinet shall be divided into three separate circuits (AC Neutral, Earth Ground, and Logic Ground). These ground circuits shall be connected together at a single point as outlined in the NEMA TS2 Standard. The main panel shall incorporate a relay, to be designed as K1, to remove +24 VDC from the common side of the load switches when the intersection is placed into mechanical flash. The relay shall have a momentary pushbutton located on the relay to apply power to the load switch inputs for ease of troubleshooting.
13. All pedestrian push button inputs from the field to the controller shall be opto-isolated through the BIU and operate at 12 VAC. All wire (size 16 AWG or smaller) at solder joints shall be hooked or looped around the eyelet or terminal block post prior to soldering to ensure circuit integrity. Lap joint soldering is not acceptable.

**Power Panel Design and Construction:** The power panel shall be integrated into the main panel and be located on the lower right portion of the cabinet. The power panel shall be wired to provide the necessary filtered power to the load switches, flasher(s), and power bus assembly. The power components shall be equipped with a removable plastic front cover for protection. The design will allow a technician to access the main and auxiliary breakers without removing the protective front cover. The power panel portion of the main panel shall include the following components:

1. A minimum of one (1) 40-amp main breaker for 16 position cabinets. This breaker shall supply power to the controller, MMU, signals, cabinet power supply and auxiliary panels. Breakers shall be at minimum, a thermal

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

- magnetic type, UL listed for HACR service, with a minimum of 10,000 amp interrupting capacity.
2. A minimum of one (1) 15-amp auxiliary breaker. This breaker shall supply power to the fan, light and GFI utility outlet.
  3. A HESCO/RLS, Inc. model HE1750 or exact approved equivalent surge arrester.
  4. A 50-amp, 125 VAC radio interference line filter.
  5. A normally open, 50-amp, Solid State Relay (SSR). Shall be Crydom Model Number HA4875H or approved equal.
  6. A minimum of one (1) 8-position neutral bus bar capable of connecting three #12 wires per position.
  7. A minimum of one (1) 6-position ground bus bar capable of connecting three #12 wires per position.
  8. A minimum of one (1) NEMA type 5-15R GFI utility outlet.
  9. The cabinet shall have a roll-out/swing-out concealable shelf/platform that can be used as platform for a laptop computer or other tools when the cabinet door is opened.

**Power and SDLC Bus Panel:** The Power and SDLC BUS Panel shall be manufactured from 0.090 to 0.125 inch thick, 5052-H32 aluminum. It shall provide a central location to supply filtered power for the controller, malfunction management unit, cabinet power supply, and all auxiliary equipment. It shall have the following features:

1. It shall include the SDLC Bus connecting cables wired to a barrier type terminal block. As an alternate, SDLC Bus connections may be made via an SDLC Hub Assembly.
2. All cabinet equipment requiring filtered power to operate shall be hardwired directly to the supplied barrier type terminal blocks on the Power and SDLC BUS Panel.
3. All AC+ power sources shall be protected with a removable plastic cover plate.
4. The SDLC Hub Assembly shall accommodate all D-Subminiature Female 15 (DB15) connectors as required, and a minimum of five (5) SLDC connections shall be provided.

**Auxiliary Cabinet Equipment:** The cabinet shall be provided with a thermostatically controlled (adjustable between 55-160 degrees Fahrenheit) ventilation fan in the top of the cabinet plenum. The fan plate shall be removable with the use of simple hand tools for serviceability. A minimum of one, maximum of

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

two, exhaust fans shall be provided. The fan shall be a ball bearing type fan and shall be capable of drawing a minimum of 100 cubic feet of air per minute (CFM). The Fan/Thermostat assembly shall be connected to the Power panel by means of a 4 position plug-in cable or hardwired to an appropriate circuit breaker.

A LED cabinet lighting system may be used to illuminate the internal structure of the cabinet assembly. The LED cabinet lighting shall be a Luxembright LED module Model #770-W0013 and approved power supply or approved equivalent. This lighting system shall be wired directly to a door active switch mounted near the top of the door. Alternately, a fluorescent lighting fixture shall be mounted on the inside top of the cabinet near the front edge. The fixture shall be rated to accommodate at minimum a F15T8 lamp operated from a normal power factor UL or ETL listed ballast. The lamp shall be wired on the power panel or to a door activated switch mounted near the top of the door.

A re-sealable print pouch shall be mounted to the door of the cabinet. The pouch shall be of sufficient size to accommodate one complete set of folded cabinet prints. A minimum of two sets of complete and accurate cabinet drawings shall be supplied with each cabinet.

**Vehicle Detection:** A minimum of one Detector rack shall be provided in each cabinet.

1. Shall support up to 16 channels of loop detection (either eight 2 channel detectors or four 4 channel detectors), two 2-channel preemption devices and one BIU.
2. All connections to the back of the detector racks to the detector cards shall be soldered to a 44 terminal, double row, 3.962 mm (0.156 in.) contact spacing, Cinch Jones card edge connector 50-44A-30M, or equivalent centered vertically for each detector module.
3. All designations shall correspond to the requirements of the TS2-2003 specification. Card guides shall be provided on the top and bottom of the card rack for each connector position.
4. Each cabinet shall contain a detector interface panel per each detector rack for the purpose of connecting field loops and vehicle detector amplifiers. The panels shall be manufactured from 0.090 or 0.125 inch thick 5052- H32 Aluminum and use barrier type terminal blocks.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

5. One 16-position interface panel shall be provided for a 16-channel rack cabinet. The interface panel shall be secured to the left wall of the cabinet.
6. Each interface panel shall allow for the connection of a minimum of eight independent field detectors.
7. In the case of loop detection, a ground bus terminal shall be provided between each loop pair terminal to provide a termination for the loop lead-in cable ground wire. Each interface panel shall provide a barrier style terminal block to terminate the field wires for up to two 2-channel preemption devices.
8. Lightning protection device mounting holes shall be provided to accommodate the potential usage of an EDCO LCA-6, lightning protection device.
9. A cable consisting of 20 AWG twisted pair wires shall be wired directly from the interface panel to the detector rack. The twisted pair wires shall be color coded red and white wire. No connectors shall be used to connect the interface panel to the detector rack.
10. All termination points shall be identified by a unique number and silk screened on the panel. Each detector rack shall accommodate rack mountable preemption devices such as EMTRAC or Opticom.

Cabinet Test Switches and Police Panel: A test switch panel shall be mounted on the inside of the main door. The test switch panel shall provide as a minimum the following:

1. SIGNALS ON/OFF SWITCH - In the OFF position, power shall be removed from signal heads in the intersection. The controller shall continue to operate. When in the OFF position, the MMU shall not conflict or require reset.
2. AUTO/FLASH SWITCH - When in the flash position, power shall be maintained to the controller and the intersection shall be placed in flash. The controller shall not be stop timed when in flash. Wired according to NEMA-TS2-2003, the MMU forces the controller to initiate the start-up sequence when exiting flash.
3. STOP TIME SWITCH - When applied, the controller shall be stop timed in the current interval.
4. CONTROL EQUIPMENT POWER ON/OFF - This switch shall control the controller, MMU, and cabinet power supply AC power. The TS2 controller to be provided with the cabinet assembly shall provide

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

vehicular and pedestrian call inputs from its keyboard while in the standard status display.

The police door switch panel shall contain the following:

1. SIGNALS ON/OFF SWITCH - In the OFF position, power shall be removed from signal heads within the intersection. The controller shall continue to operate. When in the OFF position, the MMU shall not conflict or require reset.
2. AUTO/FLASH SWITCH – When in the flash position, power shall be maintained to the controller and the intersection shall be placed in flash. The controller shall be stop timed when in flash. Wired according to NEMA-TS2-1998, the MMU forces the controller to initiate the start-up sequence when exiting flash.
3. AUTO/MANUAL SWITCH - Cabinet wiring shall include provisions for an AUTO/MANUAL switch and a momentary push button or hand cord. The AUTO/MANUAL switch and push button or hand cord shall not be provided unless it is called for in the CUSTOMER SPECIFICATION.

All toggle type switches shall be heavy duty and rated 15 amps minimum. Single- or double-pole switches may be provided, as required. Any exposed terminals or switch solder points shall be covered with a non-flexible shield to prevent accidental contact. All switch functions must be permanently and clearly labeled. All wire routed to the police door-in-door and test switch push button panel shall be adequately protected against damage from repetitive opening and closing of the main door.

Auxiliary Devices:

Load Switches: Load switches shall be solid state and shall conform to the requirements of Section 6.2 of the NEMA TS2 Standard. Signal load switches shall have a minimum rating of 10 amperes at 120 VAC for an incandescent lamp load. The front of the load switch shall be provided with three indicators to show the input signal from the controller to the load switch. Load switches shall be dedicated per phase. The use of load switches for other partial phases is not acceptable. The full complement of load switches shall be supplied with each cabinet to allow for maximum phase utilization for which the cabinet is designed.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

Flashers: The flasher shall be solid state and shall conform to the requirements of section 6.3 of the NEMA TS2 Standard. Flashing of field circuits for the purpose of intersection flash shall be accomplished by a separate flasher. The flasher shall be rated at 15 amperes, double pole with a nominal flash rate of 60 FPM. A full complement of flasher shall be provided.

Flash Transfer Relays: All flash transfer relays shall meet the requirements of Section 6.4 of the NEMA TS2 Standard. The coil of the flash transfer relay must be de-energized for flash operation. The full complement of relays shall be supplied with each cabinet to allow for maximum phase utilization for which the cabinet is designed.

Malfunction Management Units (MMU): Each cabinet assembly shall be supplied with one MMU as defined by the requirements of Section 4 of the NEMA TS2 Standard. Malfunction Management Units shall be a Type 16. The MMU shall be Model MMU-16 (EDI Model MMU-16LE) or approved equal.

Bus Interface Units (BIU): All BIUs shall meet the requirements of Section 8 of the NEMA TS2 Standard. A full complement of BIUs meeting Section 5.3.1.4 of the NEMA Publication No. TS2-2003 shall be supplied per cabinet. Bus Interface Units shall be supplied with each cabinet to allow for maximum phase and function utilization for which the cabinet is designed. A minimum of 3 BIUs shall be provided for each cabinet. Each Bus Interface Unit shall include power on, transmit and valid data indicators - all indicators shall be LEDs. A Type 1 Interface shall be defined as defined by Section 5.3: the controller interface shall conform to the Standard Publication No. TS2-2003.

Cabinet Power Supply: The cabinet power supply shall meet the requirements of Section 5.3.5 of the NEMA TS2 Standard. The cabinet power supply shall provide LED indicators for the line frequency, 12 VDC, 12 VAC, and 24 VDC outputs. The cabinet power supply shall provide (on the front panel) jack plugs for access to the +24 VDC for test purposes. Cabinet power supply shall be provided with each cabinet assembly per manufacturer's specifications and be wired directly to the Power Bus Assembly via a 12-pin Molex Robotic type connector Model# 54332-1270 or exact equivalent.

Testing: Each controller and cabinet assembly shall be tested as a complete entity under signal load for a minimum of 48 hours.



CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

Each assembly shall be delivered with a signed document detailing the cabinet final tests performed. The cabinet shall be assembled and tested by the controller manufacturer or authorized local distributor to ensure proper component integration and operation.

Warranty: The controller and MMU shall be warranted by the manufacturer against mechanical and electrical defects for a period of two years from date of shipment. The manufacturer's warranty shall be supplied in writing with each cabinet and controller. Second party extended warranties are not acceptable. The cabinet assembly and all other components shall be warranted for a period of one year from date of shipment. Any defects shall be corrected by the manufacturer at no cost to the owner.

**3.1.9 Contract Item # 9 - Econolite TS2 Traffic Signal Cabinet or Equal - Ground Mounted**

**3.1.9.1** Contract Item #9 shall be an Econolite Control Products Model #P44 or equivalent.

Cabinets: The following are minimum design requirements for a TS2 Type 1 or Type 2 traffic control cabinet assembly. As a minimum, the cabinet assembly shall meet all applicable sections of the NEMA Standard publication No.TS2-2003 (Revised 2008) or most recent version. Where differences occur, this specification shall govern.

Cabinet Design and Construction: The cabinet shall be constructed from type 5052-H32 aluminum with a minimum thickness of 0.090 to 0.125 inches. The cabinet shall have the following features:

1. The cabinet shall be designed and manufactured with materials that will allow rigid mounting, whether intended for pole, base or pedestal mounting.
2. The cabinet must not flex on its mount.
3. A rain channel shall be incorporated into the design of the main door opening to prevent liquids from entering the enclosure.
4. The cabinet door opening must be a minimum of 80 percent of the front surface of the cabinet.
5. A stiffener plate shall be welded across the inside of the main door to prevent flexing.



CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

6. Top of the cabinet shall incorporate a slope toward the rear to prevent rain accumulation.
7. The cabinet shall be supplied with a natural aluminum finish.
8. Sufficient care shall be taken in handling to ensure that scratches are minimized.
9. All surfaces shall be free from weld flash. Welds shall be smooth, neatly formed, free from cracks, blowholes and other irregularities.
10. All sharp edges shall be ground smooth.
11. All seams that are not welded shall be sealed with RTV sealant or equivalent material on the interior of the cabinet.
12. All cabinets shall be supplied with a minimum of two (2) removable shelves manufactured from 5052-H32aluminum. Shelf shall be a minimum of 10 inches deep. Shelves to be designed to accommodate a minimum 50-pound loading. The shelf shall have horizontal slots at the rear and vertical slots at the front of the turned down side flange. The shelf shall be installed securely at the rear edge of the shelf on the cabinet rear sidewall mounting studs, then lowering the shelf on the front sidewall mounting studs. The front edge of the shelf shall have holes punched every 6 inches to accommodate tie-wrapping of cables/harnesses.
13. A minimum of two (2) sets of vertical "C" channels shall be mounted on each interior wall of the cabinet for the purpose of mounting the cabinet components. The channels shall accommodate spring mounted nuts or studs. All mounting rails shall extend to within 7 inches of the top and bottom of the cabinet. Sidewall rail spacing shall be no more than 9.0 inches center-to-center. Rear wall rail spacing shall be 19.0 inches center-to-center.
14. The main door and police door-in-door shall close against a weatherproof and dust-proof, closed-cell neoprene gasket seal. The gasket material for the main door shall be a minimum of 0.250 inches thick by 1.00 inch wide. The gasket material for the police door shall be a minimum of 0.250 inches thick by 0.500 inches wide. The gaskets shall be permanently bonded to the cabinet.
15. The cabinet shall be equipped with a louvered air entrance. The air inlet shall be large enough to allow sufficient air flow per the rated fan capacity. Louvers must satisfy the NEMA rod entry test for 3R ventilated enclosures. A non-corrosive, vermin- and insect-proof,

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

removable air filter shall be secured to the air entrance. The filter shall fit snugly against the cabinet door wall. The roof of the cabinet shall incorporate an exhaust plenum with a vent screen. Perforations in the vent screen shall not exceed 0.125 inches in diameter.

16. The main door of the cabinet shall be equipped with a three-point latching mechanism. The handle on the main door of the cabinet shall be manufactured from cast aluminum or stainless steel. The handle shall include a hasp for the attachment of an optional padlock. The cabinet door handle shall rotate counterclockwise to open. The handle shall not extend beyond the perimeter of the main door at any time.
17. The lock assembly shall be positioned so that the handle shall not cause any interference with the key when opening the cabinet door.
18. The main door hinge shall be a one-piece, continuous piano hinge with a stainless-steel pin running the entire length of the door. The hinge shall be attached in such a manner that no rivets or bolts are exposed.
19. The main door shall include a mechanism capable of holding the door open at approximately 90, and/or (165 or 180) degrees under windy conditions. The main door shall be equipped with a standard Corbin No. 2 lock or exact equivalent.
20. Minimum of two keys shall be supplied.

The police door-in-door shall be provided with a treasury type lock Corbin No. R357SGS or exact equivalent and have a minimum of one key. All base mounted cabinets require anchor bolts to properly secure the cabinet to its base. The cabinet flange for securing the anchor bolts shall not protrude outward from the bottom of the cabinet. Four (4) anchor bolts shall be required for proper installation. Each cabinet shall be of sufficient size to accommodate all equipment. At a minimum, the cabinet sizes are as follows:

GROUND MOUNTED ECONOLITE CABINETS

55.00 INCHES HEIGHT  
44.25 INCHES WIDTH  
26.00 INCHES DEPTH

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

Main door shall incorporate a shroud to cover the filtered louvered openings. The assembly is secured on the interior of the door over the filtered Louvers. The Shroud is louvered downward and matches the door louvers. All enclosures must be constructed, approved and marked in accordance with the requirements for Type 1 Industrial Control Panel Enclosures contained in UL 508A, the Standard for Industrial Control Panels. Enclosure must meet NEMA 3R rating requirements and be marked with UL approval sticker.

Terminals and Facilities/Main panel Design and Construction: The main panel shall be constructed from 5052-H32 brushed aluminum of 0.125 inches minimum thickness and installed so as to minimize flexing when plug-in components are installed. All main panels are provided with a mounting mechanism which allows access to all wiring on the rear of the panel without the removal of any cabinet shelves. Lowering of the main panel can be accomplished. Complete removal can be accomplished by the use of hand tools.

The cabinet shall have the following features:

1. The terminals and facilities shall be available as a minimum in the following configuration: Sixteen load switch sockets, six flash transfer relay sockets, one flasher socket, 2- BIU sockets (expandable to 4), one 16-channel detector rack (expandable to 4) with one BIU, and one Type-16 MMU.
2. All load switch and flash transfer relay socket reference designators shall be silk-screen labeled on the front and rear of the main panel to match drawing designations. Socket pins shall be marked for reference on the rear of the panel. A maximum of eight load switch sockets may be positioned horizontally or stacked in two rows on the main panel.
3. Main panels requiring more than eight load switch sockets shall be mounted in one horizontal or two vertical rows. All load switches shall be supported by a bracket, extending at least half the length of the load switch.
4. The 16 load switch position main panels shall have all field wires contained on two rows of horizontally mounted terminal blocks. The upper row shall be wired for the pedestrian and overlap field terminations. The lower row shall be reserved for phase one through phase eight vehicle field terminations.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

5. All field output circuits shall be terminated on a non-fused barrier type terminal block with a minimum rating of 10 amps.
6. All field input/output (I/O) terminals shall be identified by permanent alphanumerical labels. All labels shall use standard nomenclature per the NEMA TS2 specification.
7. It shall be possible to flash either the yellow or red indication on any vehicle movement and to change from one color indication to the other by use of a screwdriver. Field terminal blocks shall be wired to use four positions per vehicle or overlap phase (green, yellow, and red, flash).
8. It shall not be necessary to de-buss field terminal blocks for flash programming. The main panel shall contain at least one flasher socket (silk screen labeled) capable of operating a 15-amp, 2-pole, NEMA solid-state flasher. The flasher shall be supported by a bracket, extending at least half its length.
9. One RC network shall be wired in parallel with each group of three flash-transfer relays and any other relay coils.
10. All logic-level, NEMA-controller and MMUs input and output terminations on the main panel shall be permanently labeled.
11. Cabinet prints shall identify the function of each terminal position.
12. At a minimum, three 20-position terminal blocks shall be provided at the top of the main panel to provide access to the controller unit's programmable and non-programmable I/O.
13. Terminal blocks for DC signal interfacing shall have a number 6/32 x 7/32 inch screw as minimum.

All main panel wiring shall conform to the following wire size exactly and color:

1. Green/Walk load switch output - brown wire - 14 gauge
2. Yellow load switch output - yellow wire - 14 gauge
3. Red/Don't Walk load switch - red wire output - 14 gauge
4. MMU (other than AC power) - violet wire - 22 gauge
5. Controller I/O - blue wire - 22 gauge
6. AC Line (power panel to - black wire main panel) - 8 gauge
7. AC Line (main panel) - black wire - 10 gauge

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

8. AC Neutral (power panel to - white wire main panel) - 8 gauge
9. AC Neutral (main panel) - white wire - 10 gauge
10. Earth ground (power panel) - green wire - 8 gauge
11. Logic ground - gray wire - 22 gauge
12. Flash programming - Orange wire
13. Flasher terminal - Black wire red or yellow field terminal - 14 gauge

All wiring, 14 AWG and smaller, shall conform to MIL-W-16878/1, type B/N, 600V, 19-strand tinned copper. The wire shall have a minimum of 0.010 inches thick PVC insulation with clear nylon jacket and rated to 105 degrees Celsius. All wiring shall have the following features:

1. All 12 AWG and larger wire shall have UL listed THHN/THWN-2 90 degrees Celsius, 600V, 0.020 inches thick PVC insulation and clear nylon jacketed.
2. Connecting cables shall be sleeved in a braided nylon mesh or poly-jacketed.
3. The use of exposed tie wraps or interwoven cables is unacceptable.
4. All Terminals and Facilities configurations shall be provided with BIU wiring assignments consistent with NEMA TS2-2003 specifications.
5. All Terminals and Facilities configurations shall be provided with sufficient RS-485 Port 1 communication cables to allow for the intended operation of that cabinet.
6. Each SDLC communication cable connector shall be a 15-pin metal shell D subminiature type. The cable shall be a shielded cable suitable for RS-485 communications.
7. All main panels shall be pre-wired for a Type-16 Malfunction Management Unit.
8. All wiring shall be neat in appearance.
9. All cabinet wiring shall be continuous from its point of origin to its termination point.
10. Butt type connections or splices are not acceptable.
11. All connecting cables and wire runs shall be secured by mechanical clamps. Stick-on type clamps are not acceptable.
12. The grounding system in the cabinet shall be divided into three separate circuits (AC Neutral, Earth Ground, and Logic Ground). These ground circuits shall be connected together at a single point as outlined in the NEMA TS2 Standard. The main panel shall incorporate a relay, to be

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

designed as K1, to remove +24 VDC from the common side of the load switches when the intersection is placed into mechanical flash. The relay shall have a momentary pushbutton located on the relay to apply power to the load switch inputs for ease of troubleshooting.

13. All pedestrian push button inputs from the field to the controller shall be opto-isolated through the BIU and operate at 12 VAC. All wire (size 16 AWG or smaller) at solder joints shall be hooked or looped around the eyelet or terminal block post prior to soldering to ensure circuit integrity. Lap joint soldering is not acceptable.

**Power Panel Design and Construction:** The power panel shall be integrated into the main panel and be located on the lower right portion of the cabinet. The power panel shall be wired to provide the necessary filtered power to the load switches, flasher(s), and power bus assembly. The power components shall be equipped with a removable plastic front cover for protection. The design will allow a technician to access the main and auxiliary breakers without removing the protective front cover.

The power panel portion of the main panel shall include the following components:

1. A minimum of one (1) 40-amp main breaker for 16 position cabinets. This breaker shall supply power to the controller, MMU, signals, cabinet power supply and auxiliary panels. Breakers shall be at minimum, a thermal magnetic type, UL listed for HACR service, with a minimum of 10,000 amp interrupting capacity.
2. A minimum of one (1) 15-amp auxiliary breaker. This breaker shall supply power to the fan, light and GFI utility outlet.
3. A HESCO/RLS, Inc. model HE1750 or exact approved equivalent surge arrester.
4. A 50-amp 125 VAC radio interference line filter.
5. A normally open 50-amp, Solid State Relay (SSR). Shall be Crydom Model Number HA4875H or approved equal.
6. A minimum of one (1) 8-position neutral bus bar capable of connecting three #12 wires per position.
7. A minimum of one (1) 6-position ground bus bar capable of connecting three #12 wires per position.
8. A minimum of one (1) NEMA type 5-15R GFI utility outlet.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

9. The cabinet shall have a roll-out/swing-out concealable shelf/platform that can be used as platform for a laptop computer or other tools when the cabinet door is opened.

**Power and SDLC Bus Panel:** The Power and SDLC BUS Panel shall be manufactured from 0.090 to 0.125 inch thick 5052-H32 aluminum. It shall provide a central location to supply filtered power for the controller, malfunction management unit, cabinet power supply, and all auxiliary equipment. It shall have the following features:

1. It shall include the SDLC Bus connecting cables wired to a barrier type terminal block. As an alternate, SDLC Bus connections may be made via an SDLC Hub Assembly.
2. All cabinet equipment requiring filtered power to operate shall be hardwired directly to the supplied barrier type terminal blocks on the Power and SDLC BUS Panel.
3. All AC+ power sources shall be protected with a removable plastic cover plate.
4. The SDLC Hub Assembly shall accommodate all D-Subminiature Female 15 (DB15) connectors as required, and a minimum of five (5) SLDC connections shall be provided.

**Auxiliary Cabinet Equipment:** The cabinet shall be provided with a thermostatically controlled (adjustable between 55-160 degrees Fahrenheit) ventilation fan in the top of the cabinet plenum. The fan plate shall be removable with the use of simple hand tools for serviceability. A minimum of one, maximum of two, exhaust fans shall be provided. The fan shall be a ball bearing type fan and shall be capable of drawing a minimum of 100 cubic feet of air per minute (CFM). The Fan/Thermostat assembly shall be connected to the Power panel by means of a 4 position plug-in cable or hardwired to an appropriate circuit breaker.

A LED cabinet lighting system may be used to illuminate the internal structure of the cabinet assembly. The LED cabinet lighting shall be a Luxembright LED module Model #770-W0013 and approved power supply or approved equivalent. This lighting system shall be wired directly to a door active switch mounted near the top of the door. Alternately, a fluorescent lighting fixture shall be mounted on the inside top of the cabinet near the front edge. The fixture shall be rated to accommodate at minimum a F15T8 lamp operated from a normal power factor UL or ETL

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

listed ballast. The lamp shall be wired on the power panel or to a door activated switch mounted near the top of the door.

A re-sealable print pouch shall be mounted to the door of the cabinet. The pouch shall be of sufficient size to accommodate one complete set of folded cabinet prints. A minimum of two sets of complete and accurate cabinet drawings shall be supplied with each cabinet.

Vehicle Detection: A minimum of one Detector rack shall be provided in each cabinet.

1. Shall support up to 16 channels of loop detection (either eight 2 channel detectors or four 4 channel detectors), two 2-channel preemption devices and one BIU.
2. All connections to the back of the detector racks to the detector cards shall be soldered to a 44 terminal, double row, 3.962 mm (0.156 in.) contact spacing, Cinch Jones card edge connector 50-44A-30M, or equivalent centered vertically for each detector module.
3. All designations shall correspond to the requirements of the TS2-2003 specification. Card guides shall be provided on the top and bottom of the card rack for each connector position.
4. Each cabinet shall contain a detector interface panel per each detector rack for the purpose of connecting field loops and vehicle detector amplifiers. The panels shall be manufactured from 0.090 or 0.125 inch thick 5052- H32 Aluminum and use barrier type terminal blocks.
5. One 16-position interface panel shall be provided for a 16-channel rack cabinet. The interface panel shall be secured to the left wall of the cabinet.
6. Each interface panel shall allow for the connection of a minimum of eight independent field detectors.
7. In the case of loop detection, a ground bus terminal shall be provided between each loop pair terminal to provide a termination for the loop lead-in cable ground wire. Each interface panel shall provide a barrier style terminal block to terminate the field wires for up to two 2-channel preemption devices.
8. Lightning protection device mounting holes shall be provided to accommodate the potential usage of an EDCO LCA-6, lightning protection device.
9. A cable consisting of 20 AWG twisted pair wires shall be wired directly from the interface panel to the detector



CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

rack. The twisted pair wires shall be color coded red and white wire. No connectors shall be used to connect the interface panel to the detector rack.

10. All termination points shall be identified by a unique number and silk screened on the panel. Each detector rack shall accommodate rack mountable preemption devices such as EMTRAC or Opticom.

Cabinet Test Switches and Police Panel: A test switch panel shall be mounted on the inside of the main door. The test switch panel shall provide as a minimum the following:

1. SIGNALS ON/OFF SWITCH - In the OFF position, power shall be removed from signal heads in the intersection. The controller shall continue to operate. When in the OFF position, the MMU shall not conflict or require reset.
2. AUTO/FLASH SWITCH - When in the flash position, power shall be maintained to the controller and the intersection shall be placed in flash. The controller shall not be stop timed when in flash. Wired according to NEMA-TS2-2003, the MMU forces the controller to initiate the start-up sequence when exiting flash.
3. STOP TIME SWITCH - When applied, the controller shall be stop timed in the current interval.
4. CONTROL EQUIPMENT POWER ON/OFF - This switch shall control the controller, MMU, and cabinet power supply AC power. The TS2 controller to be provided with the cabinet assembly shall provide vehicular and pedestrian call inputs from its keyboard while in the standard status display.

The police door switch panel shall contain the following:

1. SIGNALS ON/OFF SWITCH - In the OFF position, power shall be removed from signal heads within the intersection. The controller shall continue to operate. When in the OFF position, the MMU shall not conflict or require reset.
2. AUTO/FLASH SWITCH - When in the flash position, power shall be maintained to the controller and the intersection shall be placed in flash. The controller shall be stop timed when in flash. Wired according to NEMA-TS2-1998, the MMU forces the controller to initiate the start-up sequence when exiting flash.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

3. AUTO/MANUAL SWITCH - Cabinet wiring shall include provisions for an AUTO/MANUAL switch and a momentary push button or hand cord. The AUTO/MANUAL switch and push button or hand cord shall not be provided unless it is called for in the CUSTOMER SPECIFICATION.

All toggle type switches shall be heavy duty and rated 15 amps minimum. Single- or double-pole switches may be provided, as required. Any exposed terminals or switch solder points shall be covered with a non-flexible shield to prevent accidental contact. All switch functions must be permanently and clearly labeled. All wire routed to the police door-in-door and test switch push button panel shall be adequately protected against damage from repetitive opening and closing of the main door.

Auxiliary Devices:

Load Switches: Load switches shall be solid state and shall conform to the requirements of Section 6.2 of the NEMA TS2 Standard. Signal load switches shall have a minimum rating of 10 amperes at 120 VAC for an incandescent lamp load. The front of the load switch shall be provided with three indicators to show the input signal from the controller to the load switch. Load switches shall be dedicated per phase. The use of load switches for other partial phases is not acceptable. The full complement of load switches shall be supplied with each cabinet to allow for maximum phase utilization for which the cabinet is designed.

Flashers: The flasher shall be solid state and shall conform to the requirements of section 6.3 of the NEMA TS2 Standard. Flashing of field circuits for the purpose of intersection flash shall be accomplished by a separate flasher. The flasher shall be rated at 15 amperes, double pole with a nominal flash rate of 60 FPM. A full complement of flasher shall be provided.

Flash Transfer Relays: All flash transfer relays shall meet the requirements of Section 6.4 of the NEMA TS2 Standard. The coil of the flash transfer relay must be de-energized for flash operation. The full complement of relays shall be supplied with each cabinet to allow for maximum phase utilization for which the cabinet is designed.

Malfunction Management Units (MMU): Each cabinet assembly shall be supplied with one MMU as defined by the requirements

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

of Section 4 of the NEMA TS2 Standard. Malfunction Management Units shall be a Type 16. The MMU shall be Model MMU-16 (EDI Model MMU-16LE) or approved equal.

Bus Interface Units (BIU): All BIUs shall meet the requirements of Section 8 of the NEMA TS2 Standard. A full complement of BIUs meeting Section 5.3.1.4 of the NEMA Publication No. TS2-2003 shall be supplied per cabinet. Bus Interface Units shall be supplied with each cabinet to allow for maximum phase and function utilization for which the cabinet is designed. A minimum of 3 BIUs shall be provided for each cabinet. Each BIU shall include power on, transmit and valid data indicators - all indicators shall be LEDs. A Type 1 Interface shall be defined as defined by Section 5.3, the controller interface shall conform to the Standard Publication No. TS2-2003.

Cabinet Power Supply: The cabinet power supply shall meet the requirements of Section 5.3.5 of the NEMA TS2 Standard. The cabinet power supply shall provide LED indicators for the line frequency, 12 VDC, 12 VAC, and 24 VDC outputs. The cabinet power supply shall provide (on the front panel) jack plugs for access to the +24 VDC for test purposes. Cabinet power supply shall be provided with each cabinet assembly per manufacturer's specifications and be wired directly to the Power Bus Assembly via a 12-pin Molex Robotic type connector Model# 54332-1270 or exact equivalent.

Testing: Each controller and cabinet assembly shall be tested as a complete entity under signal load for a minimum of 48 hours. Each assembly shall be delivered with a signed document detailing the cabinet final tests performed. The cabinet shall be assembled and tested by the controller manufacturer or authorized local distributor to ensure proper component integration and operation.

Warranty: The controller and MMU shall be warranted by the manufacturer against mechanical and electrical defects for a period of two years from date of shipment. The manufacturer's warranty shall be supplied in writing with each cabinet and controller. Second party extended warranties are not acceptable. The cabinet assembly and all other components shall be warranted for a period of one year from date of shipment. Any defects shall be corrected by the manufacturer at no cost to the owner.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

**3.1.10 Contract Item # 10 - Iteris RZ4 Vehicle Detection Video Camera or Equal**

**3.1.10.1** Contract Item #10 shall be an Iteris Vantage RZ4 series or Equal vehicle detection video camera with associated connectors, cable, installation hardware and accessories including surge protection (EDCO #CX06-M or equivalent).

**3.1.11 Contract Item # 11 – Non-Warranty Repair of Iteris RZ4 Vehicle Detection Video Camera or Equal**

**3.1.11.1** Contract Item #11 shall be for the repair of Iteris RZ4 or Equal vehicle detection video Camera. The repaired items shall be repaired to new working condition and with a description of the repair and certificate of repair confirming it was repaired and verifying the date of repair. Repairs must be made by an Iteris or Equal certified factory workshop and by a technician with a manufacturer's certification that they are certified to work on these items.

**3.1.12 Contract Item #12 - Iteris Vehicle Detection Video Cards or Equal**

**3.1.12.1** Contract Item #12 shall be an Iteris Edge 2 Dual series (Model # 493094001) vehicle detection video card or equivalent.

**3.1.13 Contract Item #13 - Non-Warranty Repair of Iteris Vehicle Detection Video Card or Equal**

**3.1.13.1** Contract Item #13 shall be for the repair of Iteris or Equal vehicle detection video cards. The repaired items shall be repaired to new working condition and with a description of the repair and certificate of repair confirming it was repaired and verifying the date of repair. Repairs must be made by an Iteris or equal certified factory workshop and by a technician with a manufacturer's certification that they are certified to work on these items.

**3.1.14 Contract Item # 14 - Autoscope Vehicle Detection Video Camera or Equal**

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

**3.1.14.1** Contract Item #14 shall be an Autoscope AIS-IV series (Model # 703170) or Equal vehicle detection video camera with associated connectors, cable, installation hardware and accessories including surge protection or equivalent.

**3.1.15 Contract Item # 15 – Non-Warranty Repair of Autoscope Vehicle Detection Video Camera or Equal**

**3.1.15.1** Contract Item #15 shall be for the repair of Autoscope vehicle detection video cards. The repaired items shall be repaired to new working condition and with a description of the repair and certificate of repair confirming it was repaired and verifying the date of repair. Repairs must be made by an Autoscope or Equal certified factory workshop and by a technician with a manufacturer's certification that they are certified to work on these items.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

**3.1.16 Contract Item #16 - Autoscope Vehicle Detection Video Cards or Equal**

**3.1.16.1** Contract Item #16 shall be an Autoscope Rackvision Pro 2 series (Model # PRO2-A700-1030) or Equal vehicle detection video card or equivalent.

**3.1.17 Contract Item # 17- Non-Warranty Repair of Autoscope Vehicle Detection Video Cards or Equal**

**3.1.17.1** Contract Item #17 shall be for the repair of Autoscope vehicle detection video cards. The repaired items shall be repaired to new working condition and with a description of the repair and certificate of repair confirming it was repaired and verifying the date of repair. Repairs must be made by an Autoscope or Equal certified factory workshop and by a technician with a manufacturer's certification that they are certified to work on these items.

**3.1.18 Contract Item #18 - Wavetronix Smartsensor "Matrix" Vehicle Detection Radar Sensor or Equal**

**3.1.18.1** Contract Item #18 shall be a Wavetronix Smartsensor Matrix series (Model #SS225) or equivalent Radar Presence Detection (RPD) and shall provide accurate presence-detection of moving vehicles up to 140 feet from the stop bar. The RPD shall be provided with all required cabinet hardware, mounting brackets, cables, and connections.

**3.1.19 Contract Item #19 - Wavetronix Smartsensor "Advance" Vehicle Detection Radar Sensor or Equal**

**3.1.19.1** Contract Item #19 shall be a Wavetronix Smartsensor Advance (Model #SS200E) or equivalent Radar Advance Digital Detection (RADD) and shall provide accurate advanced presence-detection of moving vehicles or clusters of vehicles up to 900 feet from the stop bar. The RADD shall be provided with all required cabinet hardware, mounting brackets, cables, and connections.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

**3.1.20 Contract Item #20 - Wavetronix 2-Channel Vehicle  
Detection Radar Card or Equal**

**3.1.20.1** Contract Item #20 shall be a Wavetronix (Model # Click! 112 series) or Equal 2-channel vehicle detection radar card or equivalent.

**3.1.21 Contract Item #21 - Wavetronix 4-Channel Vehicle  
Detection Radar Card or Equal**

**3.1.21.1** Contract Item #21 shall be a Wavetronix (Model # Click! 114 series) or Equal 4-channel vehicle detection radar card or equivalent.

**3.1.22 Contract Item #22 – SmartMicro “Stop Bar + Advance”  
Vehicle Detection Radar Sensor or Equal**

**3.1.22.1** Contract Item #22 shall be a SmartMicro “Stop Bar + Advance” (Model #TRUGRD UMRR-12 Type 48) or equivalent Radar Advance Digital Detection (RADD) and shall provide accurate advanced presence-detection of moving vehicles or clusters of vehicles up to 984 feet (300 meters) from the stop bar. The RADD shall be provided with all required cabinet hardware, mounting brackets, cables, and connections.

**3.1.23 Contract Item #23 – SmartMicro Vehicle Detection Radar  
Controller Control Plus Interface Card or Equal**

**3.1.23.1** Contract Item #23 shall be a SmartMicro (Model #TMIB\_AB or Equal) controller interface board or equivalent .

**3.1.24 Contract Item #24 – SmartMicro Vehicle Detection Radar  
Controller “Daughter” Interface Card or Equal**

**3.1.24.1** Contract Item #24 shall be a SmartMicro (Model # TMIB\_C or Equal) controller “daughter” interface card or equivalent.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

**3.1.25 Contract Item #25 - TOMAR Preemption Control Systems  
Detectors or Equal**

**3.1.25.1** Contract Item #25 shall be a TOMAR Strobecom II series (Model # 2091-SD) or equivalent.

**3.1.26 Contract Item # 26 - TOMAR Preemption Control Systems  
Detection Cards or Equal**

**3.1.26.1** Contract Item # 26 shall be a TOMAR Strobecom II series (Model # 3080 optical signal processor) or equivalent.

**3.1.27 Contract Item # 27 - Non-Warranty Repair of TOMAR  
Preemption Control Systems Detection Cards or Equal**

**3.1.27.1** Contract Item #27 shall be for the repair of TOMAR Preemption Control Systems or Equal detection cards. The repaired items shall be repaired to new working condition and with a description of the repair and certificate of repair confirming it was repaired and verifying the date of repair. Repairs must be made by a TOMAR or Equal certified factory workshop and by a technician with a manufacturer's certification that they are certified to work on these items.

**3.1.28 Contract Item # 28 - Traffic Signal Conflict Monitor or  
Equal**

**3.1.28.1** Contract Item #28 shall be an EDI SSM-LE series (Model # SSM-12LE) or Equal, 12-channel conflict monitor or equivalent with EIA-232 port.

**3.1.29 Contract Item #29 - Traffic Signal Malfunction  
Management Unit or Equal**

**3.1.29.1** Contract Item #29 shall be an EDI MMU-LE Series (Model # MMU-16LE) or Equal, 16-channel MMU or equivalent with EIA-232 port.

**3.1.30 Contract Item #30 - Traffic Signal Bus Interface Unit or  
Equal**



CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

**3.1.30.1** Contract Item #30 shall be an EDI standard-width (Model # BIU-700) or half-width (Model #BIU-700H) bus interface unit or equivalent with EIA-232 port.

**3.1.31 Contract Item #31 - Green LED Signal Lamp or Equal**

**3.1.31.1** Contract Item # 31 shall be a 12-inch green LED signal lamp, GE Lighting Solutions GTX series (Model #DR6-GTFB-77A or # DR6-GTFB-VLA) or Leotek IL6-P3 series (Model # TSL-12G-LX-IL6-A1-P3) or equivalent and shall carry a five (5) year warranty from the time of purchase.

**3.1.32 Contract Item #32 - Yellow LED Signal Lamp or Equal**

**3.1.32.1** Contract Item #32 shall be a 12-inch yellow LED signal lamp, GE Lighting Solutions GTX series (Model #DR6-YTFB-77A or # DR6-YTFB-VLA) or Leotek IL6-P3 series (Model # TSL-12Y-LX-IL6-A1-P3) or equivalent and shall carry a five (5) year warranty from the time of purchase.

**3.1.33 Contract Item #33 - Red LED Signal Lamp or Equal**

**3.1.33.1** Contract Item #33 shall be a 12-inch red LED signal lamp, GE Lighting Solutions GTX series (Model #DR6-RTFB-77A or # DR6-RTFB-VLA) or Leotek IL6-P3 series (Model # TSL-12R-LX-IL6-A1-P3) or equivalent and shall carry a five (5) year warranty from the time of purchase.

**3.1.34 Contract Item #34 – Green Arrow LED Signal Lamp or Equal**

**3.1.34.1** Contract Item #34 shall be a 12-inch green arrow LED signal lamp, GE Lighting Solutions GT1 series (Model #DR6-GTAAN-17A) or Leotek IL6-P3 series (Model # TSL-12GA-IL6-A1-P3) or equivalent and shall carry a five (5) year warranty from the time of purchase.

**3.1.35 Contract Item #35 – Yellow Arrow LED Signal Lamp or Equal**

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

- 3.1.35.1** Contract Item #35 shall be a 12-inch yellow arrow LED signal lamp, GE Lighting Solutions GT1 series (Model #DR6-YTAAN-17A-YX) or Leotek IL6-P3 series (Model #TSL-12YA-IL6-A1-P3) or equivalent and shall carry a five (5) year warranty from the time of purchase.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

**3.1.36 Contract Item #36 – Red Arrow LED Signal Lamp or Equal**

**3.1.36.1** Contract Item #36 shall be a 12-inch red arrow LED signal lamp, GE Lighting Solutions GT1 series (Model #DR6-RTAAN-17A-YX) or Leotek IL6-P3 series (Model # TSL-12RA-IL6-A1-P3) or equivalent and shall carry a five (5) year warranty from the time of purchase.

**3.1.36.2**

**3.1.37 Contract Item #37 – Three (3) Section Signal Head Housing and Mounting Hardware or Equal**

**3.1.37.1** Contract Item #37 shall be a three (3) section signal head configuration traffic signal enclosure for LED lamps, Mobotrex Eagle Traffic Control Systems SG or SA series or equivalent, with aluminum or polycarbonate housing and stainless steel hardware, in full compliance with the MUTCD.

**3.1.38 Contract Item #38 – Five (5) Section Signal Head Housing and Mounting Hardware or Equal**

**3.1.38.1** Contract Item #38 shall be a five (5) section signal head configuration traffic signal enclosure for LED lamps, Mobotrex Eagle Traffic Control Systems SG or SA series or equivalent, with aluminum or polycarbonate housing and stainless steel hardware, in full compliance with the MUTCD.

**3.1.39 Contract Item #39 - LED Pedestrian Signal Head with Housing and Mounting Hardware or Equal**

**3.1.39.1** Contract Item #39 shall be a 16-inch by 18-inch LED countdown pedestrian signal, GE Lighting Solutions GT1 series (Model # PS7-CFF1-27A-J) or equivalent in full compliance with the MUTCD.

**3.1.40 Contract Item #40 - Audible Pedestrian Push Button or Equal**

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

**3.1.40.1** Contract Item #40 shall be a Polara Model #iN3 or Campbell Model # APS or Pelco Intellicross APS or equivalent.

**3.1.41 Contract Item #41 - TS1 Cabinet Power Supply or Equal**

**3.1.41.1** Contract Item #41 shall be a NEMA TS-1 cabinet power supply, Siemens Model #CPS105 or equivalent.

**3.1.42 Contract Item #42 - TS2 Cabinet Power Supply or Equal**

**3.1.42.1** Contract Item #42 shall be a NEMA TS-2 cabinet power supply, EDI Model #PS-250 or equivalent.

**3.1.43 Contract Item #43 - Time Clocks or Equal**

**3.1.43.1** Contract Item #43 shall an ELTEC Model # TC-18 or Equal programmable time clock or equivalent.

**3.1.44 Contract Item #44- Flash Transfer Relays or Equal**

**3.1.44.1** Contract Item #44 shall be Struthers-Dunn Model #W21ACPX-2/W21ACPXD-5 or equivalent.

**3.1.45 Contract Item #45 - Solar Flasher Controller or Equal**

**3.1.45.1** Contract Item #45 shall be a Morningstar Corporation ProStar-15 series (Model # PS-15) or equivalent.

**3.1.46 Contract Item #46 - Solar Flasher Motor Unit or Equal**

**3.1.46.1** Contract Item #46 shall be a Traffic Sensor Corporation (TSC) Model # C/N FU4204 or equivalent.

**3.1.47 Contract Item #47 – Multilink Uninterruptible Power Supply (UPS) or Equal**

**3.1.47.1** Contract Item #47 shall be a Multilink Double Conversion Unit, Uninterruptible Power Supply (UPS), EDP-1000 series, rated 1 KVA (Model #010-028-20) or equivalent.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

**3.1.48 Contract Item #48 – Multilink Safety Automatic Transfer Switch or Equal**

**3.1.48.1** Contract Item #48 shall be a Multilink Safety Automatic Transfer Switch, EDP Series, rated 2 KW output capacity (Model #010-505-10) or equivalent.

**3.1.49 Contract Item #49 – Multilink Battery Balancer or Equal**

**3.1.49.1** Contract Item #49 shall be a Multilink Battery Balancer (Model #018-020-20) or equivalent.

**3.1.50 Contract Item #50 – Batteries for Traffic Signal Systems**

**3.1.50.1** Contract Item #50 shall be an MK Battery, Valve-Regulated, Absorbed Glass Mat Technology, 12-volt DC (Model #8A30 HEI) or equivalent.

**3.1.51 Contract Item #51 – Multilink Battery Backup System Cabinet or Equal**

**3.1.51.1** Contract Item #51 shall be a Multilink Battery Backup System Cabinet (Model #TCLS532421A1253R9-Special), 53"H, 24"W, 21"D, with two (2) slide-out trays or equivalent.

**3.1.52 Contract Item #52 – Hubbell TwistLock Power Inlet or Equal**

**3.1.52.1** Contract Item #52 shall be a Hubbell Twist-Lock, Watertight, Safety-Shroud, Flanged Inlet, 30-amp, 125-volt, 2-pole, 3-wire grounding, NEMA L5-30P (Model #HBL2615SW) or equivalent.

**3.1.53 Contract Item #53 - Encom Radio Transceivers or Equal**

**3.1.53.1** Contract Item #53 shall be an Encom Model # Pulse S series spread spectrum radio transceiver or equivalent. This work shall consist of furnishing and installing spread-spectrum radio equipment in accordance with this special provision,

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

the Signal Spread-Spectrum Provisions, and as directed by the Engineer. Spread-spectrum radio equipment shall be used for bi-direction data communications between the designated master and local intersection controllers. The prescribed Closed Loop System must be able to integrate both spread-spectrum interconnect as well as twisted pair communication cable interconnect to conform to the Signal Spread-Spectrum Provisions relating to system software functions.

Note: For supplementary information on the specifications below, reference the West Virginia Division of Highways Standard Specifications, Roads and Bridges, 2017 Edition at:

[http://www.transportation.wv.gov/highways/contractadmin/specifications/2017StandSpec/Documents/2017\\_Standard.pdf](http://www.transportation.wv.gov/highways/contractadmin/specifications/2017StandSpec/Documents/2017_Standard.pdf).

Materials shall be:

- A. Electrical Items shall conform to the requirements of Section 660 of the specifications.
- B. Galvanizing shall conform to the requirements of Section 660 and Subsection 715.42.
- C. Steel for fabrication items shall conform to the requirements of Section 660 and subsection 715.42.

Equipment shall be:

- A. Transceivers: Transceivers shall interface with the designated master and local intersection controllers providing under this contract and shall conform to the following:
  - a. FCC part 15.247
  - b. Frequency range 902-928 MHz
  - c. Frequency hopping type modulation
  - d. 250 milli-Watt to 1000 milli-Watt output power, adjustable

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

- e. 7 channels minimum (50 frequencies minimum)
  - f. LED status indicators for transmission
  - g. Standard RS232C data interface with a DB25 connector on the transceiver
  - h. Data rate a minimum of 4800 bps
  - i. Antenna connector on transceiver shall be type "N"
  - j. Transceivers shall operate from 120 VAC or shall include a power supply for conversion of 120 VAC to the transceiver's voltage requirement
  - k. Maximum bit error rate of  $1 \times 10^{-6}$  at -105 dBm.
  - l. Transceivers shall be designed to prevent EMI and RFI interference
  - m. Transceivers shall be manufacturer's proven model designed for spread-spectrum communications
  - n. Transmitter frequency stability shall be 0.00015% from -30C degrees to +60C degrees
  - o. Transceivers shall operate within a temperature range of -30C degrees to +60C degrees and 95% relative humidity at 40 degrees centigrade
- B. Master/Repeater Antennas: Master/repeater antenna shall conform to Parts 15.247 and 15.249 of the FCC Telecommunications Manual for field strength of emissions, and be the manufacturer's proven model and conform to the following:
- a. Fiberglass, omni-directional type
  - b. 9dbd gain, omni-directional pattern
  - c. Frequency Range 902-928 MHz
  - d. Mountable for vertical polarization
  - e. "N" type female connector
  - f. Minimum wind rating of 150 MPH
  - g. Direct DC grounding system
  - h. Stainless steel mounting hardware

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

Transmitting antennas with directional gain greater than 6 dBi shall have the power reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

C. Remote Antennas: Remote antennas shall be the manufacturer's proven model and conform to the following requirements:

- a. Yagi type with a minimum of 7 elements, including driven element
- b. 9 dBd gain
- c. Frequency range 902-928 MHz
- d. Mountable for horizontal and vertical polarization
- e. "N" type female connector
- f. Stainless steel mounting hardware

D. Antenna Cables: Antenna cables having a length of 60 feet or less shall be 0.6" foam "hard line". Feed line loss of the antenna cables shall be no more than 3 dB.

E. Lightning Protection: Lightning protection for connection within the coax cable run shall conform to the following:

- a. Frequency Range, D.C. GHZ
- b. VSWR 1.5:1 Maximum
- c. Power Capacity of 200 watts @ 900 MHz
- d. Insertion loss of less than 0.3 dB @ 900 MHz
- e. D.C. Breakdown Voltages 350 VDC +/- 15%
- f. Maximum Impulse Current at 8 x 10 microseconds, 5000 amps
- g. Impulse Life at 10 x 1000 microseconds 500 amps, 500 occurrences minimum
- h. Insulation resistance at 100 VDC, 100 mega ohms
- i. Connectors "N" type female



CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

F. Software: Software (two copies) shall be furnished on 3.5" diskettes for use with a standard IBM compatible 80386 CPU laptop computer. One copy shall be provided to the City and one copy to be provided to the Traffic Engineering Division. Software shall be menu driven and furnished with operating instructions. The Contractor shall furnish a standard RS232C cable with DB25 connector for connection to the computer and transceivers. Operation of the software on existing T.E.D. laptop computers shall be demonstrated by the contractor and any software and cable problems shall be corrected by the Contractor at no expense to the T.E.D. Software shall control the following programming and diagnostic parameters:

- a. Radio system address
- b. Radio loop-back mode
- c. Mode – master remote
- d. Channel
- e. Hop pattern
- f. Data interface rate
- g. Radio model number, serial number and date of manufacture
- h. Owners name
- i. Link check
- j. Polling check
- k. Sync check

**3.1.54 Contract Item #54 - Intuicom Communicator II Radio Transceivers or Equal**

**3.1.54.1** Contract Item #54 shall be an Intuicom EB-X series spread spectrum radio transceiver or equivalent. This work shall consist of furnishing and installing spread-spectrum radio equipment in accordance with this special provision, the Signal Spread-Spectrum Provisions, and as directed by the Engineer. Spread-spectrum radio equipment shall be used for bi-direction data communications between the designated master and local intersection controllers. The

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

prescribed Closed Loop System must be able to integrate both spread-spectrum interconnect as well as twisted pair communication cable interconnect to conform to the Signal Spread-Spectrum Provisions relating to system software functions.

Note: For supplementary information on the specifications below, reference the West Virginia Division of Highways Standard Specifications, Roads and Bridges, 2017 Edition at:

[http://www.transportation.wv.gov/highways/contractadmin/specifications/2017StandSpec/Documents/2017\\_Standard.pdf](http://www.transportation.wv.gov/highways/contractadmin/specifications/2017StandSpec/Documents/2017_Standard.pdf).

Materials shall be:

- A. Electrical Items shall conform to the requirements of Section 660 of the specifications.
- B. Galvanizing shall conform to the requirements of Section 660 and Subsection 715.42.
- C. Steel for fabrication items shall conform to the requirements of Section 660 and subsection 715.42.

Equipment shall be:

- A. Transceivers: Transceivers shall interface with the designated master and local intersection controllers providing under this contract and shall conform to the following:
  - 1. FCC part 15.247
  - 2. Frequency range 902-928 MHz
  - 3. Frequency hopping type modulation
  - 4. 250 milli-Watt to 1000 milli-Watt output power, adjustable
  - 5. 7 channels minimum (50 frequencies minimum)
  - 6. LED status indicators for transmission

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

7. Standard RS232C data interface with a DB25 connector on the transceiver
8. Data rate a minimum of 4800 bps
9. Antenna connector on transceiver shall be type "N"
10. Transceivers shall operate from 120 VAC or shall include a power supply for conversion of 120 VAC to the transceiver's voltage requirement
11. Maximum bit error rate of  $1 \times 10^{-6}$  at -105 dBm.
12. Transceivers shall be designed to prevent EMI and RFI interference
13. Transceivers shall be manufacturer's proven model designed for spread-spectrum communications
14. Transmitter frequency stability shall be 0.00015% from -30C degrees to +60C degrees
15. Transceivers shall operate within a temperature range of -30C degrees to +60C degrees and 95% relative humidity at 40 degrees centigrade

B. Master/Repeater Antennas: Master/repeater antenna shall conform to Parts 15.247 and 15.249 of the FCC Telecommunications Manual for field strength of emissions, and be the manufacturer's proven model and conform to the following:

1. Fiberglass, omni-directional type
2. 9dbd gain, omni-directional pattern
3. Frequency Range 902-928 MHz
4. Mountable for vertical polarization
5. "N" type female connector
6. Minimum wind rating of 150 MPH
7. Direct DC grounding system
8. Stainless steel mounting hardware

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

Transmitting antennas with directional gain greater than 6 dBi shall have the power reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

C. Remote Antennas: Remote antennas shall be the manufacturer's proven model and conform to the following requirements:

1. Yagi type with a minimum of 7 elements, including driven element
2. 9 dBd gain
3. Frequency range 902-928 MHz
4. Mountable for horizontal and vertical polarization
5. "N" type female connector
6. Stainless steel mounting hardware

D. Antenna Cables: Antenna cables having a length of 60 feet or less shall be 0.6" foam "hard line". Feed line loss of the antenna cables shall be no more than 3 dB.

E. Lightning Protection: Lightning protection for connection within the coax cable run shall conform to the following:

1. Frequency Range, D.C. GHZ
2. VSWR 1.5:1 Maximum
3. Power Capacity of 200 watts @ 900 MHz
4. Insertion loss of less than 0.3 dB @ 900 MHz
5. D.C. Breakdown Voltages 350 VDC +/- 15%
6. Maximum Impulse Current at 8 x 10 microseconds, 5000 amps
7. Impulse Life at 10 x 1000 microseconds 500 amps, 500 occurrences minimum
8. Insulation resistance at 100 VDC, 100 mega ohms
9. Connectors "N" type female

CRFQ DOT2300000079REQUEST FOR QUOTATION  
**TSS and ITS Parts and Equipment**  
**8523C3006**

---

F. Software: Software (two copies) shall be furnished on 3.5" diskettes for use with a standard IBM compatible 80386 CPU laptop computer. One copy shall be provided to the City and one copy to be provided to the Traffic Engineering Division. Software shall be menu driven and furnished with operating instructions. The Contractor shall furnish a standard RS232C cable with DB25 connector for connection to the computer and transceivers. Operation of the software on existing T.E.D. laptop computers shall be demonstrated by the contractor and any software and cable problems shall be corrected by the Contractor at no expense to the T.E.D. Software shall control the following programming and diagnostic parameters:

1. Radio system address
2. Radio loop-back mode
3. Mode – master remote
4. Channel
5. Hop pattern
6. Data interface rate
7. Radio model number, serial number and date of manufacture
8. Owners name
9. Link check
10. Polling check
11. Sync check

**3.1.55 Contract Item #55 - Solar Flasher Assembly, 15-Watt, or Equal**

**3.1.55.1** Contract Item #55 shall be a 15-Watt rated Carmanah Solar Flasher Assembly (Model #R247-E) or equivalent.

**3.1.56 Contract Item #56 - Solar Flasher Assembly, 30-Watt, or Equal**

**3.1.56.1** Contract Item #56 shall be a 30-Watt rated Carmanah Solar Flasher Assembly (Model #R247-F) or equivalent.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

**3.1.57 Contract Item #57 – Econolite EVO Radar Vehicle  
Detection Sensor Kit or Equal**

**3.1.57.1** Contract Item #57 shall be an Econolite EVO Radar Sensor Kit with Sensor, Mounting Bracket and Junction Box (Part #143-1001-502) or equivalent.

**3.1.58 Contract Item #58 – Econolite EVO Radar Vehicle  
Detection System Hub or Equal**

**3.1.58.1** Contract Item #58 shall be an Econolite EVO Radar Sensor Hub (Part #143-1001-503) or equivalent.

**3.1.59 Contract Item #59 – Iteris Vantage Radius Radar Vehicle  
Detection Sensor Kit or Equal**

**3.1.59.1** Contract Item #59 shall be an Iteris Vantage Radius Radar Sensor Kit with Sensor Unit, Pedestal-Mounting Bracket Assembly and Two (2) Shielded RJ-45 Connectors (Part #RAD-SENSOR-PAK, includes Part #RAD-PROC-SHIPKIT) or equivalent.

**3.1.60 Contract Item #60 – Iteris Vantage Radius Radar Vehicle  
Detection CCU Kit or Equal**

**3.1.60.1** Contract Item #60 shall be an Iteris Vantage Radius Radar CCU Kit with CCU Shelf-Mount Unit for TS2 applications, supports up to four (4) sensors, external din-rail power supply, 2.4 GHz rubber duck antenna (Part #RAD-CCU-SM4-TS2-PAK, includes Part #CCU-SM-TS2-SHIPKIT) or equivalent.

**4 CONTRACT AWARD:**

**4.1 Contract Award:** The Contract is intended to provide Agencies with a purchase price on all Contract Items. The Contract shall be awarded to the Vendor that provides the Contract Items meeting the required specifications for the lowest

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

overall total cost by section as shown on the Pricing Pages. Each section shall be evaluated independently, and award shall be made to multiple vendors if needed.

- 4.2 Pricing Pages:** Vendor should complete the Pricing Pages by completing **Exhibit A** by entering the Unit Price for each commodity line item requested. The **Exhibit A Pricing Pages** are supplied in Excel and formatted to calculate the Extended Cost and the Grand Total Cost. It is the vendor's responsibility to ensure the calculations for their bid is correct before submitting. Vendor should complete the Pricing Pages in their entirety as failure to do so may result in Vendor's bids being disqualified.

The Pricing Pages contain a list of the Contract Items and estimated purchase volume. The estimated purchase volume for each item represents the approximate volume of anticipated purchases only. No future use of the Contract or any individual item is guaranteed or implied.

Vendor should electronically enter the information into the Pricing Pages through wvOASIS if available, or as an electronic document. In most cases, the Vendor can request an electronic copy of the Pricing Pages for bid purposes by sending an email request to the following address: [John.W.Estep@wv.gov](mailto:John.W.Estep@wv.gov).

## **5 ORDERING AND PAYMENT:**

- 5.1 Ordering:** Vendor shall accept orders through WVOASIS, regular mail, facsimile, e-mail, or any other written form of communication. Vendor may, but is not required to, accept on-line orders through a secure internet ordering portal/website. If Vendor has the ability to accept on-line orders, it should include in its response a brief description of how Agencies may utilize the on-line ordering system. Vendor shall ensure that its on-line ordering system is properly secured prior to processing Agency orders on-line.
- 5.1 Payment:** Vendor shall accept payment in accordance with the payment procedures of the State of West Virginia.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

**6 DELIVERY AND RETURN:**

**6.1 Delivery Time:** Vendor shall deliver standard orders within thirty-two (32) working days after orders are received. Vendor shall deliver emergency orders within three (3) working day(s) after orders are received. Vendor shall ship all orders in accordance with the above schedule and shall not hold orders until a minimum delivery quantity is met.

**6.2 Late Delivery:** The Agency placing the order under this Contract must be notified in writing if orders will be delayed for any reason. Any delay in delivery that could cause harm to an Agency will be grounds for cancellation of the delayed order, and/or obtaining the items ordered from a third party. Any order not received in full after thirty-two (32) working days of ARO will be penalized \$40.00 per calendar day until order is completed in full.

Any Agency seeking to obtain items from a third party under this provision must first obtain approval of the Purchasing Division.

**6.3 Delivery Payment/Risk of Loss:** Standard order delivery shall be F.O.B. destination to the Agency's location. Vendor shall include the cost of standard order delivery charges in its bid pricing/discount and is not permitted to charge the Agency separately for such delivery. The Agency will pay delivery charges on all emergency orders provided that Vendor invoices those delivery costs as a separate charge with the original freight bill attached to the invoice.

**6.4 Return of Unacceptable Items:** If the Agency deems the Contract Items to be unacceptable, the Contract Items shall be returned to Vendor at Vendor's expense and with no restocking charge. Vendor shall either make arrangements for the return within five (5) days of being notified that items are unacceptable or permit the Agency to arrange for the return and reimburse Agency for delivery expenses. If the original packaging cannot be utilized for the return, Vendor will supply the Agency with appropriate return packaging upon request. All returns of unacceptable items shall be F.O.B. the Agency's location. The returned product shall either be replaced, or the Agency shall receive a full credit or refund for the purchase price, at the Agency's discretion.



CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

- 6.5 Return Due to Agency Error:** Items ordered in error by the Agency will be returned for credit within 30 days of receipt, F.O.B. Vendor's location. Vendor shall not charge a restocking fee if returned products are in a resalable condition. Items shall be deemed to be in a resalable condition if they are unused and in the original packaging. Any restocking fee for items not in a resalable condition shall be the lower of the Vendor's customary restocking fee or 5% of the total invoiced value of the returned items.

**7 VENDOR DEFAULT:**

- 7.1** The following shall be considered a vendor default under this Contract.
- 7.1.1 Failure to provide Contract Items in accordance with the requirements contained herein.
  - 7.1.2 Failure to comply with other specifications and requirements contained herein.
  - 7.1.3 Failure to comply with any laws, rules, and ordinances applicable to the Contract Services provided under this Contract.
  - 7.1.4 Failure to remedy deficient performance upon request.

CRFQ DOT2300000079REQUEST FOR QUOTATION  
TSS and ITS Parts and Equipment  
8523C3006

---

7.2 The following remedies shall be available to Agency upon default.

7.2.1 Immediate cancellation of the Contract.

7.2.2 Immediate cancellation of one or more release orders issued under this Contract.

7.2.3 Any other remedies available in law or equity.

**8 MISCELLANEOUS:**

8.1 **No Substitutions:** Vendor shall supply only Contract Items submitted in response to the Solicitation unless a contract modification is approved in accordance with the provisions contained in this Contract.

8.2 **Vendor Supply:** Vendor must carry sufficient inventory of the Contract Items being offered to fulfill its obligations under this Contract. By signing its bid, Vendor certifies that it can supply the Contract Items contained in its bid response.

8.3 **Reports:** Vendor shall provide quarterly reports and annual summaries to the Agency showing the Agency's items purchased, quantities of items purchased, and total dollar value of the items purchased. Vendor shall also provide reports, upon request, showing the items purchased during the term of this Contract, the quantity purchased for each of those items, and the total value of purchases for each of those items. Failure to supply such reports may be grounds for cancellation of this Contract.

8.4 **Contract Manager:** During its performance of this Contract, Vendor must designate and maintain a primary contract manager responsible for overseeing Vendor's responsibilities under this Contract. The Contract manager must be available during normal business hours to address any customer service or other issues related to this Contract. Vendor should list its Contract manager and his or her contact information below.

**Contract Manager:** Halle Van Scoy

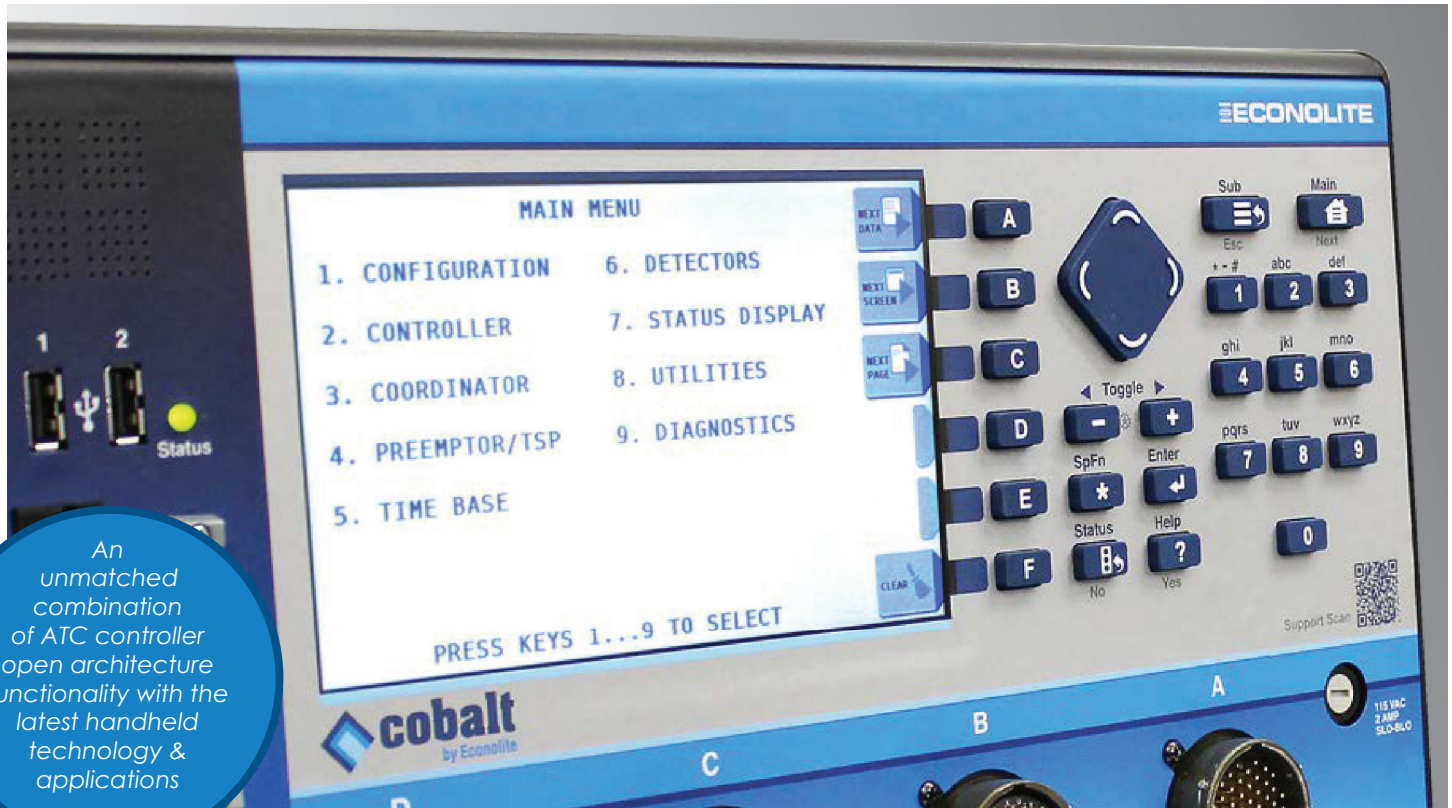
**Telephone Number:** 330-425-4994

**Fax Number:** 330-425-9338

**Email Address:** halle.vanscoy@pathmasterinc.com



Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 6  
Qty. 15  
With FSK/RS232 Telemetry Module



An unmatched combination of ATC controller open architecture functionality with the latest handheld technology & applications

## About Cobalt-C Series

The traffic signal controller represents one of the most important intelligent technology and communication components of a signalized intersection. As such, today's advanced traffic signal controller must integrate leading edge electronics, while supporting industry standards and specifications. Econolite continues its tradition of offering the most advanced and innovative technologies with the Cobalt™ family of Advanced Transportation Controllers (ATC).

Fully meeting the industry's ATC standard 5.2b and proposed standard 6.10, Cobalt-C is designed to provide an unmatched combination of ATC controller open architecture functionality with powerful, field-proven Cobalt ASC/3-LX software. Cobalt-C also features a breakthrough hardened seven-inch screen and user interface matched with a Linux-based operating system, making programming and access to functions the easiest in the industry.

### At A Glance

- Revolutionary, large seven-inch TFT LCD display
- High brightness and contrast display for better outdoor readability than any other controller on the market
- Linux, open architecture real-time multi-tasking operating system
- Alternative Web browser-based user interface allows remote programming and status observation (with appropriate network connection)

# Cobalt-C ATC Hardware

Cobalt ATC controllers may be configured with Econolite's robust Cobalt Cobalt ASC/3-LX application software package, or other pre-qualified ATC/Linux software application software meeting current ATC standards. OS and software upgrades can be made easily by USB memory stick, SD card, or Ethernet via Econolite's Windows software installation application.

Cobalt -C includes a high-power, Linux-based Engine Board that is compliant with the ATC 5.2b and proposed 6.10 standard for a NEMA standard TS2 Type-1 or Type-2 I/O connectors, four Ethernet ports, two USB ports, and an SD Card slot. Additionally, the Cobalt -C seven-inch, high brightness TFT LCD module with is readable in direct sunlight, and is not affected by condensation or water drops.



## Hardware Details

- Supports Econolite Linux-based software or other pre-qualified ATC/Linux software
- ATC Engine Board
  - Fully compliant with the ATC Standard version 5.2b and proposed ATC Standard 6.10
  - 233MHz PowerQUICC II Pro-processor that provides 10 times more processing power than previous generation controller processor
  - 128Mbytes of DDR2 DRAM memory for application and OS program execution
  - 64 Mbytes of FLASH for storage of OS Software and user applications
  - 2MB of SRAM memory for non-volatile parameter storage
- Two integral Ethernet switches for two networks, ENET1 and ENET2
- Two USB 2.0 ports used to:
  - Update application software
  - Upload or download configuration
  - Upload logged data
- Datakey socket for an optional 3.3V Datakey, 8MB
- SD Memory Card socket
  - The SD Card stores configuration and logs and provides automatic backup of configuration
- CPU Active LED
- Three communications ports standard:
  - NEMA-ATC SDLC serial port 1
  - 25 pin serial port 2
  - 9 pin console serial port
- Built in speaker for enhanced audio controller feedback
- Integral carrying handle in back of controller
- Power Supply
  - Meets all requirements of ATC standard v6.10.
  - External 24VDC protected by a self-resetting electronic fuse
- Operating system
  - Linux 2.6.3x or later kernel and Board Support Package (BSP)
  - Compliant to ATC Standard V. 5.2.b Annex B specifications

## Hardware Options

- Two models:
  - TS2 type 2 connectors
  - TS2 type 1 connector
- Communications module options:
  - FSK Module that can be configured for RS232 operation
  - 2070 TEES 2009 standard 6A, 6B, and 7A plug-in modules
- Datakey 3.3V, 8MB



# Capabilities



- Exit to interrupted vehicle phase
- Use timing from an exit timing plan once, then the normal timing plan
- Exit to a selected phase first then to free or coordination (selectable)
- Exit free for one complete cycle then resume coordination (no transition)
- Exit to the phases where the most drivers have waited the longest

## Time Base Features

- 200 schedule programs, configurable for any combination of months, days of the week, and days of the month
- Fixed or floating exception day programs that override the day plan event on a specific day
- 50 day plan events that can use any of the 100 action plans
- 100 action plans that can be used by any of the 50 day plans

## Status Display Features

- Keyboard selection of detailed dynamic status displays for each of the main controller unit functions including: controller, coordinator, preemptor, time base, detectors, and MMU

## Detector Features

- 64 vehicle detectors
- 16 system or speed detectors
- Unique detector types and operation
- Individually assignable to phase and functions
- Lock/non-lock function by detector
- 4 detector plans
- 4 detector diagnostics plans
- Logging of volume and/or occupancy assignable by detector
- 4 pedestrian diagnostic plans

## Logging Features

- Separate buffers for detector activity, detector failures, controller events, and MMU events
- Logged data can be:
  - Viewed on front panel
  - Retrieved via a RS-232 terminal port, USB flash drive, or SD Card
  - Transferred via telemetry to a traffic management center

## Systems

- NTCIP level 2 compliance
- Supports Centrac®s, Aries® and TS2 NTCIP Level 2-compliant pre-qualified central applications

## Control Features

- 16 phases, 8 configurable concurrent groups in 4 timing rings
- 16 vehicle overlaps that can be configured as normal, -green/ yellow, PPLT/FYA or Econolite
- 16 pedestrian phases that can be configured as pedestrian overlaps
- Exclusive pedestrian operation
- Dynamic max operation
- Extendable walk and pedestrian clearance
- Advanced Walk
- Bike input and green timing
- Adaptive red clearance
- Transit Signal Priority

## Coordination Features

- 120 coordination event plans, each with its own cycle, offsets, split timing, coordinated phases, vehicle and pedestrian recall and phase omits
- Offset and split entries displayed in percent or seconds
- Automatic permissive periods
- Fixed or floating force-off
- Crossing arterial coordination
- Quick-sync feature

## Preemption Features

- Ten preemption sequences. Each may be configured as priority, first-come-first-serve, or bus preemption operation
- ECPI interlock to provide added monitoring
- Railroad gate-down input and timing.
- Conditional delay when entering preemption
- Multiple exit preemption options
  - Exit to selected exit phase
  - Exit to coordination (no transition)
  - Exit to interrupted pedestrian phase

# Cobalt Software

## Cobalt ASC/3 Linux Software

- Provides menu selection
- Field-proven for over 9 years
- Allows for an agency-specific default database
- Automatic backup of controller database to optional Datakey, SD card, or manual back up to USB flash drive
- Context sensitive help
- 100-statement logic processor to test inputs, outputs or timers and take actions based on the results
- Peer-to-Peer operation is a feature that allows controllers to share information with other controllers, independent of the central system. One controller can communicate with up to 15 other controllers through Ethernet.

## Optional Software

- Centrac's Adaptive
- Intersection Monitor

# User Interface

At its foundation, Cobalt-C has an intuitive navigation system that can be used with a laptop. Mobile device connectivity includes four Ethernet ports and two Universal Serial Bus (USB) ports that include support for an external Wi-Fi device. Cobalt-C also includes a Secure Digital (SD) port to provide almost unlimited file storage capability.

## Basic Specifications

- Temperature
  - -34.6°F to +165°F (-37°C to +74°C)
- Power
  - 110VAC @ 50/60 HZ or optional 220/240 VAC @ 50/60 HZ
  - Fuse protection for either 110 or 220/240V
  - Protection for the 24VDC supply is provided by a resettable electronic fuse
- Dimensions
  - 14.84"W x 8.50"H x 6.13"D



Cobalt Shelfmount  
Cobalt Rackmount  
2070 Series

# Next-Gen Advanced Transportation

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 8  
Qty. 1



## Overview

Cobalt is the next-generation in Advanced Transportation Controller (ATC) specifically designed for the mobile computing environment. Fully meeting ATC standards, Cobalt features a breakthrough hardened seven-inch touchscreen Graphical User Interface (GUI) matched with Linux-based OS that makes programming and access to functions the easiest in the industry.

Cobalt is designed to support Connected and Automated Vehicle (CAV) programs. Combined with the Connected Vehicle Co-Processor (CVCP) module, Cobalt fully supports Signal Phase and Timing (SPaT)/MAP data messaging capabilities, providing a fundamental Vehicle-to-Infrastructure (V2I) element for connected vehicle applications.

The controller technology benefits the driving public by ensuring safety. The traffic signal controller represents one of the most important intelligent technology and communication components of a signalized intersection. The Cobalt ATC family of controllers are designed to increase safety and traffic signal operations for years to come.

## Key Features

- **Large seven-inch color TFT LCD display**
- **Touch-screen display for intuitive, graphical programming**
- **High brightness and contrast display for increased outdoor readability**
- **Linux, open architecture real-time multi-tasking operating system**
- **Alternative Web browser-based user interface allows remote programming and status observation**

## Cobalt Shelfmount Hardware

Cobalts Shelfmount ATC controllers can be configured with Econolite's robust Cobalt touch or Cobalt ASC application software package, or other Linux application software meeting current ATC standards. OS software upgrades can be made easily by USB memory stick, SD card, or Ethernet via Econolite's Windows software installation application.

Cobalts Shelfmount ATC controllers includes a high-power, Linux-based engine board that is compliant with the ATC 6.25 and 6.34 standards for a NEMA TS2 Type-1 or Type-2 I/O and provides connectors that support four Ethernet ports, two USB ports, and an SD card slot. Additionally, Cobalt's seven-inch color, high brightness TFT LCD module with touchscreen capabilities is readable in direct sunlight, can be operated with gloved hands, and is not affected by condensation or water drops.

## Hardware Details

- Supports Econolite Linux-based software or other pre-qualified ATC/Linux software
- ATC Engine Board:
  - Fully compliant with the ATC Standard version 6.25 and proposed ATC Standard 6.34
  - 233MHz PowerQUICC II Pro-processor that provides 10 times more processing power than previous generation controller processor
  - 128Mbytes of DDR2 DRAM memory for application and OS program execution
  - 64 Mbytes of FLASH for storage of OS Software and user applications
  - 2MB of SRAM memory for non-volatile parameter storage
- Two integral Ethernet switches for two networks, ENET1 and ENET2:
  - Advanced Graphics Controller
  - Enables Cobalt's enhanced graphics user interface
  - Touch screen capability means the keyboard never has to be used
  - Replaces traditional text menu selection with graphical selections

- Two USB 2.0 ports used to:
  - Update application software
  - Upload or download configuration
  - Upload logged data
- Datakey socket for an optional 3.3V Datakey, 2 through 32MB
- SD Memory Card socket
- CPU Active LED
- Three communications ports standard:
  - NEMA-ATC SDLC serial port 1
  - 25 pin serial port 2
  - 9 pin console serial port
- Built in speaker for enhanced audio controller feedback
- Integral carrying handle in back of controller
- Power Supply:
  - Meets all requirements of ATC standard 6.34
  - External 24VDC protected by a self-resetting electronic fuse
- Operating System:
  - Linux 2.6.3x or later kernel and Board Support Package (BSP)
  - Compliant to ATC Standard V. 6.25 Annex B specifications

## Hardware Options

- Two user interface options:
  - Advanced Display with graphics and touch-screen (Standard)
  - Basic Display with text and textual menus only—no touch or graphics
- Two models:
  - TS2 Type-2 connector
  - TS2 Type-1 connector
- Communications module options:
  - FSK Module that can be configured for RS232 operation
  - 2070 TEES 2009 standard 6A, 6B, and 7A plug-in modules



- Datakey 3.3V, 2 through 32MB

### Control Features

- 16 phases, 8 configurable concurrent groups in 4 timing rings
- 16 pedestrian phases that can be configured as pedestrian overlaps
- Dynamic max operation
- Extendable walk and pedestrian clearance
- Advanced walk
- Bike input and green timing
- Extendable red clearance

### Coordination Features

- 120 coordination patterns, each with its own cycle, offsets and split plan selection
- 120 split plans, each with its own coordinated phases, vehicle and pedestrian recall and phase omits
- Offset and split entries displayed in percent or seconds
- Automatic permissive periods
- Fixed or floating force-off
- Crossing arterial coordination
- Quick-sync feature

### Preemption Features

- Ten preemption sequences. Each may be configured as priority, first-come-first-serve, or bus preemption operation
- ECPI interlock to provide added monitoring
- Railroad gate-down input and timing
- Conditional delay when entering preemption
- Multiple exit preemption options

### Time-Based Features

- 200 schedule programs, configurable for any combination of months, days of the week, and days of the month
- Fixed or floating exception day programs that override the day plan event on a specific day
- 16 day plan events that can use any of the 100 action plans



### Status Display Features

Keyboard selection of detailed dynamic status displays for each of the main controller unit functions including: controller, coordinator, preemptor, time base, detectors, and MMU

### Detector Features

- 64 vehicle detectors
- 16 system or speed detectors
- Unique detector types and operation
- Individually assignable to phase and functions
- Lock/non-lock function by detector
- 4 detector plans
- 4 detector diagnostic plans
- Individually assignable to phase and functions
- Logging of volume and/or occupancy assignable by detector
- 4 pedestrian diagnostic plans

### Logging Features

- Separate buffers for detector activity, detector failures, controller events, and MMU events
- Logged data can be:
  - Viewed on front panel
  - Retrieved via a RS-232 terminal port, USB flash drive, or SD Card
  - Transferred via telemetry to a traffic management center

## Cobalt Touch Software

(Requires Cobalt ATC hardware including the Advanced Graphics Controller)

- All the ASC/3-LX Software features, plus the following:
  - *Full-color graphic interface with touch-screen capability*
  - *Provides menu selection using touch selections*
  - *Programming uses touch data entry allowing touch gestures to select yes/no, select enable/disable, pull-down list selections and more*
  - *Screen can be swiped to advance to another screen*

## ASC/3-LX Software (General)

- Field-proven for over 8 years
- Allows for an agency-specific default database
- Automatic backup of controller database to optional Datakey or manual back up to USB flash drive
- Context sensitive help
- Hyperlink feature allows jumping from a status field to the screen where data is defined
- 100-statement logic processor to test inputs, outputs or timers and take actions based on the results
- Optional software includes EOS, ASC/3, and Adaptive

## Connected Vehicle Co-Processor

Cobalt ATC is designed to support the Connected Vehicle Co-Processor (CVCP) module. The CVCP module is intended to allow third-party-developed and processor-intensive connected vehicle applications, including leveraging SAE J2735 (5.9 GHz DSRC), to be used with Cobalt or any other properly equipped ATC-compliant traffic controller.

## Systems

- NTCIP level 2 compliance
- Supports Centrac's®, Aries® and TS2 NTCIP Level 2-compliant central applications

## Specifications

### • Temperature:

- $-34.6^{\circ}\text{F}$  to  $+165^{\circ}\text{F}$  ( $-37^{\circ}\text{C}$  to  $+74^{\circ}\text{C}$ )

### • Power:

- 110VAC @ 50/60 HZ or optional 220/240 VAC @ 50/60 HZ
- Fuse protection for either 110 or 220/240V
- Protection for the 24VDC supply is provided by a resettable electronic fuse

### • Dimensions:

- 14.84" W x 8.50" H x 6.13" D



Learn more  
about additional  
Controller products



[www.econolite.com](http://www.econolite.com)



1250 N. Tustin Avenue, Anaheim, CA 92807



[sales@econolite.com](mailto:sales@econolite.com)



714-630-3700

Complies With The New  
NEMA MMU2 Standard and  
MUTCD Requirements



# SmartMonitor

## MMU2-16LE SERIES

### NEMA LCD MALFUNCTION MANAGEMENT UNIT

- 
- MMU2-16LEip with Ethernet Port
  - MMU2-16LE with EIA-232 Port

Whether you're a **NOVICE** or **EXPERT** Signal Technician, wouldn't it be great if you could:

- ☐ Use a built-in SETUP WIZARD to **quickly and accurately configure** the Signal Monitor to the exact requirements of the cabinet and intersection?
- ☐ Use a MENU DRIVEN LCD interface to **view** vital cabinet operational details such as field signal voltages, historical event logs, and monitor configuration data?
- ☐ Use a built-in DIAGNOSTIC WIZARD to **automatically diagnose** cabinet malfunctions and **pinpoint** faulty signals?

If your answer is Yes, the **MMU2-16LE SmartMonitor®** is for YOU!

### NEW MMU2-16LE SmartMonitor® ENHANCED FEATURES

<b>NEMA TS2-2003 (R2008) Standard Including Amendment #4:</b>	The MMU2-16LE SmartMonitor® meets all specifications of the NEMA Standard TS2-2003 (R2008) for the MMU2 configuration while maintaining compatibility with NEMA TS1-1989 Assemblies.
<b>NEMA Standard Flashing Yellow Arrow PPLT:</b>	The MMU2-16LE SmartMonitor® supports MUTCD Flashing Yellow Arrow PPLT operation and meets / exceeds the NEMA Standard MMU2 requirements of TS-2 Amendment #4-2012, providing modes for both TS-2 or TS-1 cabinet configurations.
<b>Standardized Communications:</b>	Real-time SDLC communications with the Controller Unit exchanges field input status, Controller Unit output status, fault status, MMU programming, and time and date.
<b>Full Intersection &amp; Status Display:</b>	Two high contrast, large area Liquid Crystal Displays (LCD) continuously show full RYG(W) intersection status. A separate graphic LCD provides a menu driven user interface to status, signal voltages, configuration, event logs, and the Help system.
<b>Event Logging:</b>	A time-stamped nonvolatile event log records the complete intersection status as well as AC Line events, configuration changes, monitor resets, temperature and true RMS voltages.
<b>Setup Wizard:</b>	Use the built-in Setup Wizard to configure the Nema Enhanced settings of the SmartMonitor® by answering a short series of questions regarding intersection design and operation.
<b>Diagnostic Wizard and Help System</b>	The Diagnostic Wizard <i>automatically pinpoints</i> faulty signals and offers trouble-shooting guidance. The integrated Help System provides context sensitive operational assistance.
<b>TS-1 Type 12 with SDLC Mode:</b>	The MMU2-16LE SmartMonitor® can be configured to operate with the Port 1 SDLC function and Diagnostic Wizard enabled in a TS-1 twelve channel cabinet with no cabinet wiring changes.
<b>Program Card Memory:</b>	Enhanced settings of the MMU2-16LE SmartMonitor® are stored in nonvolatile memory on the EDI Program Card. Moving the Program Card to another MMU2-16LE automatically transfers all settings.
<b>Signal Sequence History Log:</b>	The five Signal Sequence History logs stored in nonvolatile memory graphically display up to 30 seconds of signal status prior to each fault event.
<b>LEDguard®:</b>	This EDI innovative signal threshold technique can be used to increase the level of monitoring protection when using LED based signal heads.
<b>EDI RMS-Engine:</b>	A DSP coprocessor converts AC input measurements to True RMS voltages, virtually eliminating false sensing due to changes in frequency, phase, or sine wave distortion.
<b>ECcom PC Software:</b>	Access to the MMU2-16LE data is provided by the industry standard EDI ECcom Windows based software for status, event log retrieval, configuration, and data archival.

EBERLE DESIGN INC.

3510 East Atlanta Avenue  
Phoenix, AZ 85040 USA  
www.EDITraffic.com

Tel (480) 968-6407  
Fax (602) 437-1996





# PS-250

## Heavy Duty Cabinet Power Supply

The ideal power source when using high current devices such as video detection cards.

The PS-250 Cabinet Power Supply is a shelf mounted unit which supplies regulated DC power, unregulated AC power, and a line frequency reference for the Detector Rack, BIUs, load switches, and other auxiliary equipment. The PS-250 meets and/or exceeds all requirements of the NEMA TS2-2003 (R2008) Standard.

All TS-2 Type 1 cabinet assemblies require the use of this unit as well as any TS-2 Type 2 cabinet assemblies that utilize Bus Interface Units (BIU).

Each EDI PS-250 Cabinet Power Supply is put through a rigorous three part Total Quality Assurance program and tested under the extreme environmental conditions experienced on the street. It is this commitment to quality and performance that EDI products are known for, providing years of trouble free operation.

## PS-250 OPERATIONAL FEATURES

**Basic Functions:** The PS-250 provides four outputs rated over the full -30°F to 165°F (-34°C to +74°C) Nema operating temperature range:

- ☒ +12 VDC rated at 5 Amps
- ☒ +24 VDC rated at 3 Amps
- ☒ 12 VAC rated at 0.25 Amps
- ☒ 60 Hz Line Frequency Reference rated at 50 mAmps
- ☒ Input Voltage Operating Range is 89 Vac to 135 Vac at 50/60 Hz
- ☒ Power Factor Corrected

**Display Indicators:** A separate LED indicator is provided to display output status and fuse integrity for the four supply outputs. The Line Frequency Reference LED indicator pulses to show 60 Hz activity.

Input / Output Pins:	Pin	Function
	A	AC Neutral
	B	Line Frequency Reference Output
	C	AC Line Input
	D	+12 VDC Output
	E	+24 VDC Output
	F	Reserved
	G	Logic Ground
	H	Earth Ground
	I	12 VAC Output
	J	Reserved

**Test Points:** Individual test jacks are provided for the +12 VDC output, +24 VDC output, and Logic Ground reference.

**Output Protection:** The +12 VDC, +24VDC, and 12 VAC outputs are fused for over-current protection. Each output is protected against voltage transients by a 1500 Watt suppressor.

**Dimensions:** **Compact Size:** 6.0 inches High x 4.0 inches Wide x 8.4 inches Deep

EBERLE DESIGN INC.

3510 East Atlanta Avenue  
Phoenix, AZ 85040 USA  
www.EDITraffic.com

Tel (480) 968-6407  
Fax (602) 437-1996





## TRAFFIC CONTROL / AC SERVICE

# HE1750



### DESCRIPTION

The HE1750 has been specifically designed for use on both type 170 and on NEMA controllers. Because of the high quality of this protector, it may be used as a standalone device without the use of an external line filter. If an external line filter is required, it is recommended that a HESCO/RLS line filter be used.

The HE1750 (like the popular HE1800) is a multi-stage, high energy suppressor that incorporates a sophisticated, inline EMI/RFI filter. The inline filter has been designed to effectively reject random noise and spikes from 10KHz to 25MHz. The primary and secondary clamp stages are separated by an inductive network; yet work together to give clamp voltages of under 395 volts at 20KA (8 x 20us).

The HE1750 also incorporates the use of warning/failure indicators in addition to remote sensing for monitoring by a central computer. If random data base memory loss or any other transient interference is effecting the safe operation of one or more of your intersections, the HE1750 surge protector will quickly and effectively eliminate the problem.

### SPECIFICATIONS

<b>Peak Surge Current</b>	
8 x 20us.....	48KA
<b>Max Clamp Voltage.....</b>	395VAC
<b>Response Time.....</b>	<5nS
<b>Continuous Service Current.....</b>	15 Amps Max
<b>Operating Temperature.....</b>	-40 to 85c
<b>Dimensions (in.).....</b>	4.6W x 3.1L x 1.9H
<b>Mounting.....</b>	Aluminum Base Plate

**HESCO/RLS Incorporated**  
1470 Kastner Place, Suite 112  
Sanford, FL 32771  
Fax (407) 321-2344

For more information and product support call us at...

1-800-547-4868

### FEATURES

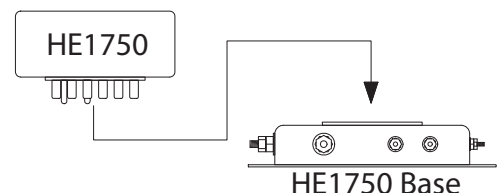
- Modular Design
- Multi-Stage Surge Arrestor
- Effectively Protects Against Lightning and Other Power Surges
- Dry Relay Contact Remote Sensing Circuit
- Immediately Self-Restores After Each Surge
- LED Warning / Failure Indicators

### PIN ASSIGNMENTS


Line In.....	1,2
Neutral In.....	11,12
Ground.....	3,4,9,10
Line Out.....	5
Neutral Out.....	7
Relay NC.....	8
Relay Com.....	6

### MIL-STD-220A INSERTION LOSS DATA

Frequency	Insertion Loss (dB)
60Hz.....	0
10Khz.....	35
50Khz.....	71
100Khz.....	72
500Khz.....	75
2MHz.....	67
5MHz.....	57
10MHz.....	52
20MHz.....	38



**CAUTION: Disconnect Power Prior to Installing or Removing Unit**



Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 8  
Qty. 1  
Qty. 3 BIU's

# Traffic Cabinet Components and Accessories

## BIU

---

### What, exactly, is a BIU?

The Bus Interface Unit (BIU) is a rack module that interfaces 24V logic I/O signals to the Synchronous Data Link Control (SDLC) serial bus of TS2 Type-1 traffic cabinets. The BIU is required in all TS2 Type-1 cabinets and in TS2 Type-2 cabinets when controller I/O interface is through the SDLC bus.

### About BIU

It is required in all TS2 Type-1 cabinets and in TS2 Type-2 cabinets when controller I/O interface is through the SDLC bus, not via TS1 MS-A, B, and C connectors.

Physically, the BIU-64 consists of a circuit board and a front panel. A male 64-pin DIN 41612 Type-B series connector provides the connection to the backplane of the rack. A female 15-pin metal shell D subminiature connector with latching blocks provides the connection to the SDLC cable. The front panel provides separate indicator lights for Power, Transmit, and Valid Data. It also provides a handle for easy removal of the unit from the rack. A separate TS2 cabinet power supply provides the required 24 VDC power plus a 60 Hz line-timing reference.



## Hardware

The BIU measures 2.34 in. W x 4.50 in. H x 6.60 in. D. Low-profile components are used in order to facilitate an optional half-width front plate unit which measures 1.17 in. x 4.5 in. x 6.60 in. The BIU will slide freely into two rack card-guides having a nominal slot width of 0.075 in. and a maximum slot width of 0.125 in.

An aluminum handle is provided on the front panel to allow easy removal of the BIU from the rack. Nominal outer dimensions of the handle shall be 1 in. x 2½ in.

The card rack connector on back of the BIU is a male 64-pin DIN 41612 type-B series. The connector is centered at the edge of the circuit board and oriented with Pin 1 located on top. The circuit board edges align with the connector per DIN 41612.

The Port-1 SDLC bus connector on the front panel of the BIU is a 15-pin metal shell sub-miniature type with female gold plated contacts. The connector is equipped with latching blocks and mates with a male 15-pin D-type cable connector that is equipped with spring latches (Amp part number 745012-1 or equivalent).

The front panel made of 0.090 in. sheet aluminum and is finished with a durable protective coating. Two indicator lamps are provided on the front panel, as specified by the TS2 Standard, for Power and Transmit. In addition, the front panel provides a Valid Data indicator, which lights whenever a Valid Data frame is received. The Power light flashes during absence of Line Frequency Reference (LFR) from the cabinet power supply. The BIU operates with internally generated 60 Hz reference in the absence of the LFR signal.

## Pin Assignments

- Port-1 (SDLC bus) pin assignments shall be as specified in Section 8.6.2.1 of the TS2 Standard:
  - 1 - Rx Data
  - 2 - Logic Ground
  - 3 - Rx Clock +
  - 4 - Logic Ground
  - 5 - Tx Data
  - 6 - Logic Ground
  - 7 - Tx Clock +
  - 8 - Logic Ground
  - 9 - Rx Data -
  - 10 - Not Used
  - 11 - Rx Clock -
  - 12 - Earth Ground
  - 13 - Tx Data -
  - 14 - Reserved
  - 15 - Tx Clock -



P  
D  
C



# DATA SHEET SSF-86-3

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 8  
Qty. 1

## Solid State Flasher:

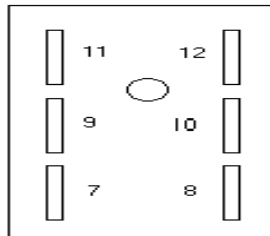
### Description:

The PDC model SSF-86 solid state flasher is a dual circuit flasher designed for the Traffic Control Industry. This unit is conservatively rated up to 20 A per circuit. The flash rate is 56.25 flashes per minute and does not vary due to voltage or temperature variations. With the zero voltage switching design, there are no contacts to wear out or deteriorate due to arcing or corrosion. Also, extended life of the bulbs can be expected as well as reduced Radio Frequency Interference (RFI). The extruded aluminum heatsink provides more than adequate heat dissipation.

### Connector Pinout:

FIG 1.

Pin	Function
7	Load #1
8	Load #2
9	Chassis ground
10	AC-
11	AC+
12	Spare



Mates with a Beau P-5406-LAB or equivalent

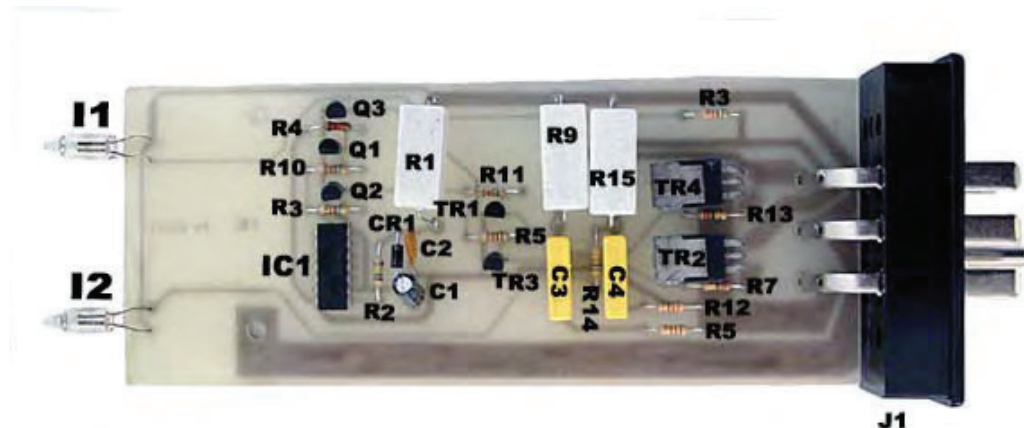
### Electrical Characteristics:

Zero voltage turn on-----  
Zero voltage turn off-----  
Tungsten Lamp or Gas Tubing Transformer load-----  
Operating Voltage-----  
Mechanical-----

0V +5 degrees  
0A +5 degrees  
Up to 20 A max.  
60-135 VAC  
Length.....8.40 inches  
Width.....1.70 inches  
Height.....4.18 inches  
Weight.....1.135 lbs

Operating Temperature : Full load from -35 to +74 degrees C

Guarantee: The flasher is fully guaranteed against all failures due to manufacturing defects for two years.







## DATA SHEET SSS-86I/O

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 8  
Qty. 1  
Qty. 16 Loadswitches

### Solid State Loadswitch with Output Indicators:

#### **Description:**

The PDC SSS-86I/O Solid State Loadswitch is a tri-pack solid state relay package designed specifically for the Traffic Control Industry. This unit meets NEMA specification TS1-1983, section 5, and has indicators for both the input and output signals.

Each switch will turn it's rated load ON or OFF within 10 deg. of the first zero cross-over point & within 5 deg. on succeeding alterations randomly timed input command signal.

The electronics are enclosed in a dust resistant, metal enclosure providing mechanical protection and excellent heat sinking for the heat generating components in the circuit. The electronic components are easily accessible by removing the cover with a screwdriver.

#### **Installation:**

The switchpac inter mates with any standard NEMA loadbay or with the model 332 cabinet output file. It is easily installed or removed by grasping the handle. Connector P1 pin outs are shown in FIG 1. The connector mates with a PDC BCS-12 or equal.

PIN	FUNCTION	P1
1	+115VAC, 60 Hz	(P1 as viewed from the outside of the product looking directly at the connector)
2	Chassis Ground	
3	A Output (Red, Don't Walk)	
4	Not Assigned	
5	B Output	
6	A Input (Red, Don't Walk)	
7	C Output (Green, Walk)	
8	B Input (Yellow)	
9	+24 VDC	
10	C Input (Green, Walk)	
11	-115 VAC, 60 Hz	
12	Not Assigned	

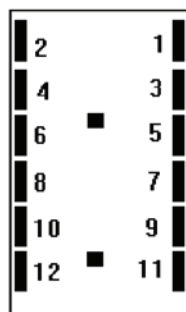


FIG 1.

#### **General Characteristics:**

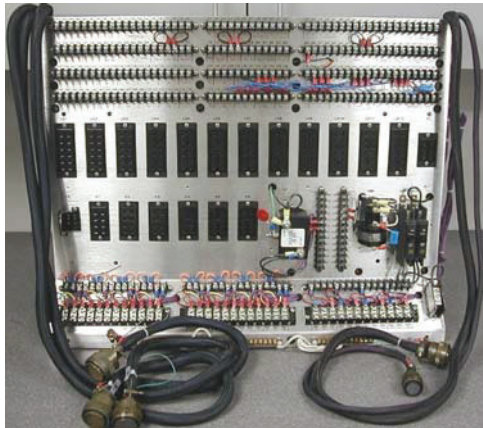
Load	voltage.....120 VAC
	current (max)..... 15.0 Amps
(Tungsten Filament Load)	
Control Signal	voltage..... +24VDC
	current ..... 20.0 MA (max)
Switching	1st alternation after.....+10 Degrees of line voltage at the zero signal is applied. crossover point.
	Succeeding alterations.....+5 Degrees of line voltage at the zero crossover point.
Off State	dv/dt.....100 V per microsecond
	line to load resistance.....15 K Ohms Min
	leakage current.....less than 20 MA
Isolation	voltage.....2500 VDC Min
	resistance.....10 Meg Ohms Min
Surge Current	one cycle.....175 Amps RMS Min
	one second.....40 Amps RMS Min
Life	operations.....30 million Min
Mechanical	length.....8.40 inches
	width.....1.74 inches
	height.....4.185 inches
	weight.....1.135 LBS

**Guarantee:** The SSS-86I/O is fully guaranteed against all failures due to manufacturing defects for two years.

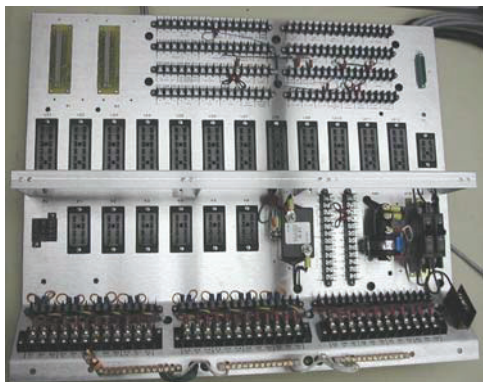
**Adjustments:** The switchpac has no adjustments



**NEMA TS2 Type 2  
12 Position Cabinet Assembly**



**NEMA TS2 Type 2  
12 Position Wired Panel**



**NEMA TS2 Type 1  
12 Position Wired Panel**

## NEMA Wired Cabinet Assemblies

NEMA TS1/NEMA TS2-1/NEMA TS2-2

Path Master, Inc. wired cabinet assemblies are designed and built to meet all current NEMA requirements, both in TS1 and TS2 configurations. All panels are constructed from 3.18mm (.125") aluminum and include the following list of features:

- Field terminals for signal hook-up are mounted at 45° for ease of maintenance and installation.
- All electrical connections to the backside of the panel are soldered in place. All electrical connections to the front side of the panel use crimp terminals with threaded fasteners.
- All main power panel devices are fastened to the lower right portion of the main panel including all circuit breakers, line filters and load relays. An option side mounted power panel is available.
- The wiring harnesses to the controller and monitor are protected with a nylon mesh or "Snake Skin".
- The front side of the backpanel is permanently silk-screened with both functional descriptions and terminal reference numbers. The backside is silk-screened with terminal reference numbers.
- All plug-in and panel mounted devices are identified with silk-screened designations.
- Flash programming is made from the front of the panel with the use of a screwdriver.
- All NEMA defined controller functions are terminated and accessible from the front of the backpanel.
- Available in 4, 8, 12, and 16 load switch positions in both NEMA TS1 and NEMA TS2 configurations.
- All load switches and flashers are mounted in a single horizontal row and include an adjustable support bracket.

## Specifications

### NEMA TS2 Type 1

8 Position	558mmH x 508mmW	(22"H x 20"W)
12 Position	558mmH x 686mmW	(22"H x 27"W)
➔ 16 Position	558mmH x 864mmW	(22"H x 34"W)

### NEMA TS1/TS2 Type 2

4 Position	380mmH x 406mmW	(15"H x 16"W)
8 Position	508mmH x 508mmW	(20"H x 20"W)
12 Position	558mmH x 686mmW	(22"H x 27"W)
16 Position	521mmH x 864mmW	(20.5"H x 34"W)

# Large Single Door

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 8  
Qty. 1  
Pole Mounted

## APX Enclosures, Inc.

200 Oregon Street Mercersburg, PA 17236

Phone: (717) 328-9399 Fax: (717) 328-2447 [www.apx-enclosures.com](http://www.apx-enclosures.com)

### APPLICATION - NEMA 3R

APX Enclosures, Inc. 3R large single door enclosures are designed to house electronic controls, terminals, and instruments, and to **provide protection from rain, sleet, snow, dripping water and corrosion, while providing ventilation.**

### INDUSTRY STANDARD:

U.L. Type 3R, 4X

### STANDARD CONSTRUCTION:

(For details see specification sheets.)

#### A. ENCLOSURE:

1. The complete enclosure is made from .125" thick aluminum alloy type 5052-H32 to provide a strong and rigid construction. ~~Alternative material is 14 gauge type 304 stainless steel. (Specifier must choose the material to be used.)~~
2. Each enclosure is equipped with two adjustable "C" mounting channels on both side walls, and back wall, providing versatile positioning of shelves, or optional panels or rack mounting angles.
3. The door frame opening is double flanged on all four sides. These flanges increase the strength of door opening and help prevent dust and liquids from dropping into the enclosure when the door is opened.
4. All exterior seams are ground smooth or sealed weathertight with silicone sealant.
5. Pole or wall mounted enclosures have welded stiffener plates to reinforce the top and bottom of rear wall. Welded bottom plates are standard on pole mounted enclosures. A removable bolt-on bottom plate is available as an option.
6. (3R only) Enclosures have provisions for mounting a forced-air fan system that can be thermostatically controlled, and air is exhausted through a slotted vent system in the roof overhang.

#### B. DOOR:

1. All doors are equipped with a three-point latching mechanism with nylon rollers at the top and bottom.
2. Each door handle is .75" stainless steel round bar and has provisions for a padlock.
3. (3R only) The standard main door lock is Corbin #1548-1 or equal.
4. (3R only) A louvered air vent with filter-retaining brackets and a disposable paper filter element is provided.
5. The main door is sealed with closed-cell neoprene gasket.
6. The continuous door hinge is .075" thick stainless

### APPLICATION - NEMA 4X

APX Enclosures, Inc. 4X large single door enclosures are designed to house electronic controls, terminals, and instruments, and to **provide protection from rain, sleet, snow, dripping water and corrosion, as well as hosedown, splashing water, oil or coolant seepage.**

### NEMA 3R SHOWN



steel with a .25" stainless steel hinge pin.

7. The switch compartment with removable back panel is standard and also made from .125" thick aluminum alloy type 5052-H32. This back can optionally be replaced with a clear lexan window to provide for limited access inspection of operating components or instrumentation.
8. The switch compartment door hinge is 14 gauge stainless steel with a .120 stainless steel hinge pin.

#### C. FINISH:

1. Natural aluminum enclosures are mill finish per federal specification QQA-250/8.
2. Painted enclosures are treated with an iron phosphate coating and dried by radiant heat.

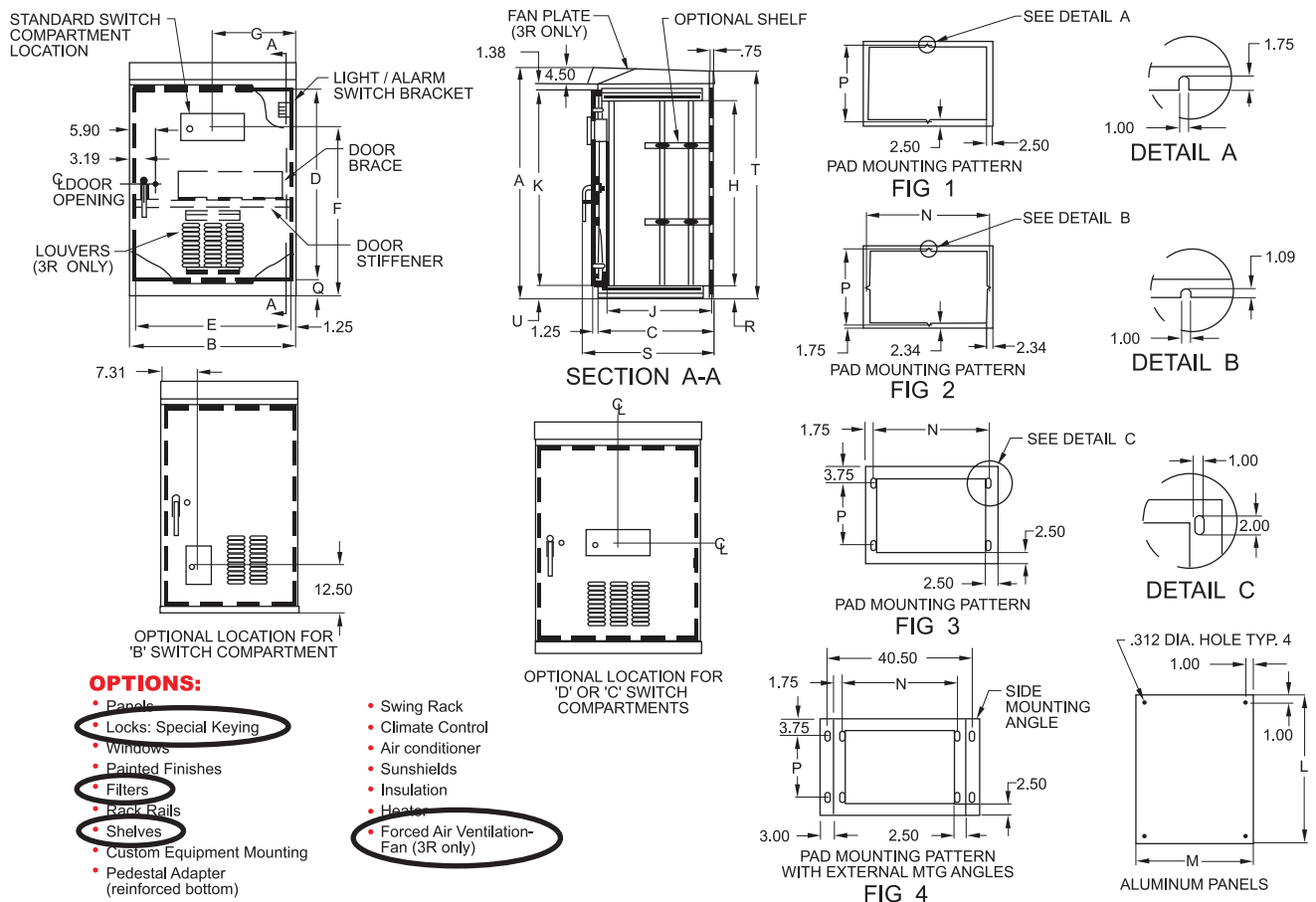
#### FOR NEMA TYPE 4X RATING:

**DELETE** all vents and main door lock (Corbin #1548-1), and Corbin R357SGS switch compartment lock.

**ADD** Chicago #1703-100-G switch compartment lock. All through holes are sealed.



LARGE SINGLE DOOR



## DIMENSIONS (inches)

CATALOG NUMBER	MOUNTING OPTIONS			OVERALL ENCLOSURE			DOOR OPENING		SWITCH COMPARTMENT LOCATION		AVAILABLE EQUIPMENT SPACE		DOOR HEIGHT	PANEL SIZE		PAD MTG. PATTERN		MISCELLANEOUS DIMENSIONS				
	PED	POLE	PAD	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U
FIG.1																						
TC301815	YES	YES	YES	30.00	18.00	15.00	21.00	15.50	16.81	8.00	19.00	11.31	23.25	22.63	15.00	N/A	12.50	2.00	3.00	18.62	28.50	.88
TC362015	YES	YES	YES	36.00	20.00	15.00	27.00	17.50	23.25	10.00	25.00	11.31	29.25	28.63	17.00	N/A	12.50	2.00	3.00	18.62	34.50	.88
TC412516	YES	YES	YES	41.00	25.00	16.00	32.00	22.50	28.25	12.50	30.00	12.31	34.25	33.63	22.00	N/A	13.50	2.00	3.00	19.62	39.50	.88
TC512516	YES	YES	YES	51.00	25.00	16.00	42.00	22.50	34.25	12.50	40.00	12.31	44.25	43.63	22.00	N/A	13.50	2.00	3.00	19.62	49.50	.88
FIG.2																						
TC503017	NO	YES	YES	50.00	30.00	17.00	39.00	27.50	37.25	15.00	39.00	13.31	41.25	42.63	27.00	26.50	13.50	4.00	3.00	20.62	48.50	2.88
TC503617	NO	NO	YES	50.00	36.00	17.00	39.00	33.50	37.25	18.00	39.00	13.31	41.25	42.63	33.00	32.50	13.50	4.00	3.00	20.62	48.50	2.88
TC583617	NO	NO	YES	58.00	36.00	17.00	47.00	33.50	45.25	18.00	47.00	13.31	49.25	50.63	33.00	32.50	13.50	4.00	3.00	20.62	56.50	2.88
TC583017	NO	NO	YES	58.00	30.00	17.00	47.00	27.50	45.25	15.00	47.00	13.31	49.25	50.63	27.00	26.50	13.50	4.00	3.00	20.62	56.50	2.88
TC763017	NO	NO	YES	76.00	30.00	17.00	65.00	27.50	63.25	15.00	65.00	13.31	67.25	68.63	27.00	26.50	13.50	4.00	3.00	20.62	74.50	2.88
FIG.3																						
TC363624	NO	NO	YES	36.00	36.00	24.00	25.00	33.50	23.25	18.00	25.00	20.31	27.25	28.63	33.00	32.50	18.50	4.00	3.00	27.62	34.50	2.88
TC443624	NO	NO	YES	44.00	36.00	24.00	33.00	33.50	31.25	18.00	33.00	20.31	35.25	36.63	33.00	32.50	18.50	4.00	3.00	27.62	42.50	2.88
TC553826	NO	NO	YES	55.00	38.00	26.00	44.00	35.50	39.37	19.00	44.00	22.31	46.25	48.25	35.00	34.50	18.50	4.00	3.00	29.62	53.50	2.88
TC554426	NO	NO	YES	55.00	44.00	26.00	44.00	41.50	39.37	22.00	44.00	22.31	46.25	48.25	41.00	40.50	18.50	4.00	3.00	29.62	53.50	2.88
TC594426	NO	NO	YES	59.00	44.00	26.00	48.00	41.50	43.37	22.00	48.00	22.31	50.25	52.25	41.00	40.50	18.50	4.00	3.00	29.62	57.50	2.88
TC723618	NO	NO	YES	72.00	36.00	18.00	61.00	33.50	45.00	18.00	61.00	14.31	63.25	65.25	45.00	32.50	13.50	4.00	3.00	21.62	70.50	2.88
TC773826	NO	NO	YES	77.00	38.00	26.00	66.00	35.50	50.00	19.00	66.00	22.31	68.25	70.25	35.00	34.50	18.50	4.00	3.00	29.62	75.50	2.88
TC774426	NO	NO	YES	77.00	44.00	26.00	66.00	41.50	50.00	22.00	66.00	22.31	68.25	70.25	41.00	40.50	18.50	4.00	3.00	29.62	75.50	2.88



Cobalt Shelfmount  
Cobalt Rackmount  
2070 Series

# Next-Gen Advanced Transportation

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 9  
Qty. 1



## Overview

Cobalt is the next-generation in Advanced Transportation Controller (ATC) specifically designed for the mobile computing environment. Fully meeting ATC standards, Cobalt features a breakthrough hardened seven-inch touchscreen Graphical User Interface (GUI) matched with Linux-based OS that makes programming and access to functions the easiest in the industry.

Cobalt is designed to support Connected and Automated Vehicle (CAV) programs. Combined with the Connected Vehicle Co-Processor (CVCP) module, Cobalt fully supports Signal Phase and Timing (SPaT)/MAP data messaging capabilities, providing a fundamental Vehicle-to-Infrastructure (V2I) element for connected vehicle applications.

The controller technology benefits the driving public by ensuring safety. The traffic signal controller represents one of the most important intelligent technology and communication components of a signalized intersection. The Cobalt ATC family of controllers are designed to increase safety and traffic signal operations for years to come.

## Key Features

- **Large seven-inch color TFT LCD display**
- **Touch-screen display for intuitive, graphical programming**
- **High brightness and contrast display for increased outdoor readability**
- **Linux, open architecture real-time multi-tasking operating system**
- **Alternative Web browser-based user interface allows remote programming and status observation**

## Cobalt Shelfmount Hardware

Cobalts Shelfmount ATC controllers can be configured with Econolite's robust Cobalt touch or Cobalt ASC application software package, or other Linux application software meeting current ATC standards. OS software upgrades can be made easily by USB memory stick, SD card, or Ethernet via Econolite's Windows software installation application.

Cobalts Shelfmount ATC controllers includes a high-power, Linux-based engine board that is compliant with the ATC 6.25 and 6.34 standards for a NEMA TS2 Type-1 or Type-2 I/O and provides connectors that support four Ethernet ports, two USB ports, and an SD card slot. Additionally, Cobalt's seven-inch color, high brightness TFT LCD module with touchscreen capabilities is readable in direct sunlight, can be operated with gloved hands, and is not affected by condensation or water drops.

## Hardware Details

- Supports Econolite Linux-based software or other pre-qualified ATC/Linux software
- ATC Engine Board:
  - Fully compliant with the ATC Standard version 6.25 and proposed ATC Standard 6.34
  - 233MHz PowerQUICC II Pro-processor that provides 10 times more processing power than previous generation controller processor
  - 128Mbytes of DDR2 DRAM memory for application and OS program execution
  - 64 Mbytes of FLASH for storage of OS Software and user applications
  - 2MB of SRAM memory for non-volatile parameter storage
- Two integral Ethernet switches for two networks, ENET1 and ENET2:
  - Advanced Graphics Controller
  - Enables Cobalt's enhanced graphics user interface
  - Touch screen capability means the keyboard never has to be used
  - Replaces traditional text menu selection with graphical selections

- Two USB 2.0 ports used to:
  - Update application software
  - Upload or download configuration
  - Upload logged data
- Datakey socket for an optional 3.3V Datakey, 2 through 32MB
- SD Memory Card socket
- CPU Active LED
- Three communications ports standard:
  - NEMA-ATC SDLC serial port 1
  - 25 pin serial port 2
  - 9 pin console serial port
- Built in speaker for enhanced audio controller feedback
- Integral carrying handle in back of controller
- Power Supply:
  - Meets all requirements of ATC standard 6.34
  - External 24VDC protected by a self-resetting electronic fuse
- Operating System:
  - Linux 2.6.3x or later kernel and Board Support Package (BSP)
  - Compliant to ATC Standard V. 6.25 Annex B specifications

## Hardware Options

- Two user interface options:
  - Advanced Display with graphics and touch-screen (Standard)
  - Basic Display with text and textual menus only—no touch or graphics
- Two models:
  - TS2 Type-2 connector
  - TS2 Type-1 connector
- Communications module options:
  - FSK Module that can be configured for RS232 operation
  - 2070 TEES 2009 standard 6A, 6B, and 7A plug-in modules

- Datakey 3.3V, 2 through 32MB

### Control Features

- 16 phases, 8 configurable concurrent groups in 4 timing rings
- 16 pedestrian phases that can be configured as pedestrian overlaps
- Dynamic max operation
- Extendable walk and pedestrian clearance
- Advanced walk
- Bike input and green timing
- Extendable red clearance

### Coordination Features

- 120 coordination patterns, each with its own cycle, offsets and split plan selection
- 120 split plans, each with its own coordinated phases, vehicle and pedestrian recall and phase omits
- Offset and split entries displayed in percent or seconds
- Automatic permissive periods
- Fixed or floating force-off
- Crossing arterial coordination
- Quick-sync feature

### Preemption Features

- Ten preemption sequences. Each may be configured as priority, first-come-first-serve, or bus preemption operation
- ECPI interlock to provide added monitoring
- Railroad gate-down input and timing
- Conditional delay when entering preemption
- Multiple exit preemption options

### Time-Based Features

- 200 schedule programs, configurable for any combination of months, days of the week, and days of the month
- Fixed or floating exception day programs that override the day plan event on a specific day
- 16 day plan events that can use any of the 100 action plans



### Status Display Features

Keyboard selection of detailed dynamic status displays for each of the main controller unit functions including: controller, coordinator, preemptor, time base, detectors, and MMU

### Detector Features

- 64 vehicle detectors
- 16 system or speed detectors
- Unique detector types and operation
- Individually assignable to phase and functions
- Lock/non-lock function by detector
- 4 detector plans
- 4 detector diagnostic plans
- Individually assignable to phase and functions
- Logging of volume and/or occupancy assignable by detector
- 4 pedestrian diagnostic plans

### Logging Features

- Separate buffers for detector activity, detector failures, controller events, and MMU events
- Logged data can be:
  - Viewed on front panel
  - Retrieved via a RS-232 terminal port, USB flash drive, or SD Card
  - Transferred via telemetry to a traffic management center

## Cobalt Touch Software

(Requires Cobalt ATC hardware including the Advanced Graphics Controller)

- All the ASC/3-LX Software features, plus the following:
  - *Full-color graphic interface with touch-screen capability*
  - *Provides menu selection using touch selections*
  - *Programming uses touch data entry allowing touch gestures to select yes/no, select enable/disable, pull-down list selections and more*
  - *Screen can be swiped to advance to another screen*

## ASC/3-LX Software (General)

- Field-proven for over 8 years
- Allows for an agency-specific default database
- Automatic backup of controller database to optional Datakey or manual back up to USB flash drive
- Context sensitive help
- Hyperlink feature allows jumping from a status field to the screen where data is defined
- 100-statement logic processor to test inputs, outputs or timers and take actions based on the results
- Optional software includes EOS, ASC/3, and Adaptive

## Connected Vehicle Co-Processor

Cobalt ATC is designed to support the Connected Vehicle Co-Processor (CVCP) module. The CVCP module is intended to allow third-party-developed and processor-intensive connected vehicle applications, including leveraging SAE J2735 (5.9 GHz DSRC), to be used with Cobalt or any other properly equipped ATC-compliant traffic controller.

## Systems

- NTCIP level 2 compliance
- Supports Centrac's®, Aries® and TS2 NTCIP Level 2-compliant central applications

## Specifications

### • Temperature:

- -34.6°F to +165°F (-37°C to +74°C)

### • Power:

- 110VAC @ 50/60 HZ or optional 220/240 VAC @ 50/60 HZ
- Fuse protection for either 110 or 220/240V
- Protection for the 24VDC supply is provided by a resettable electronic fuse

### • Dimensions:

- 14.84" W x 8.50" H x 6.13" D



Learn more  
about additional  
Controller products



[www.econolite.com](http://www.econolite.com)



1250 N. Tustin Avenue, Anaheim, CA 92807



[sales@econolite.com](mailto:sales@econolite.com)



714-630-3700



Complies With The New  
NEMA MMU2 Standard and  
MUTCD Requirements



# SmartMonitor

## MMU2-16LE SERIES

### NEMA LCD MALFUNCTION MANAGEMENT UNIT

- 
- MMU2-16LEip with Ethernet Port
  - MMU2-16LE with EIA-232 Port

Whether you're a **NOVICE** or **EXPERT** Signal Technician, wouldn't it be great if you could:

- ☐ Use a built-in SETUP WIZARD to **quickly and accurately configure** the Signal Monitor to the exact requirements of the cabinet and intersection?
- ☐ Use a MENU DRIVEN LCD interface to **view** vital cabinet operational details such as field signal voltages, historical event logs, and monitor configuration data?
- ☐ Use a built-in DIAGNOSTIC WIZARD to **automatically diagnose** cabinet malfunctions and **pinpoint** faulty signals?

If your answer is Yes, the **MMU2-16LE SmartMonitor®** is for YOU!

### NEW MMU2-16LE SmartMonitor® ENHANCED FEATURES

<b>NEMA TS2-2003 (R2008) Standard Including Amendment #4:</b>	The MMU2-16LE SmartMonitor® meets all specifications of the NEMA Standard TS2-2003 (R2008) for the MMU2 configuration while maintaining compatibility with NEMA TS1-1989 Assemblies.
<b>NEMA Standard Flashing Yellow Arrow PPLT:</b>	The MMU2-16LE SmartMonitor® supports MUTCD Flashing Yellow Arrow PPLT operation and meets / exceeds the NEMA Standard MMU2 requirements of TS-2 Amendment #4-2012, providing modes for both TS-2 or TS-1 cabinet configurations.
<b>Standardized Communications:</b>	Real-time SDLC communications with the Controller Unit exchanges field input status, Controller Unit output status, fault status, MMU programming, and time and date.
<b>Full Intersection &amp; Status Display:</b>	Two high contrast, large area Liquid Crystal Displays (LCD) continuously show full RYG(W) intersection status. A separate graphic LCD provides a menu driven user interface to status, signal voltages, configuration, event logs, and the Help system.
<b>Event Logging:</b>	A time-stamped nonvolatile event log records the complete intersection status as well as AC Line events, configuration changes, monitor resets, temperature and true RMS voltages.
<b>Setup Wizard:</b>	Use the built-in Setup Wizard to configure the Nema Enhanced settings of the SmartMonitor® by answering a short series of questions regarding intersection design and operation.
<b>Diagnostic Wizard and Help System</b>	The Diagnostic Wizard <i>automatically pinpoints</i> faulty signals and offers trouble-shooting guidance. The integrated Help System provides context sensitive operational assistance.
<b>TS-1 Type 12 with SDLC Mode:</b>	The MMU2-16LE SmartMonitor® can be configured to operate with the Port 1 SDLC function and Diagnostic Wizard enabled in a TS-1 twelve channel cabinet with no cabinet wiring changes.
<b>Program Card Memory:</b>	Enhanced settings of the MMU2-16LE SmartMonitor® are stored in nonvolatile memory on the EDI Program Card. Moving the Program Card to another MMU2-16LE automatically transfers all settings.
<b>Signal Sequence History Log:</b>	The five Signal Sequence History logs stored in nonvolatile memory graphically display up to 30 seconds of signal status prior to each fault event.
<b>LEDguard®:</b>	This EDI innovative signal threshold technique can be used to increase the level of monitoring protection when using LED based signal heads.
<b>EDI RMS-Engine:</b>	A DSP coprocessor converts AC input measurements to True RMS voltages, virtually eliminating false sensing due to changes in frequency, phase, or sine wave distortion.
<b>ECcom PC Software:</b>	Access to the MMU2-16LE data is provided by the industry standard EDI ECcom Windows based software for status, event log retrieval, configuration, and data archival.

EBERLE DESIGN INC.

3510 East Atlanta Avenue  
Phoenix, AZ 85040 USA  
www.EDITraffic.com

Tel (480) 968-6407  
Fax (602) 437-1996





# PS-250

## Heavy Duty Cabinet Power Supply

The ideal power source when using high current devices such as video detection cards.

The PS-250 Cabinet Power Supply is a shelf mounted unit which supplies regulated DC power, unregulated AC power, and a line frequency reference for the Detector Rack, BIUs, load switches, and other auxiliary equipment. The PS-250 meets and/or exceeds all requirements of the NEMA TS2-2003 (R2008) Standard.

All TS-2 Type 1 cabinet assemblies require the use of this unit as well as any TS-2 Type 2 cabinet assemblies that utilize Bus Interface Units (BIU).

Each EDI PS-250 Cabinet Power Supply is put through a rigorous three part Total Quality Assurance program and tested under the extreme environmental conditions experienced on the street. It is this commitment to quality and performance that EDI products are known for, providing years of trouble free operation.

## PS-250 OPERATIONAL FEATURES

**Basic Functions:** The PS-250 provides four outputs rated over the full -30°F to 165°F (-34°C to +74°C) Nema operating temperature range:

- ☒ +12 VDC rated at 5 Amps
- ☒ +24 VDC rated at 3 Amps
- ☒ 12 VAC rated at 0.25 Amps
- ☒ 60 Hz Line Frequency Reference rated at 50 mAmps
- ☒ Input Voltage Operating Range is 89 Vac to 135 Vac at 50/60 Hz
- ☒ Power Factor Corrected

**Display Indicators:** A separate LED indicator is provided to display output status and fuse integrity for the four supply outputs. The Line Frequency Reference LED indicator pulses to show 60 Hz activity.

Input / Output Pins:	Pin	Function
	A	AC Neutral
	B	Line Frequency Reference Output
	C	AC Line Input
	D	+12 VDC Output
	E	+24 VDC Output
	F	Reserved
	G	Logic Ground
	H	Earth Ground
	I	12 VAC Output
	J	Reserved

**Test Points:** Individual test jacks are provided for the +12 VDC output, +24 VDC output, and Logic Ground reference.

**Output Protection:** The +12 VDC, +24VDC, and 12 VAC outputs are fused for over-current protection. Each output is protected against voltage transients by a 1500 Watt suppressor.

**Dimensions:** **Compact Size:** 6.0 inches High x 4.0 inches Wide x 8.4 inches Deep

EBERLE DESIGN INC.

3510 East Atlanta Avenue  
 Phoenix, AZ 85040 USA  
 www.EDIttraffic.com

Tel (480) 968-6407  
 Fax (602) 437-1996



## TRAFFIC CONTROL / AC SERVICE

# HE1750



### DESCRIPTION

The HE1750 has been specifically designed for use on both type 170 and on NEMA controllers. Because of the high quality of this protector, it may be used as a standalone device without the use of an external line filter. If an external line filter is required, it is recommended that a HESCO/RLS line filter be used.

The HE1750 (like the popular HE1800) is a multi-stage, high energy suppressor that incorporates a sophisticated, inline EMI/RFI filter. The inline filter has been designed to effectively reject random noise and spikes from 10KHz to 25MHz. The primary and secondary clamp stages are separated by an inductive network; yet work together to give clamp voltages of under 395 volts at 20KA (8 x 20us).

The HE1750 also incorporates the use of warning/failure indicators in addition to remote sensing for monitoring by a central computer. If random data base memory loss or any other transient interference is effecting the safe operation of one or more of your intersections, the HE1750 surge protector will quickly and effectively eliminate the problem.

### SPECIFICATIONS

<b>Peak Surge Current</b>	
8 x 20us.....	48KA
<b>Max Clamp Voltage.....</b>	395VAC
<b>Response Time.....</b>	<5nS
<b>Continuous Service Current.....</b>	15 Amps Max
<b>Operating Temperature.....</b>	-40 to 85c
<b>Dimensions (in.).....</b>	4.6W x 3.1L x 1.9H
<b>Mounting.....</b>	Aluminum Base Plate

**HESCO/RLS Incorporated**  
1470 Kastner Place, Suite 112  
Sanford, FL 32771  
Fax (407) 321-2344

For more information and product support call us at...

1-800-547-4868

### FEATURES

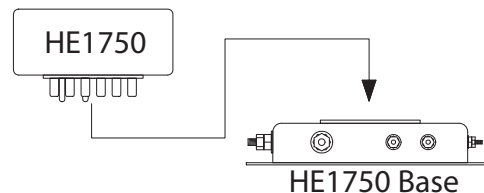
- Modular Design
- Multi-Stage Surge Arrestor
- Effectively Protects Against Lightning and Other Power Surges
- Dry Relay Contact Remote Sensing Circuit
- Immediately Self-Restores After Each Surge
- LED Warning / Failure Indicators

### PIN ASSIGNMENTS


Line In.....	1,2
Neutral In.....	11,12
Ground.....	3,4,9,10
Line Out.....	5
Neutral Out.....	7
Relay NC.....	8
Relay Com.....	6

### MIL-STD-220A INSERTION LOSS DATA

Frequency	Insertion Loss (dB)
60Hz.....	0
10Khz.....	35
50Khz.....	71
100Khz.....	72
500Khz.....	75
2MHz.....	67
5MHz.....	57
10MHz.....	52
20MHz.....	38



**CAUTION: Disconnect Power Prior to Installing or Removing Unit**



Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 9  
Qty. 1  
Qty. 3 BIU's

# Traffic Cabinet Components and Accessories

## BIU

---

### What, exactly, is a BIU?

The Bus Interface Unit (BIU) is a rack module that interfaces 24V logic I/O signals to the Synchronous Data Link Control (SDLC) serial bus of TS2 Type-1 traffic cabinets. The BIU is required in all TS2 Type-1 cabinets and in TS2 Type-2 cabinets when controller I/O interface is through the SDLC bus.

### About BIU

It is required in all TS2 Type-1 cabinets and in TS2 Type-2 cabinets when controller I/O interface is through the SDLC bus, not via TS1 MS-A, B, and C connectors.

Physically, the BIU-64 consists of a circuit board and a front panel. A male 64-pin DIN 41612 Type-B series connector provides the connection to the backplane of the rack. A female 15-pin metal shell D subminiature connector with latching blocks provides the connection to the SDLC cable. The front panel provides separate indicator lights for Power, Transmit, and Valid Data. It also provides a handle for easy removal of the unit from the rack. A separate TS2 cabinet power supply provides the required 24 VDC power plus a 60 Hz line-timing reference.



## Hardware

The BIU measures 2.34 in. W x 4.50 in. H x 6.60 in. D. Low-profile components are used in order to facilitate an optional half-width front plate unit which measures 1.17 in. x 4.5 in. x 6.60 in. The BIU will slide freely into two rack card-guides having a nominal slot width of 0.075 in. and a maximum slot width of 0.125 in.

An aluminum handle is provided on the front panel to allow easy removal of the BIU from the rack. Nominal outer dimensions of the handle shall be 1 in. x 2½ in.

The card rack connector on back of the BIU is a male 64-pin DIN 41612 type-B series. The connector is centered at the edge of the circuit board and oriented with Pin 1 located on top. The circuit board edges align with the connector per DIN 41612.

The Port-1 SDLC bus connector on the front panel of the BIU is a 15-pin metal shell sub-miniature type with female gold plated contacts. The connector is equipped with latching blocks and mates with a male 15-pin D-type cable connector that is equipped with spring latches (Amp part number 745012-1 or equivalent).

The front panel made of 0.090 in. sheet aluminum and is finished with a durable protective coating. Two indicator lamps are provided on the front panel, as specified by the TS2 Standard, for Power and Transmit. In addition, the front panel provides a Valid Data indicator, which lights whenever a Valid Data frame is received. The Power light flashes during absence of Line Frequency Reference (LFR) from the cabinet power supply. The BIU operates with internally generated 60 Hz reference in the absence of the LFR signal.

## Pin Assignments

- Port-1 (SDLC bus) pin assignments shall be as specified in Section 8.6.2.1 of the TS2 Standard:
  - 1 - Rx Data
  - 2 - Logic Ground
  - 3 - Rx Clock +
  - 4 - Logic Ground
  - 5 - Tx Data
  - 6 - Logic Ground
  - 7 - Tx Clock +
  - 8 - Logic Ground
  - 9 - Rx Data -
  - 10 - Not Used
  - 11 - Rx Clock -
  - 12 - Earth Ground
  - 13 - Tx Data -
  - 14 - Reserved
  - 15 - Tx Clock -







# DATA SHEET SSF-86-3

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 9  
Qty. 1

## Solid State Flasher:

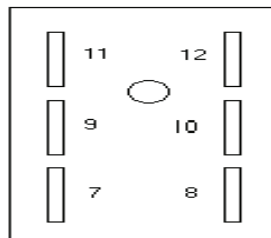
### Description:

The PDC model SSF-86 solid state flasher is a dual circuit flasher designed for the Traffic Control Industry. This unit is conservatively rated up to 20 A per circuit. The flash rate is 56.25 flashes per minute and does not vary due to voltage or temperature variations. With the zero voltage switching design, there are no contacts to wear out or deteriorate due to arcing or corrosion. Also, extended life of the bulbs can be expected as well as reduced Radio Frequency Interference (RFI). The extruded aluminum heatsink provides more than adequate heat dissipation.

### Connector Pinout:

FIG 1.

Pin	Function
7	Load #1
8	Load #2
9	Chassis ground
10	AC-
11	AC+
12	Spare



Mates with a Beau P-5406-LAB or equivalent

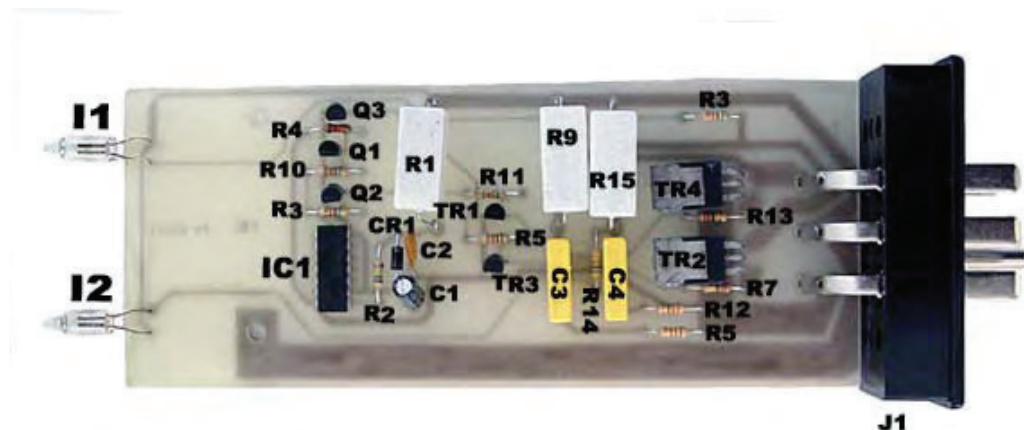
### Electrical Characteristics:

Zero voltage turn on-----  
Zero voltage turn off-----  
Tungsten Lamp or Gas Tubing Transformer load-----  
Operating Voltage-----  
Mechanical-----

0V +5 degrees  
0A +5 degrees  
Up to 20 A max.  
60-135 VAC  
Length.....8.40 inches  
Width.....1.70 inches  
Height.....4.18 inches  
Weight.....1.135 lbs

Operating Temperature : Full load from -35 to +74 degrees C

Guarantee: The flasher is fully guaranteed against all failures due to manufacturing defects for two years.





## DATA SHEET SSS-86I/O

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 9  
Qty. 1  
Qty. 16 Loadswitches

### Solid State Loadswitch with Output Indicators:

#### **Description:**

The PDC SSS-86I/O Solid State Loadswitch is a tri-pack solid state relay package designed specifically for the Traffic Control Industry. This unit meets NEMA specification TS1-1983, section 5, and has indicators for both the input and output signals.

Each switch will turn it's rated load ON or OFF within 10 deg. of the first zero cross-over point & within 5 deg. on succeeding alterations randomly timed input command signal.

The electronics are enclosed in a dust resistant, metal enclosure providing mechanical protection and excellent heat sinking for the heat generating components in the circuit. The electronic components are easily accessible by removing the cover with a screwdriver.

#### **Installation:**

The switchpac inter mates with any standard NEMA loadbay or with the model 332 cabinet output file. It is easily installed or removed by grasping the handle. Connector P1 pin outs are shown in FIG 1. The connector mates with a PDC BCS-12 or equal.

PIN	FUNCTION	P1
1	+115VAC, 60 Hz	(P1 as viewed from the outside of the product looking directly at the connector)
2	Chassis Ground	
3	A Output (Red, Don't Walk)	
4	Not Assigned	
5	B Output	
6	A Input (Red, Don't Walk)	
7	C Output (Green, Walk)	
8	B Input (Yellow)	
9	+24 VDC	
10	C Input (Green, Walk)	
11	-115 VAC, 60 Hz	
12	Not Assigned	

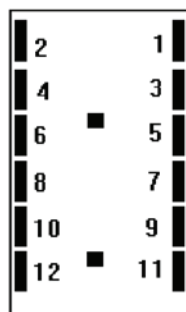


FIG 1.

#### **General Characteristics:**

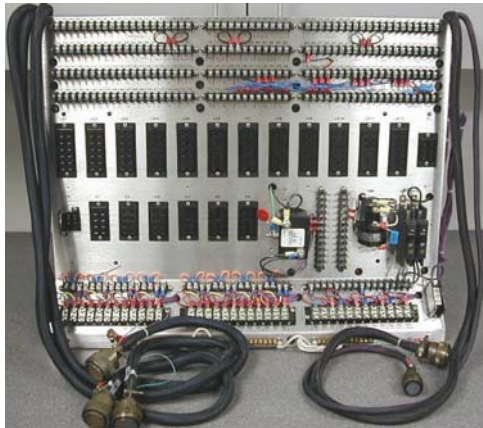
Load	voltage.....120 VAC
	current (max)..... 15.0 Amps
(Tungsten Filament Load)	
Control Signal	voltage..... +24VDC
	current ..... 20.0 MA (max)
Switching	1st alternation after.....+10 Degrees of line voltage at the zero signal is applied. crossover point.
	Succeeding alterations.....+5 Degrees of line voltage at the zero crossover point.
Off State	dv/dt.....100 V per microsecond
	line to load resistance.....15 K Ohms Min
	leakage current.....less than 20 MA
Isolation	voltage.....2500 VDC Min
	resistance.....10 Meg Ohms Min
Surge Current	one cycle.....175 Amps RMS Min
	one second.....40 Amps RMS Min
Life	operations.....30 million Min
Mechanical	length.....8.40 inches
	width.....1.74 inches
	height.....4.185 inches
	weight.....1.135 LBS

**Guarantee:** The SSS-86I/O is fully guaranteed against all failures due to manufacturing defects for two years.

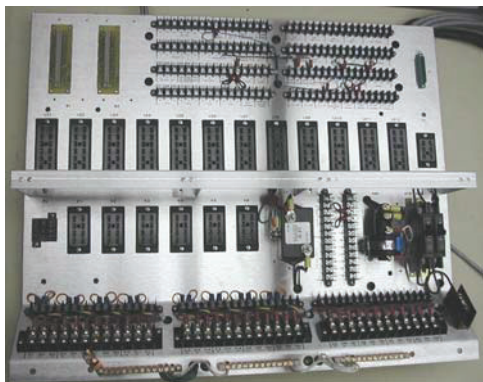
**Adjustments:** The switchpac has no adjustments



**NEMA TS2 Type 2  
12 Position Cabinet Assembly**



**NEMA TS2 Type 2  
12 Position Wired Panel**



**NEMA TS2 Type 1  
12 Position Wired Panel**

## NEMA Wired Cabinet Assemblies

NEMA TS1/NEMA TS2-1/NEMA TS2-2

Path Master, Inc. wired cabinet assemblies are designed and built to meet all current NEMA requirements, both in TS1 and TS2 configurations. All panels are constructed from 3.18mm (.125") aluminum and include the following list of features:

- Field terminals for signal hook-up are mounted at 45° for ease of maintenance and installation.
- All electrical connections to the backside of the panel are soldered in place. All electrical connections to the front side of the panel use crimp terminals with threaded fasteners.
- All main power panel devices are fastened to the lower right portion of the main panel including all circuit breakers, line filters and load relays. An option side mounted power panel is available.
- The wiring harnesses to the controller and monitor are protected with a nylon mesh or "Snake Skin".
- The front side of the backpanel is permanently silk-screened with both functional descriptions and terminal reference numbers. The backside is silk-screened with terminal reference numbers.
- All plug-in and panel mounted devices are identified with silk-screened designations.
- Flash programming is made from the front of the panel with the use of a screwdriver.
- All NEMA defined controller functions are terminated and accessible from the front of the backpanel.
- Available in 4, 8, 12, and 16 load switch positions in both NEMA TS1 and NEMA TS2 configurations.
- All load switches and flashers are mounted in a single horizontal row and include an adjustable support bracket.

## Specifications

### NEMA TS2 Type 1

8 Position	558mmH x 508mmW	(22"H x 20"W)
12 Position	558mmH x 686mmW	(22"H x 27"W)
16 Position	558mmH x 864mmW	(22"H x 34"W)

### NEMA TS1/TS2 Type 2

4 Position	380mmH x 406mmW	(15"H x 16"W)
8 Position	508mmH x 508mmW	(20"H x 20"W)
12 Position	558mmH x 686mmW	(22"H x 27"W)
16 Position	521mmH x 864mmW	(20.5"H x 34"W)



# Large Single I

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 9  
Qty. 1

## APX Enclosures, Inc.

200 Oregon Street Mercersburg, PA 17236

Phone: (717) 328-9399 Fax: (717) 328-2447 [www.apx-enclosures.com](http://www.apx-enclosures.com)

### APPLICATION - NEMA 3R

APX Enclosures, Inc. 3R large single door enclosures are designed to house electronic controls, terminals, and instruments, and to **provide protection from rain, sleet, snow, dripping water and corrosion, while providing ventilation.**

### INDUSTRY STANDARD:

U.L. Type 3R, 4X

### STANDARD CONSTRUCTION:

(For details see specification sheets.)

#### A. ENCLOSURE:

1. The complete enclosure is made from .125" thick aluminum alloy type 5052-H32 to provide a strong and rigid construction. ~~Alternative material is 14 gauge type 304 stainless steel. (Specifier must choose the material to be used.)~~
2. Each enclosure is equipped with two adjustable "C" mounting channels on both side walls, and back wall, providing versatile positioning of shelves, or optional panels or rack mounting angles.
3. The door frame opening is double flanged on all four sides. These flanges increase the strength of door opening and help prevent dust and liquids from dropping into the enclosure when the door is opened.
4. All exterior seams are ground smooth or sealed weathertight with silicone sealant.
5. Pole or wall mounted enclosures have welded stiffener plates to reinforce the top and bottom of rear wall. Welded bottom plates are standard on pole mounted enclosures. A removable bolt-on bottom plate is available as an option.
6. (3R only) Enclosures have provisions for mounting a forced-air fan system that can be thermostatically controlled, and air is exhausted through a slotted vent system in the roof overhang.

#### B. DOOR:

1. All doors are equipped with a three-point latching mechanism with nylon rollers at the top and bottom.
2. Each door handle is .75" stainless steel round bar and has provisions for a padlock.
3. (3R only) The standard main door lock is Corbin #1548-1 or equal.
4. (3R only) A louvered air vent with filter-retaining brackets and a disposable paper filter element is provided.
5. The main door is sealed with closed-cell neoprene gasket.
6. The continuous door hinge is .075" thick stainless

### APPLICATION - NEMA 4X

APX Enclosures, Inc. 4X large single door enclosures are designed to house electronic controls, terminals, and instruments, and to **provide protection from rain, sleet, snow, dripping water and corrosion, as well as hosedown, splashing water, oil or coolant seepage.**

### NEMA 3R SHOWN



steel with a .25" stainless steel hinge pin.

7. The switch compartment with removable back panel is standard and also made from .125" thick aluminum alloy type 5052-H32. This back can optionally be replaced with a clear lexan window to provide for limited access inspection of operating components or instrumentation.
8. The switch compartment door hinge is 14 gauge stainless steel with a .120 stainless steel hinge pin.

#### C. FINISH:

1. Natural aluminum enclosures are mill finish per federal specification QQA-250/8.
2. Painted enclosures are treated with an iron phosphate coating and dried by radiant heat.

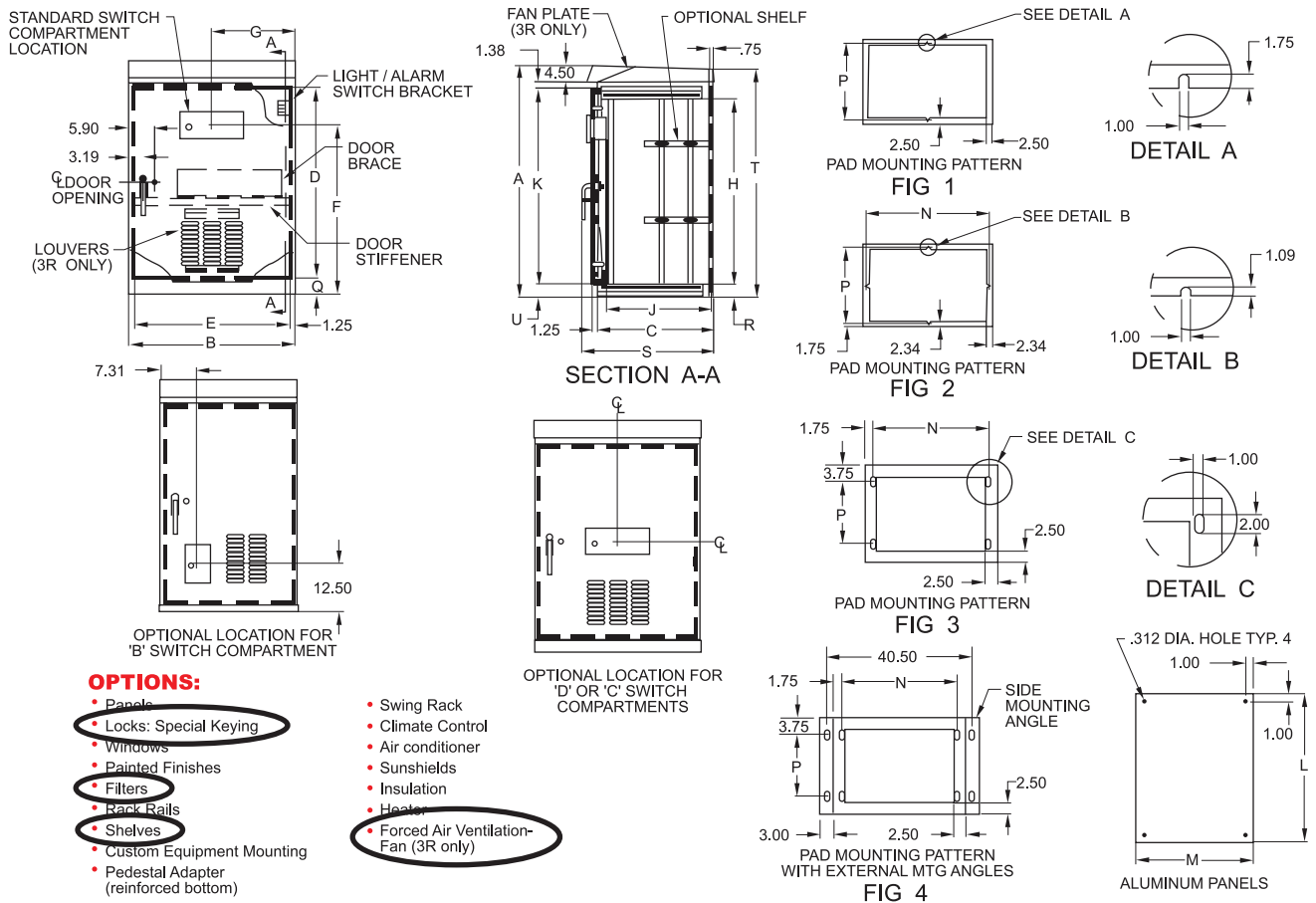
#### FOR NEMA TYPE 4X RATING:

**DELETE** all vents and main door lock (Corbin #1548-1), and Corbin R357SGS switch compartment lock.

**ADD** Chicago #1703-100-G switch compartment lock. All through holes are sealed.

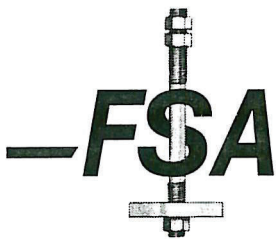


LARGE SINGLE DOOR



## DIMENSIONS (inches)

CATALOG NUMBER	MOUNTING OPTIONS			OVERALL ENCLOSURE			DOOR OPENING		SWITCH COMPARTMENT LOCATION		AVAILABLE EQUIPMENT SPACE		DOOR HEIGHT	PANEL SIZE		PAD MTG. PATTERN		MISCELLANEOUS DIMENSIONS				
	PED	POLE	PAD	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U
FIG.1																						
TC301815	YES	YES	YES	30.00	18.00	15.00	21.00	15.50	16.81	8.00	19.00	11.31	23.25	22.63	15.00	N/A	12.50	2.00	3.00	18.62	28.50	.88
TC362015	YES	YES	YES	36.00	20.00	15.00	27.00	17.50	23.25	10.00	25.00	11.31	29.25	28.63	17.00	N/A	12.50	2.00	3.00	18.62	34.50	.88
TC412516	YES	YES	YES	41.00	25.00	16.00	32.00	22.50	28.25	12.50	30.00	12.31	34.25	33.63	22.00	N/A	13.50	2.00	3.00	19.62	39.50	.88
TC512516	YES	YES	YES	51.00	25.00	16.00	42.00	22.50	34.25	12.50	40.00	12.31	44.25	43.63	22.00	N/A	13.50	2.00	3.00	19.62	49.50	.88
FIG.2																						
TC503017	NO	YES	YES	50.00	30.00	17.00	39.00	27.50	37.25	15.00	39.00	13.31	41.25	42.63	27.00	26.50	13.50	4.00	3.00	20.62	48.50	2.88
TC503617	NO	NO	YES	50.00	36.00	17.00	39.00	33.50	37.25	18.00	39.00	13.31	41.25	42.63	33.00	32.50	13.50	4.00	3.00	20.62	48.50	2.88
TC583617	NO	NO	YES	58.00	36.00	17.00	47.00	33.50	45.25	18.00	47.00	13.31	49.25	50.63	33.00	32.50	13.50	4.00	3.00	20.62	56.50	2.88
TC583017	NO	NO	YES	58.00	30.00	17.00	47.00	27.50	45.25	15.00	47.00	13.31	49.25	50.63	27.00	26.50	13.50	4.00	3.00	20.62	56.50	2.88
TC763017	NO	NO	YES	76.00	30.00	17.00	65.00	27.50	63.25	15.00	65.00	13.31	67.25	68.63	27.00	26.50	13.50	4.00	3.00	20.62	74.50	2.88
FIG.3																						
TC363624	NO	NO	YES	36.00	36.00	24.00	25.00	33.50	23.25	18.00	25.00	20.31	27.25	28.63	33.00	32.50	18.50	4.00	3.00	27.62	34.50	2.88
TC443624	NO	NO	YES	44.00	36.00	24.00	33.00	33.50	31.25	18.00	33.00	20.31	35.25	36.63	33.00	32.50	18.50	4.00	3.00	27.62	42.50	2.88
TC553826	NO	NO	YES	55.00	38.00	26.00	44.00	35.50	39.37	19.00	44.00	22.31	46.25	48.25	35.00	34.50	18.50	4.00	3.00	29.62	53.50	2.88
TC554426	NO	NO	YES	55.00	44.00	26.00	44.00	41.50	39.37	22.00	44.00	22.31	46.25	48.25	41.00	40.50	18.50	4.00	3.00	29.62	53.50	2.88
TC594426	NO	NO	YES	59.00	44.00	26.00	48.00	41.50	43.37	22.00	48.00	22.31	50.25	52.25	41.00	40.50	18.50	4.00	3.00	29.62	57.50	2.88
TC723618	NO	NO	YES	72.00	36.00	18.00	61.00	33.50	45.00	18.00	61.00	14.31	63.25	65.25	45.00	32.50	13.50	4.00	3.00	21.62	70.50	2.88
TC773826	NO	NO	YES	77.00	38.00	26.00	66.00	35.50	50.00	19.00	66.00	22.31	68.25	70.25	35.00	34.50	18.50	4.00	3.00	29.62	75.50	2.88
TC774426	NO	NO	YES	77.00	44.00	26.00	66.00	41.50	50.00	22.00	66.00	22.31	68.25	70.25	41.00	40.50	18.50	4.00	3.00	29.62	75.50	2.88



# FOUNDATION SYSTEMS &

Threading • Fabricating • Special

2300 Allen Avenue S.E. • Canton, Ohio 44707  
Phone: (330) 454-1700 • 800-776-7331 • Fax (330) 454-2336  
www.fsabolt.com

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 9  
Qty. 1  
Qty. 4 Anchor Bolts

## DRAWING SUBMITTAL FORM

### PROJECT REFERENCE:

CUSTOMER: Pathmaster PO# \_\_\_\_\_

FSA WORK ORDER # N/A

### STEEL SPECIFICATIONS

A36 \_\_\_\_\_ A36M55/F1554 GR 55 X A687/F1554 GR 105 \_\_\_\_\_ OTHER \_\_\_\_\_

### FINISH

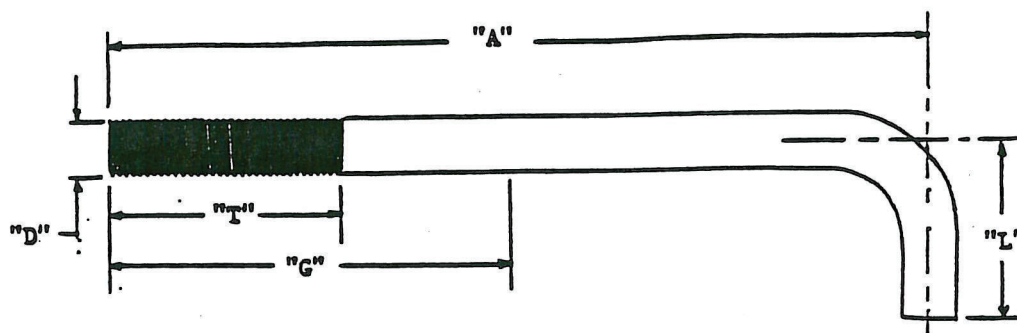
PLAIN \_\_\_\_\_  
HOT-DIP GALVANIZED (A153/A123) X  
OTHER \_\_\_\_\_

### THREADING

UNC-CLASS 2A (CUT) \_\_\_\_\_  
UNC-CALSS 2A (ROLLED) X  
OTHER \_\_\_\_\_

### HARDWARE

HEAVY HEX NUTS (A563 GR A) \_\_\_\_\_ (A563 GR DH/A194-2H) 1  
FLATWASHERS (F436) 1 (USS) \_\_\_\_\_  
LOCKWASHERS \_\_\_\_\_



QTY	D	A	L	T	G
	3/4"	17"	3"	6"	Full length

SUBMITTED BY: Monica Upm APPROVED BY: \_\_\_\_\_  
DATE: 9-10-10 DATE: \_\_\_\_\_

# Autoscope AIS-IV

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 14  
Qty. 10



►► The Autoscope Image Sensor (AIS) Series is a lightweight color zoom camera system, designed for the rigors and performance requirements of vehicle detection at virtually all traffic intersection and highway environments.

## About Autoscope

As more Intelligent Transportation System (ITS) programs come online, transportation agencies and metropolitan planning organizations (MPO) are realizing the enhanced traffic management capabilities that are accessible through ITS. A solution that offers one of the largest gains in capability and lower cost of ownership to any ITS program is a video detection system. A video system provides access to new levels of strategic traffic information, supporting comprehensive reporting for funding opportunities, regular signal timing updates, traveler and shared traffic information, etc. Optimized as a video source for the Autoscope standalone Machine Vision Processor (MVP) product suite, the AIS Suite of cameras produce consistently high quality video in all weather, lighting, and traffic conditions common in today's demanding traffic management and ITS environments.

### At A Glance

- Designed for most wide-area machine vision vehicle detection applications
- Low maintenance
- Low power consumption
- Rugged, environmentally sealed enclosure
- Auto-gain circuitry for improved detection in varying light conditions
- Hydrophilic faceplate coating
- No streaking or blooming from bright light sources (headlights)





## Description

The image sensor has high sensitivity for accurate vehicle detection at night and during other low light conditions. The solid-state design provides maximum hardware reliability for 24/7 operations. The color image sensor minimizes streaking and blooming from bright light sources, such as headlights and wet pavement that could adversely affect detection performance.

A variety of available mounting brackets enable easy installation of the AIS camera systems on existing poles, mast arms, or other structures. The unique bracket design speeds installation by minimizing adjustment hardware and eliminating steps in the set-up process.

### Faceplate Heater

New technology has greatly reduced the power consumption of the AIS. By applying heat directly to the faceplate, the AIS can keep the faceplate clear in extreme conditions with less power.

### Zoom Control

"Control-over-Coax" technology is used to adjust the zoom lens, eliminate adapter cables, or extra control wires in the pole, simplifying installation. Zoom and camera controls travel to the AIS along the coax cable. Adjustments are made via a hand-held zoom controller or a coax modem that plugs into the coax cable, allowing the user to adjust the lens via a laptop computer.

### Color or Black & White

The AIS-IV can be ordered with output video pre-set to color or black & white. For RackVision™ and 2020™ MVP products, order with color video output. For use with Autoscope 2004 MVP, black & white video must be used. The video output can be switched by the user via the zoom control setup software.

### EasyLock Connection Option

This connector is an excellent choice for easy field installation. It eliminates "pig tail" camera cables and splicing by allowing the installer to pull power and coax cable directly to the camera. Connectors are easily installed for reliable, waterproof connections.

### Hydrophilic Faceplate Coating

This new faceplate coating fills the porous surface of the faceplate, preventing airborne contaminants and water from striking and sticking to the surface of the lens. The coating maintains image quality and reduces the need for maintenance.

## Basic Specifications

### ► Temperature

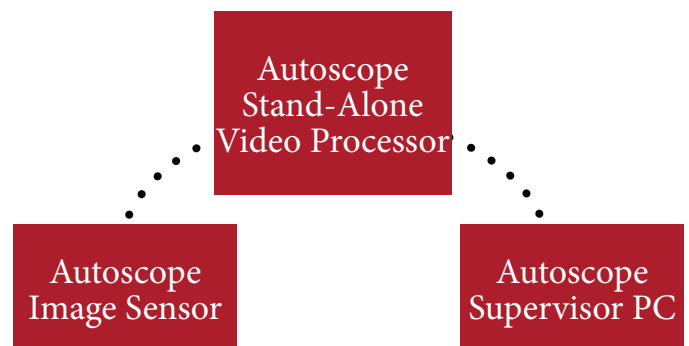
- ◉ -40°F to +140°F (-40°C to +60°C)

### ► Power

- ◉ Input power options: 85-265VAC-40-440Hz/24VAC, 47-440Hz/12-14VDC
- ◉ 10W max
- ◉ 5W nominal

### ► Dimensions

- ◉ Housing Enclosure: 3.5 in. D x 10.3 in. L (8.89 cm D x 26.2 cm L)
- ◉ Weather sunshield: 14.5 in. L (36.8 cm L)





www.pelcoinc.com  
EDMOND, OK 73013  
405-340-3434  
FAX: 405-340-3435

This drawing is for reference only. It is the property of Pelco and is not to be used in whole or in part without Pelco's permission.

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151

B/R# 14

Qty. 10

REF:

Pathmaster

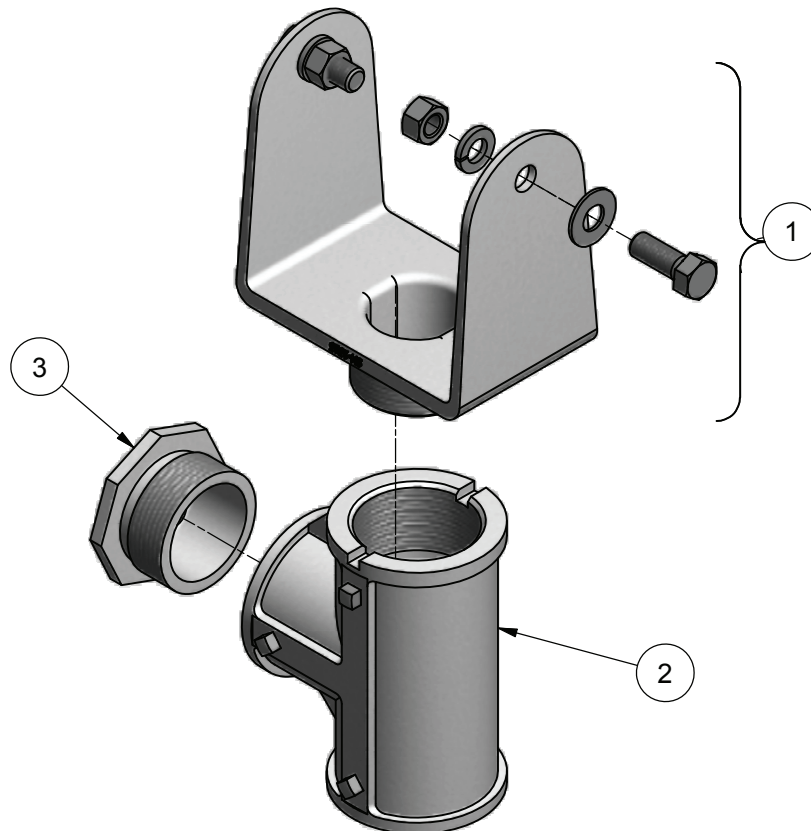
TITLE:

Camera Bracket, 1-PC w/ Tee &  
Cap, Alum

SP-5861

PART NO  
SP-5861-PXX

Process No Color=PNC  
Paint=PXX



Notes:

1. 1-Piece For Mounting Iteris, Odetics or Econlite Solo Pro Type Camera.

OPTIONS  
Paint

ITEM	PART NUMBER	DESCRIPTION	QTY
1	SH-0535-PXX	Bracket, Camera Mount, 1-Piece Tilt & Pan, 1-1/2" Ext Threads, Alum	1
2	SE-0458-PXX	Tee, Serrated, 1-1/2" NPS w/ Set Screws, Alum	1
3	SE-0361-M1	Closure Cap, Octagonal, 1-1/2" NPS x 7/8", Alum	1

DRAWN: WAC

DATE: 9/27/2011

CHK'D: KAK

DATE: 9/29/2011

REV: A-10/5/11 WAC

REV: KAK

DATE: 10/6/2011

SHEET 1 OF 1

# Aluminum Tubes

Supplied in lengths shown below, Pelco's vertical support tubing is made from high strength aluminum alloy. A unique shape and vinyl insert insures a complete weather proof wiring installation anywhere along the entire length of the tube.

The standard 46" tube will accommodate all signal combinations up to 3-Section 12". Tubes are also available in 58" and 74" lengths for 4 and 5-Section combinations.

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 14  
Qty. 10



## Astro-Brac Gusseted Tube w/ Vinyl Insert, 1-1/2" x Length, Threaded One End



AB-0306  
Gusseted Tube



AB-0233  
Vinyl Insert

AB-2003 -

Length

Coating

23=23"

37=37"

46=46"

58=58"

74=74"

PNC=Process No Color

P\_\_=Paint

## Astro-Brac Gusseted Tube w/ Vinyl Insert, 1-1/2" x Length, Threaded Both Ends



AB-0307  
Gusseted Tube



AB-0233  
Vinyl Insert

AB-2007 -

Length

Coating

23=23"

37=37"

46=46"

58=58"

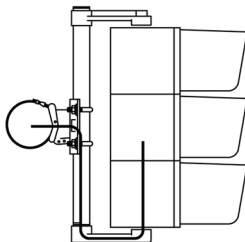
74=74"

PNC=Process No Color

P\_\_=Paint

### Concealed Wiring Installation

Pelco's aluminum gusseted tubes allow wire entry at any point. Vinyl insert conceals wiring from mast arm to signal head. Simply run wire throughout field-drilled hole in mast arm, through Astro-Brac, and into support tube. Hollow lower arm provides a channel for wire to be fed into signal head.



Note: 1. Lengths up to 120" maximum are available upon request. Specify by including Length in the part number, i.e., AB-2003-120-PNC.  
2. See Reference Section for available paint colors.

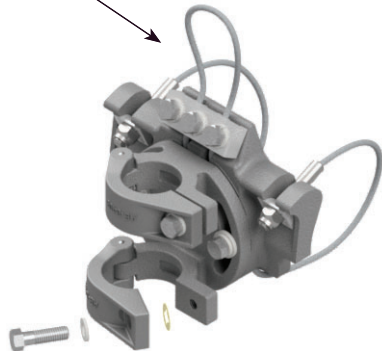
# Galaxy Series Clamp Kits

The Galaxy is designed using a single cable plate which allows easy installation, as well as the multi-directional adjustable tube saddle for strength. These high tensile aluminum alloy clamp kits provide strength with maximum adjustability and complete clamping versatility. Comes complete with all necessary attaching hardware.

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 14  
Qty. 10



AB-0512  
Cable Kit

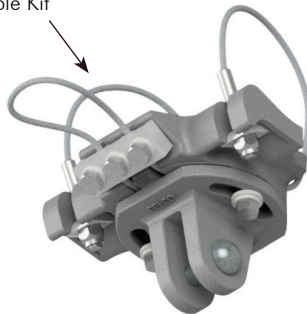


## Astro-Brac, Galaxy Hinged Clamp Kit, Cable Mount

AG-3055 - Cable Length:  - Cable:  - Coating:   
See Note Blank=Galv PNC=Process No Color  
SS=Stainless P\_ =Paint

Note:  
Cable Length: 62", 84", 96", 110", 120", 132", 144", 220", or 280".

AB-0512  
Cable Kit



## Astro-Brac, Galaxy Series Clamp Kit, Cable Mount, 3/4" Clevis, Free-Swinging

AG-3014 - Cable Length:  - Stainless Upgrade:  - Bushing:  - Coating:   
See Note Blank=Galv SB=Stainless PNC=Process No Color  
SS=Stainless Bushing P\_ =Paint

Note:  
Cable Length: 62", 84", 96", 110", 120", 132", 144", 220", or 280".  
Stainless upgrade to include stainless cable and pins.

- Note: 1. All assemblies are supplied standard with stainless steel fasteners.  
2. See Reference Section for clamp kit pole diameters.  
3. See Reference Section for available paint colors.







94 Eagle Fork Rd Hayesville, NC 28904  
Phone (800)343-2579 Fax (828)389-3922

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 14  
Qty. 10  
Qty. 2500' of Cable

Part Number: **2062PE**

Description: 75 Ohm Precision Video Coax Cable with Dual 96% Tinned Copper Braids and a Black Polyethylene jacket.

#### Physical Characteristics:

Awg	20
Stranding	Solid
Conductor Material	Bare Copper .032" nom
Dielectric Material	Low density foamed polyethylene
Nominal Diameter	.200"
First Braid Awg	34
First Braid Material	Tinned Copper
First Braid Coverage	96%
First Nominal Diameter	.226"
Second Braid Awg	34
Second Braid Material	Tinned Copper
Second Braid Coverage	96%
Second Nominal Diameter	.252"
Final Jacket Material	Black Polyethylene
Nominal Thickness	.026"
Nominal Operation Diameter	.304"

INKJET PRINT:

#### ADVANCED DIGITAL CABLE INC. 75 Ohm PRECISION VIDEO COAX CABLE RATED FOR OUTDOOR USE

#### Nominal Attenuation:

Impedance:	75 Ohms
Capacitance	20.5 pF/foot
Velocity of Prop	66%
Temperature Rating	-55°C to +80°C

#### Applicable Standards:

UL Type	NA
ROHS Compliant	Yes

#### Attenuation

Frequency	Nom db/100
3.6	.54
10	.78
71	2.10
135	3.00
270	4.30
360	5.10
720	7.40
1000	9.20

Customer Name: \_\_\_\_\_ Date Signed: \_\_\_\_\_

Customer Approval: \_\_\_\_\_

Specification Issue Date: 05/20/09

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 14  
Qty. 10  
Qty. 2500' of Cable

<b>Advanced Digital Cable, Inc.</b>	<b>Specification Sheet for 16 awg 3 conductor PVC/ Nylon</b>	<b>Part Number:</b>	AST-6603TC								
		<b>UL Type:</b>	TC								
Drawn by:	Customer Approval:										
<b>Construction Details:</b>  This cable is constructed with a core composed of three polyvinyl chloride insulated and Nylon jacketed 16 awg stranded tinned copper conductors cabled together and a black sunlight resistant polyvinyl chloride jacket completes the package.											
<b>Physical Specifications</b>  <b>Conductors:</b> 3 – 16 awg (26/30”) tinned copper .059” nom.  <b>Dielectric:</b> 15 mil wall of 105C polyvinyl chloride to a nominal diameter of .088”. <u>See color code.</u>  <b>Skin:</b> 5 mil wall of Nylon jacket to a nominal diameter of .098”  <b>Cable:</b> 3 –16 awg conductors in a 3” left hand lay to a nominal diameter of .215”  <b>Jacket:</b> 45 mils of black 90 deg. C sunlight, moisture, and flame resistant polyvinyl chloride to a nominal diameter of .305”.  <b>Print:</b> White Ink: ADVANCED DIGITAL CABLE 16/3 CAMERA (UL) TYPE TC 90C 600V E195597 SUN RES DIR BUR  <b>Put-up:</b> Reels per customer requirements.  <b>Color Code</b> <table><tr><th>Quantity</th><th>Color</th></tr><tr><td>1</td><td>Black</td></tr><tr><td>1</td><td>White</td></tr><tr><td>1</td><td>Green</td></tr></table>		Quantity	Color	1	Black	1	White	1	Green	<b>Electrical and Mechanical Testing</b>  <b>Conductor:</b> Conforms to ASTM B-3 and B-8  <b>Insulation:</b> Conforms to UL 62 type TFN requirements. <b>Min. average thickness:</b> .015” <b>Min. thickness any pt.:</b> .013”  <b>Nylon:</b> Conforms to UL 62 type TFN requirements. <b>Min. thickness any pt.:</b> .004”  <b>Spark Testing:</b> 6,000 volts AC at 1,000 to 3,500 Hertz.  <b>Jacket:</b> Conforms to UL 1277 requirements. <b>Min. average thickness:</b> .045” <b>Min. thickness any pt.:</b> .036”  <b>Dielectric test:</b> 2,000 volts AC at 60 Hertz for 1 minute per UL 1277.  <b>Additional Testing:</b> Physical and visual Continuity and cross testing on each shipping length of finished cable.	
Quantity	Color										
1	Black										
1	White										
1	Green										

# Autoscope RackVision 1 and

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 16  
Qty. 10



▷ ▷ Quality sources of video signal include the Autoscope Image Sensor or existing CCTV cameras that meet minimum performance standards.

## About RVP1 & RVP2

The need for a simple, reliable and cost-effective dynamic video-based detection solution at vulnerable intersections and along congested roadways is becoming more important in maintaining mobility and safety. As a result, agencies are leveraging the benefits of the video processing and broadband communications capabilities of video detection, including Autoscope – a critical first step in implementing an Intelligent Transportation System (ITS) program.

The Autoscope RackVision Pro Series solutions, including RVP1 and 2 are Machine Vision Processors (MVP) designed to meet intersection detection objectives of vehicle detection and signal actuation in a typical traffic cabinet. This cost-effective detection solution utilizes the same algorithms that have established Autoscope video detection as the global leader for wide-area video vehicle detection.

### At A Glance

- ▷ Provides basic video vehicle detection for intersection stop-line and advance extension applications
- ▷ Bicycle detection
- ▷ Installs in a standard detector rack or self-contained shelf-mount unit
- ▷ Software installation by USB flash drive
- ▷ Comprehensive traffic data collection
- ▷ Self-test on power-up



## Benefits

- No laptop required
- Reliable performance
- Interchangeability with existing solutions
- Compatibility with standard loop detector racks
- Low power consumption
- Minimal maintenance
- Cost-effective solution for traffic detection
- Easy to install and configure
- Field-proven **Autoscope** accuracy and reliability
- Built on proven **Autoscope Terra™** Technology
- Connects to existing **Autoscope AIS** or other CCTV cameras
- Compatible with color or monochrome cameras
- Native language graphical user interface support

## Applications

- Fully actuated intersection detection
- Semi-actuated intersection detection
- Temporary construction and work zone safety
- Traffic studies
- Bicycle detection

## Set-Up & Operation

The RVP1 and RVP2 detector cards are easy to install/configure and adaptable to meet an agency's detection requirements. Autoscope Mouse & Monitor functionality quickly sets up intersection detection applications without the use of a laptop.

Simple Mouse & Monitor setup enables stop lines and advance extension detection zones to be drawn as needed. Users can also easily assign detector outputs to interface with NEMA TS1/TS2, Type 170/179 and 2070 ATC controllers.

## Basic Specifications

### ► Temperature

- -29°F to +165°F/-34°C to +74°C

### ► Power

- 12 or 24-VDC 11 Watts maximum

### ► Dimensions

- 4.5 in. (H) x 2.3 in. (W) x 7 in. (D) (11.4cm x 5.7 cm x 17.8 cm) plus handle
- 0.5 lb (0.2 kg)



# SSM-LE

## Enhanced NEMA Signal Monitor Unit



SSM-6LE

SSM-12LE

### A NEW STANDARD OF SAFETY AND DIAGNOSTIC CAPABILITIES

Providing the signal technician with powerful monitoring and trouble-shooting tools helps assure that cabinet malfunctions are detected, diagnosed, and repaired with confidence. The Full Intersection LCD display and event log recording capabilities present the signal technician with detailed and accurate information regarding cabinet operation. New True RMS voltage sensing capabilities make the SSM-LE series the most reliable signal monitor available at any cost.

The SSM-LE series signal monitor includes both ~~six channel~~ (SSM-6LE) and twelve channel (SSM-12LE) configurations.

### SSM-LE OPERATIONAL FEATURES

- Enhanced Monitoring Functions:** The SSM-LE series meets all specifications of NEMA Standard TS1-1994, Part 6. Basic fault coverage includes Conflict, Red Fail, CVM, 24V-I and 24V-II. Dual Indication Monitoring detects simultaneous active signals on a channel. Clearance Monitoring assures proper sequencing of signals and a minimum yellow clearance interval. AC Line Monitoring responds to low AC Line voltages as well as interruptions.
- Full Intersection Display:** High contrast, large area Liquid Crystal Displays (LCD) show full intersection status with an active Red, Yellow, Green, and Walk indicator for each channel. Separate indicators identify channels involved in the fault.
- Event Logging:** The SSM-LE series maintains a nonvolatile event log recording the complete intersection status as well as previous fault events, AC Line events, configuration changes, monitor resets, cabinet temperature and true RMS voltages for all AC inputs. A real time clock time stamps each log event with time and date.
- Signal Sequence:** The Signal Sequence History Log stored in nonvolatile memory graphically displays up to 30 seconds of signal status prior to the fault trigger event with 50ms resolution to ease diagnosing of intermittent and transient faults.
- EDI RMS-Engine:** A DSP coprocessor converts ac input measurements to True RMS voltages, virtually eliminating false sensing due to changes in frequency, phase, or sine wave distortion.
- Configuration Options:** Front panel options include GY Dual indication, +24V and CVM Latching, Red Fail Walk Disable, External Watchdog input, and CVM Log Disable.
- ECcom PC Software:** Access by a computer is provided by EDI ECcom Windows based software for status, event log review and archival, using the standard EIA-232 front panel port.
- CU Communication:** The SSM-LE model will upload to a Controller Unit for remote interrogation. Consult the factory for availability.

EBERLE DESIGN INC.

3819 E. La Salle Street Phoenix, AZ 85040 USA  
tel +1-480-968-6407 www.editrtraffic.com





Complies With The New  
NEMA MMU2 Standard and  
MUTCD Requirements



# SmartMonitor

## MMU2-16LE SERIES

### NEMA LCD MALFUNCTION MANAGEMENT UNIT

- 
- MMU2-16LEip with Ethernet Port
  - MMU2-16LE with EIA-232 Port

Whether you're a **NOVICE** or **EXPERT** Signal Technician, wouldn't it be great if you could:

- ☐ Use a built-in SETUP WIZARD to **quickly and accurately configure** the Signal Monitor to the exact requirements of the cabinet and intersection?
- ☐ Use a MENU DRIVEN LCD interface to **view** vital cabinet operational details such as field signal voltages, historical event logs, and monitor configuration data?
- ☐ Use a built-in DIAGNOSTIC WIZARD to **automatically diagnose** cabinet malfunctions and **pinpoint** faulty signals?

If your answer is Yes, the **MMU2-16LE SmartMonitor®** is for YOU!

### NEW MMU2-16LE SmartMonitor® ENHANCED FEATURES

<b>NEMA TS2-2003 (R2008) Standard Including Amendment #4:</b>	The MMU2-16LE SmartMonitor® meets all specifications of the NEMA Standard TS2-2003 (R2008) for the MMU2 configuration while maintaining compatibility with NEMA TS1-1989 Assemblies.
<b>NEMA Standard Flashing Yellow Arrow PPLT:</b>	The MMU2-16LE SmartMonitor® supports MUTCD Flashing Yellow Arrow PPLT operation and meets / exceeds the NEMA Standard MMU2 requirements of TS-2 Amendment #4-2012, providing modes for both TS-2 or TS-1 cabinet configurations.
<b>Standardized Communications:</b>	Real-time SDLC communications with the Controller Unit exchanges field input status, Controller Unit output status, fault status, MMU programming, and time and date.
<b>Full Intersection &amp; Status Display:</b>	Two high contrast, large area Liquid Crystal Displays (LCD) continuously show full RYG(W) intersection status. A separate graphic LCD provides a menu driven user interface to status, signal voltages, configuration, event logs, and the Help system.
<b>Event Logging:</b>	A time-stamped nonvolatile event log records the complete intersection status as well as AC Line events, configuration changes, monitor resets, temperature and true RMS voltages.
<b>Setup Wizard:</b>	Use the built-in Setup Wizard to configure the Nema Enhanced settings of the SmartMonitor® by answering a short series of questions regarding intersection design and operation.
<b>Diagnostic Wizard and Help System</b>	The Diagnostic Wizard <i>automatically pinpoints</i> faulty signals and offers trouble-shooting guidance. The integrated Help System provides context sensitive operational assistance.
<b>TS-1 Type 12 with SDLC Mode:</b>	The MMU2-16LE SmartMonitor® can be configured to operate with the Port 1 SDLC function and Diagnostic Wizard enabled in a TS-1 twelve channel cabinet with no cabinet wiring changes.
<b>Program Card Memory:</b>	Enhanced settings of the MMU2-16LE SmartMonitor® are stored in nonvolatile memory on the EDI Program Card. Moving the Program Card to another MMU2-16LE automatically transfers all settings.
<b>Signal Sequence History Log:</b>	The five Signal Sequence History logs stored in nonvolatile memory graphically display up to 30 seconds of signal status prior to each fault event.
<b>LEDguard®:</b>	This EDI innovative signal threshold technique can be used to increase the level of monitoring protection when using LED based signal heads.
<b>EDI RMS-Engine:</b>	A DSP coprocessor converts AC input measurements to True RMS voltages, virtually eliminating false sensing due to changes in frequency, phase, or sine wave distortion.
<b>ECcom PC Software:</b>	Access to the MMU2-16LE data is provided by the industry standard EDI ECcom Windows based software for status, event log retrieval, configuration, and data archival.

EBERLE DESIGN INC.

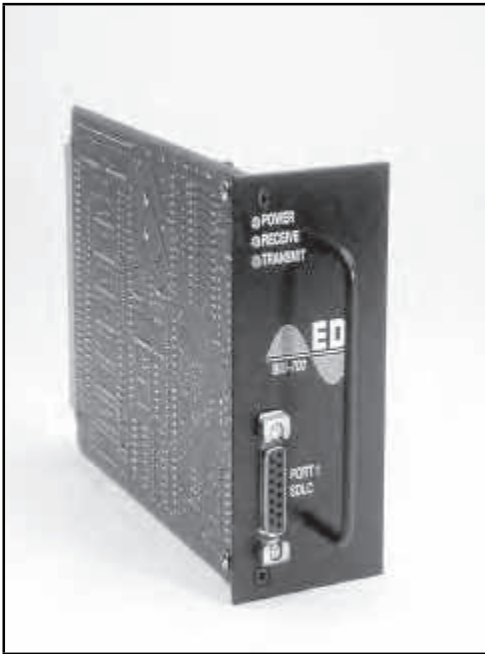
3510 East Atlanta Avenue  
Phoenix, AZ 85040 USA  
www.EDITraffic.com

Tel (480) 968-6407  
Fax (602) 437-1996



# BIU

## NEMA TS-2 Bus Interface Unit



The BIU-700 Bus Interface Unit (BIU) performs the interface between Port 1 of the Controller Unit and the Loop Detector Racks, Terminals and Facilities, and other devices in a NEMA TS-2 Cabinet Assembly. Its functions include controlling load switch outputs, detector resets, communicating with Inductive Loop Detectors and other devices, and the conditioning and conversion of Terminals and Facilities and Loop Detector call inputs for the Controller Unit.

Each EDI BIU-700 is put through a vigorous three part Total Quality Assurance program and tested under the extreme environmental conditions experienced on the street. It is this commitment to quality and performance that EDI products are known for, providing years of trouble free operation.

### BIU-700 OPERATIONAL FEATURES

**Basic Functions:** The BIU-700 Bus Interface Unit meets or exceeds all requirements of the NEMA Standard TS2-1998 for the BIU configuration.

**Display Indicators:** Separate Power, Receive, and Transmit LED indicators display DC power status and SDLC Port 1 status.

**Input / Output Pins:** Signal I/O Configuration:

- ✓ 15 DC Output pins
- ✓ 24 Programmable Input / Output pins
- ✓ 8 DC Input pins
- ✓ 4 Optically isolated input pins
- ✓ 1 Line Frequency Reference input pin
- ✓ 4 Address Select input pins

**Output Drivers:** All outputs are rated at 150mA continuous sink current. Each output provides a 500mA typical current limit. Outputs are rated to 50 volts and utilize a voltage clamp for inductive transient protection.

**Isolated Inputs:** Four optically isolated inputs provide isolation for Pedestrian Detector and Remote Interconnect inputs. These inputs are intended for direct connection to 12 Vac from the cabinet power supply for Pedestrian Detector applications. They may also be connected for 'Low True' DC applications when the Opto Common pin is connected to a 24Vdc supply.

EBERLE DESIGN INC.

3819 E. La Salle Street Phoenix, AZ 85040 USA  
tel +1-480-968-6407 www.editraffic.com

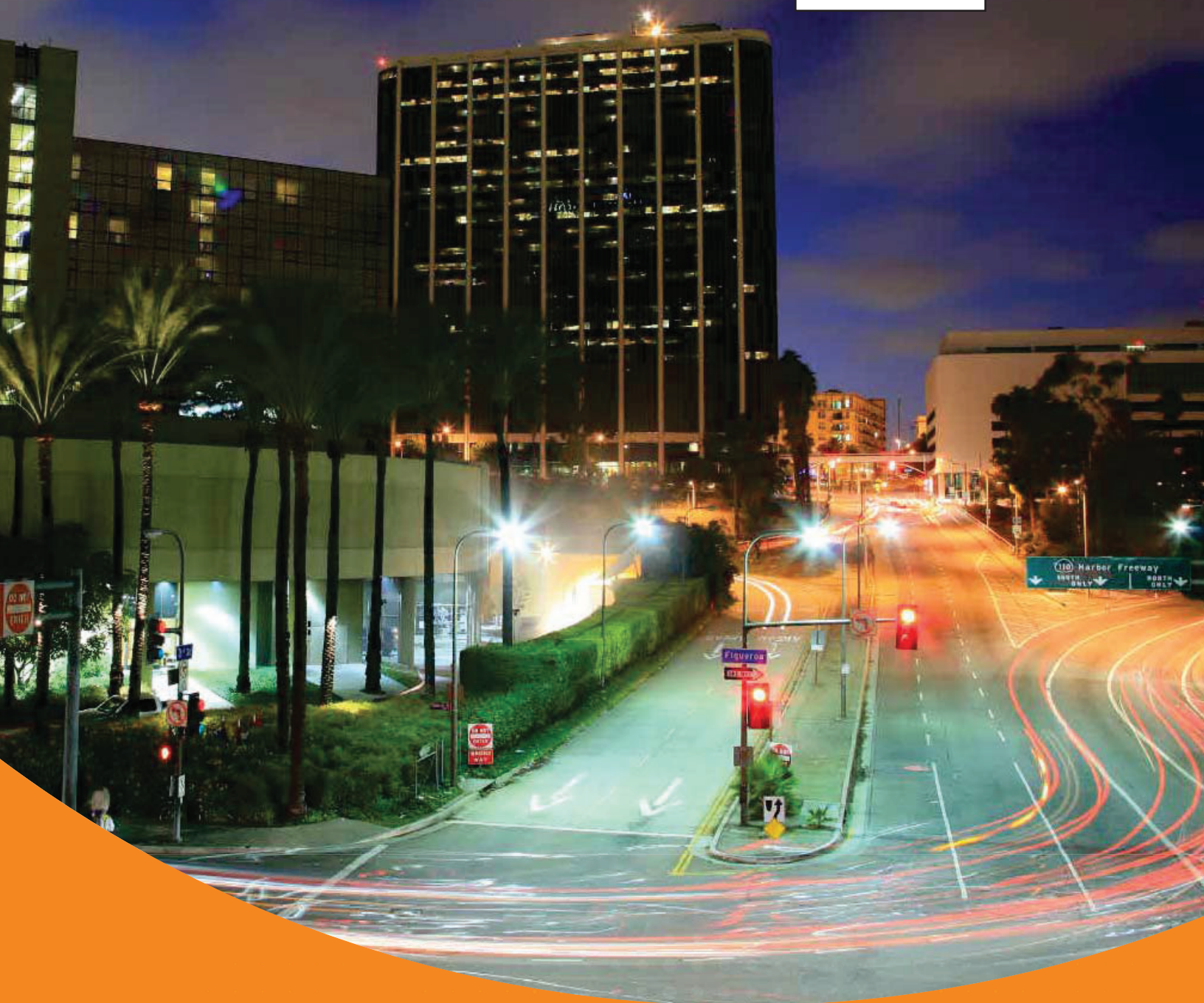




# .....Dialight

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 31  
Qty. 200

Green Ball LED



## ITE Compliant LED Signal Modules

# ITE Compliant LED Traffic Signal

## Module Performance Specifications

### All LED Ball Signal Modules - 8 inch (200mm) and 12 inch (300mm)

All shall be fully compliant to the ITE VTCSH LED Circular Supplement specifications dated and adopted June 27, 2005. Compliance to the ITE VTCSH-2 Interim Purchase Specification is not sufficient, and will not substitute for compliance to the ITE VTCSH LED Circular Supplement specifications. Additionally, prior to bid award, the manufacturer shall submit to purchaser, reports from ETL/Intertek, that certify full compliance of all LED ball signal modules to the entire ITE specification. These tests should include but not be limited to the luminous intensity measurements and requirements outlined in the ITE specification sections 6.4.4 through 6.4.4.4.2 (25°C and 74°C / 49°C). Evidence of full compliance to all required testing methods, procedures and sections as outlined in the above ITE document Figure 2, Design Qualification Testing Flow Chart must be included without any exceptions, changes or omissions. The manufacturer must also submit a datasheet showing the catalog number of the items submitted on the bid and the Independent Lab report must show full qualification of this catalog number.

### All LED 12 inch (300mm) Arrow Signal Modules

All shall be fully compliant to the “Omni-directional” specifications of the ITE VTCSH - LED Vehicle Arrow Traffic Signal Supplement adopted July 1, 2007. Additionally, prior to bid award, the manufacturer shall submit to purchaser, reports from ETL/Intertek that certify full compliance of all LED Arrow signal modules. These tests should include but not be limited to the luminous intensity measurements and requirements outlined in the ITE specification sections 6.4.4 through 6.4.4.4.2 (25°C and 74°C / 49°C). Evidence of full compliance to all required testing methods, procedures and sections as outlined in the above ITE document Attachment 1, “Design Qualification Testing Flow Chart” must be included without any exceptions, changes or omissions. The manufacturer must also submit a data sheet showing the catalog number of the items submitted on the bid and the Independent Lab report must show full qualification of this catalog number.

### All LED 16x18 Countdown Pedestrian Signal Modules

All shall be fully compliant to the ITE PTCSI Part-2: LED Pedestrian Traffic Signal Modules specifications adopted August 4, 2010 or the latest adopted version as listed on the ITE website at time of bid. Additionally, prior to bid award, the manufacturer shall submit to purchaser, reports from ETL/Intertek that certify full compliance of LED signal modules, to these specifications. Evidence of full compliance to all required testing methods, procedures and sections as outlined in the above ITE document Attachment 2, “Design Qualification Testing Flow Chart” must be included without any exceptions, changes or omissions. The manufacturer must also submit a data sheet showing the exact catalog number of the items submitted on the bid and the Independent Lab report must show full qualification of this catalog number. Combination hand/person pedestrian signal modules shall incorporate separate power supplies for the hand and the person icons.

In addition to, and in excess of the above applicable ITE specification compliance, the on-board circuitry of all LED traffic signal modules shall include voltage surge protection, to withstand high-repetition noise transients and low-repetition high-energy transients as stated in Section 2.1.8, NEMA Standard TS 2-2003. In addition, the module shall comply with the following standards: IEC 1000-4-5 at 3kV with a 2 ohm source impedance, ANSI/IEEE C62, 41-2002; IEC 61000-4-12 (6kV, 200A, 100kHz ring wave).

## Warranty

Manufacturer shall provide at time of bid, a written warranty which provides for repair or replacement of modules that fail to function as intended due to workmanship or material defects within the first 60 months from date of delivery. Modules which exhibit luminous intensities less than the minimum as specified in the ITE specifications as indicated above, within the first 60 months from date of delivery shall be replaced or repaired.



## Notes

CSA approved to the following applicable requirements:

- CSA Standard C22.2 No. 9.0-96 General Requirements for Luminaires
- CSA Std. No. C22.2 No. 250.0-04 Luminaires
- UL Std. No. 1598-2004 (May 2006) Luminaires



## Uniform Appearance LED Traffic Signal Modules

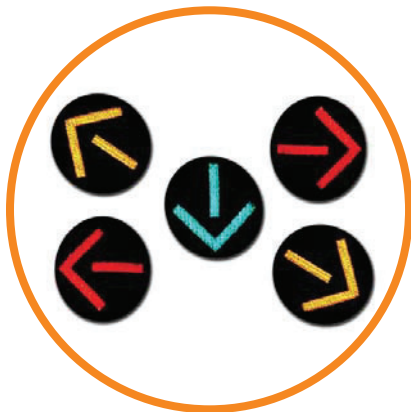


### Features & Benefits

- \*Fully compliant to ITE VTCSH-LED Circular Signal Supplement dated 6/27/2005
- Industry's lowest power for all colors
- Meets or exceeds ITE intensity, color & uniformity spec, including 49°C / 74°C requirements
- Temperature compensated power supplies for longer LED life
- Uniform appearance
- Expanded view radiation pattern suitable for span wire and steep grade applications
- Transient suppression exceeds ITE and NEMA specifications (Up to 6KV ring wave)
- Manufactured with anti-capillary wires
- Conformal coated power supply
- Secondary lens treatment for abrasion resistance
- Patent No. 7,281,818 and other patents pending
- Intertek/ETL certified and listed on ETL certification program
- All units operate at 80-135VAC RMS, 60+/-3Hz

Part Number	Color	Lens Type	Dominant Wavelength (nm)	Typical Wattage at 25°C	Peak Minimum Maintained Luminous Intensity (cd)	Size (in)	*Meets ITE Spec	CSA Approved
433-1110-003XL	Red	Tinted	625	7	165	8	•	•
433-1170-003XL	Red	Clear	625	7	165	8	•	•
433-3130-901XL	Yellow	Tinted	590	8	410	8	•	•
433-3170-901XL	Yellow	Clear	590	8	410	8	•	•
433-2120-001XL	Green	Tinted	500	7	215	8	•	•
433-2170-001XL	Green	Clear	500	7	215	8	•	•
433-1210-003XL	Red	Tinted	625	7	365	12	•	•
433-1270-003XL	Red	Clear	625	7	365	12	•	•
433-3230-901XL	Yellow	Tinted	590	9	910	12	•	•
433-3270-901XL	Yellow	Clear	590	9	910	12	•	•
433-2220-001XL	Green	Tinted	500	8	475	12	•	•
4332270-001XL	Green	Clear	500	8	475	12	•	•

## Omni-Directional Uniform Appearance LED Arrow



### Features & Benefits

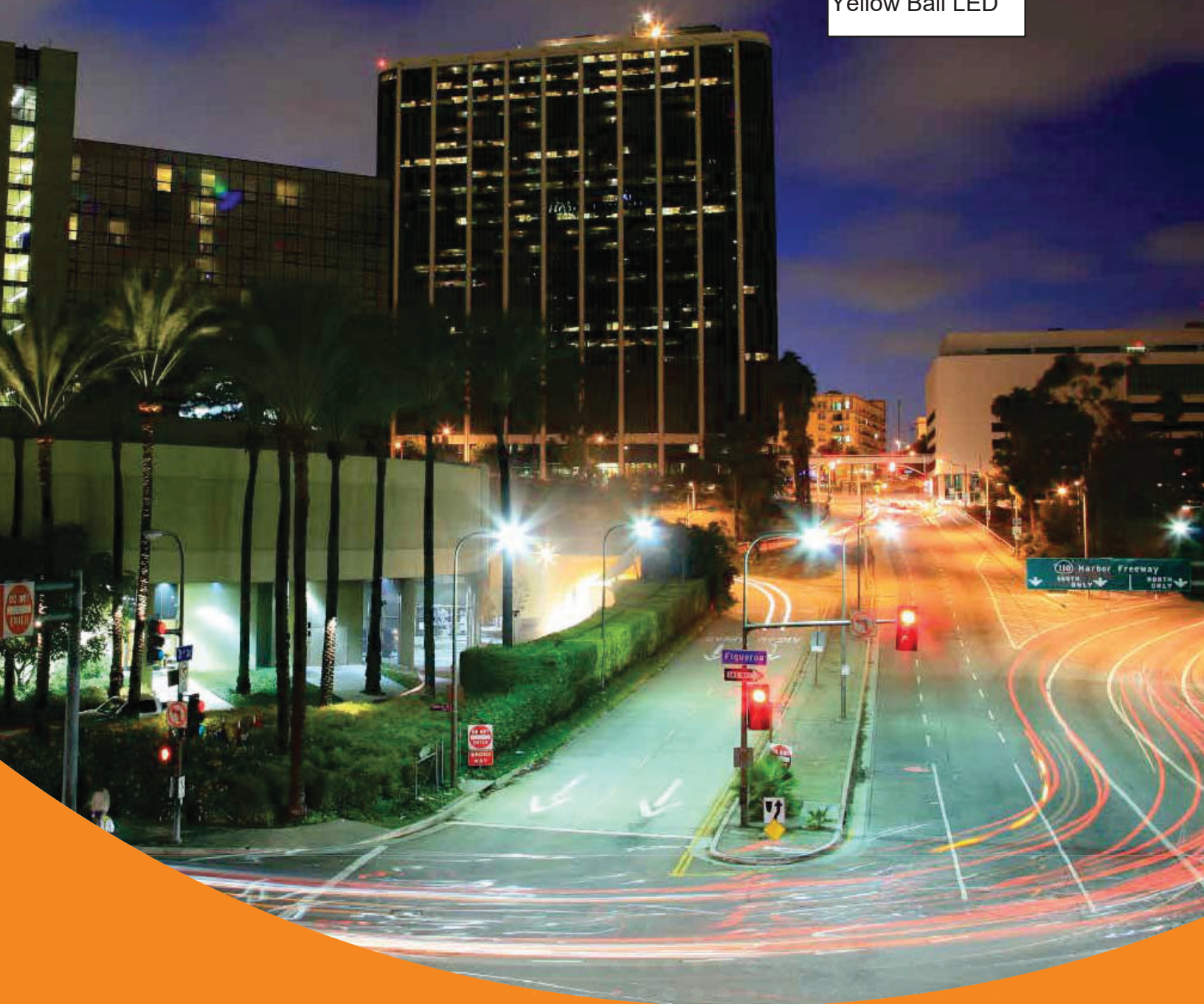
- \*Fully compliant to ITE VTCSH-LED Vehicle Arrow Supplement dated 7/01/2007
- Allows for mounting in any orientation in the signal head
- Industry's lowest power for all colors
- Meets or exceeds ITE intensity, color & uniformity spec, including 49°C / 74°C requirements
- Temperature compensated power supplies for longer LED life
- Uniform appearance
- Transient suppression exceeds ITE and NEMA specifications (Up to 6KV ring wave)
- Manufactured with anti-capillary wires
- Conformal coated power supply
- Secondary lens treatment for abrasion resistance
- Intertek/ETL certified and listed on ETL certification program
- All units operate at 80-135VAC RMS, 60+/-3Hz

Part Number	Color	Lens Type	Dominant Wavelength (nm)	Typical Wattage at 25°C	Peak Minimum Maintained Luminous Intensity (cd)	*Meets ITE Spec	CSA Approved
432-1314-001XOD	Red	Tinted	628	6	56.8	•	•
432-1374-001XOD	Red	Clear	628	6	56.8	•	•
431-3334-901XOD	Yellow	Tinted	590	7	141.6	•	•
431-3374-901XOD	Yellow	Clear	590	7	141.6	•	•
432-2324-001XOD	Green	Tinted	500	6	73.9	•	•
432-2374-001XOD	Green	Clear	500	6	73.9	•	•

# .....Dialight

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 32  
Qty. 200

Yellow Ball LED



## ITE Compliant LED Signal Modules



# ITE Compliant LED Traffic Signal

## Module Performance Specifications

### All LED Ball Signal Modules - 8 inch (200mm) and 12 inch (300mm)

All shall be fully compliant to the ITE VTCSH LED Circular Supplement specifications dated and adopted June 27, 2005. Compliance to the ITE VTCSH-2 Interim Purchase Specification is not sufficient, and will not substitute for compliance to the ITE VTCSH LED Circular Supplement specifications. Additionally, prior to bid award, the manufacturer shall submit to purchaser, reports from ETL/Intertek, that certify full compliance of all LED ball signal modules to the entire ITE specification. These tests should include but not be limited to the luminous intensity measurements and requirements outlined in the ITE specification sections 6.4.4 through 6.4.4.4.2 (25°C and 74°C / 49°C). Evidence of full compliance to all required testing methods, procedures and sections as outlined in the above ITE document Figure 2, Design Qualification Testing Flow Chart must be included without any exceptions, changes or omissions. The manufacturer must also submit a datasheet showing the catalog number of the items submitted on the bid and the Independent Lab report must show full qualification of this catalog number.

### All LED 12 inch (300mm) Arrow Signal Modules

All shall be fully compliant to the “Omni-directional” specifications of the ITE VTCSH - LED Vehicle Arrow Traffic Signal Supplement adopted July 1, 2007. Additionally, prior to bid award, the manufacturer shall submit to purchaser, reports from ETL/Intertek that certify full compliance of all LED Arrow signal modules. These tests should include but not be limited to the luminous intensity measurements and requirements outlined in the ITE specification sections 6.4.4 through 6.4.4.4.2 (25°C and 74°C / 49°C). Evidence of full compliance to all required testing methods, procedures and sections as outlined in the above ITE document Attachment 1, “Design Qualification Testing Flow Chart” must be included without any exceptions, changes or omissions. The manufacturer must also submit a data sheet showing the catalog number of the items submitted on the bid and the Independent Lab report must show full qualification of this catalog number.

### All LED 16x18 Countdown Pedestrian Signal Modules

All shall be fully compliant to the ITE PTCSI Part-2: LED Pedestrian Traffic Signal Modules specifications adopted August 4, 2010 or the latest adopted version as listed on the ITE website at time of bid. Additionally, prior to bid award, the manufacturer shall submit to purchaser, reports from ETL/Intertek that certify full compliance of LED signal modules, to these specifications. Evidence of full compliance to all required testing methods, procedures and sections as outlined in the above ITE document Attachment 2, “Design Qualification Testing Flow Chart” must be included without any exceptions, changes or omissions. The manufacturer must also submit a data sheet showing the exact catalog number of the items submitted on the bid and the Independent Lab report must show full qualification of this catalog number. Combination hand/person pedestrian signal modules shall incorporate separate power supplies for the hand and the person icons.

In addition to, and in excess of the above applicable ITE specification compliance, the on-board circuitry of all LED traffic signal modules shall include voltage surge protection, to withstand high-repetition noise transients and low-repetition high-energy transients as stated in Section 2.1.8, NEMA Standard TS 2-2003. In addition, the module shall comply with the following standards: IEC 1000-4-5 at 3kV with a 2 ohm source impedance, ANSI/IEEE C62, 41-2002; IEC 61000-4-12 (6kV, 200A, 100kHz ring wave).

## Warranty

Manufacturer shall provide at time of bid, a written warranty which provides for repair or replacement of modules that fail to function as intended due to workmanship or material defects within the first 60 months from date of delivery. Modules which exhibit luminous intensities less than the minimum as specified in the ITE specifications as indicated above, within the first 60 months from date of delivery shall be replaced or repaired.



## Notes

CSA approved to the following applicable requirements:

- CSA Standard C22.2 No. 9.0-96 General Requirements for Luminaires
- CSA Std. No. C22.2 No. 250.0-04 Luminaires
- UL Std. No. 1598-2004 (May 2006) Luminaires

## Uniform Appearance LED Traffic Signal Modules

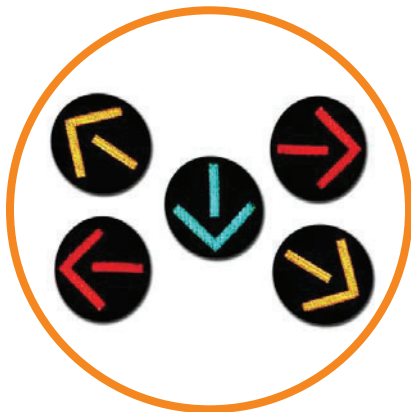


### Features & Benefits

- \*Fully compliant to ITE VTCSH-LED Circular Signal Supplement dated 6/27/2005
- Industry's lowest power for all colors
- Meets or exceeds ITE intensity, color & uniformity spec, including 49°C / 74°C requirements
- Temperature compensated power supplies for longer LED life
- Uniform appearance
- Expanded view radiation pattern suitable for span wire and steep grade applications
- Transient suppression exceeds ITE and NEMA specifications (Up to 6KV ring wave)
- Manufactured with anti-capillary wires
- Conformal coated power supply
- Secondary lens treatment for abrasion resistance
- Patent No. 7,281,818 and other patents pending
- Intertek/ETL certified and listed on ETL certification program
- All units operate at 80-135VAC RMS, 60+/-3Hz

Part Number	Color	Lens Type	Dominant Wavelength (nm)	Typical Wattage at 25°C	Peak Minimum Maintained Luminous Intensity (cd)	Size (in)	*Meets ITE Spec	CSA Approved
433-1110-003XL	Red	Tinted	625	7	165	8	•	•
433-1170-003XL	Red	Clear	625	7	165	8	•	•
433-3130-901XL	Yellow	Tinted	590	8	410	8	•	•
433-3170-901XL	Yellow	Clear	590	8	410	8	•	•
433-2120-001XL	Green	Tinted	500	7	215	8	•	•
433-2170-001XL	Green	Clear	500	7	215	8	•	•
433-1210-003XL	Red	Tinted	625	7	365	12	•	•
433-1270-003XL	Red	Clear	625	7	365	12	•	•
433-3230-901XL	Yellow	Tinted	590	9	910	12	•	•
433-3270-901XL	Yellow	Clear	590	9	910	12	•	•
433-2220-001XL	Green	Tinted	500	8	475	12	•	•
433-2270-001XL	Green	Clear	500	8	475	12	•	•

## Omni-Directional Uniform Appearance LED Arrow



### Features & Benefits

- \*Fully compliant to ITE VTCSH-LED Vehicle Arrow Supplement dated 7/01/2007
- Allows for mounting in any orientation in the signal head
- Industry's lowest power for all colors
- Meets or exceeds ITE intensity, color & uniformity spec, including 49°C / 74°C requirements
- Temperature compensated power supplies for longer LED life
- Uniform appearance
- Transient suppression exceeds ITE and NEMA specifications (Up to 6KV ring wave)
- Manufactured with anti-capillary wires
- Conformal coated power supply
- Secondary lens treatment for abrasion resistance
- Intertek/ETL certified and listed on ETL certification program
- All units operate at 80-135VAC RMS, 60+/-3Hz

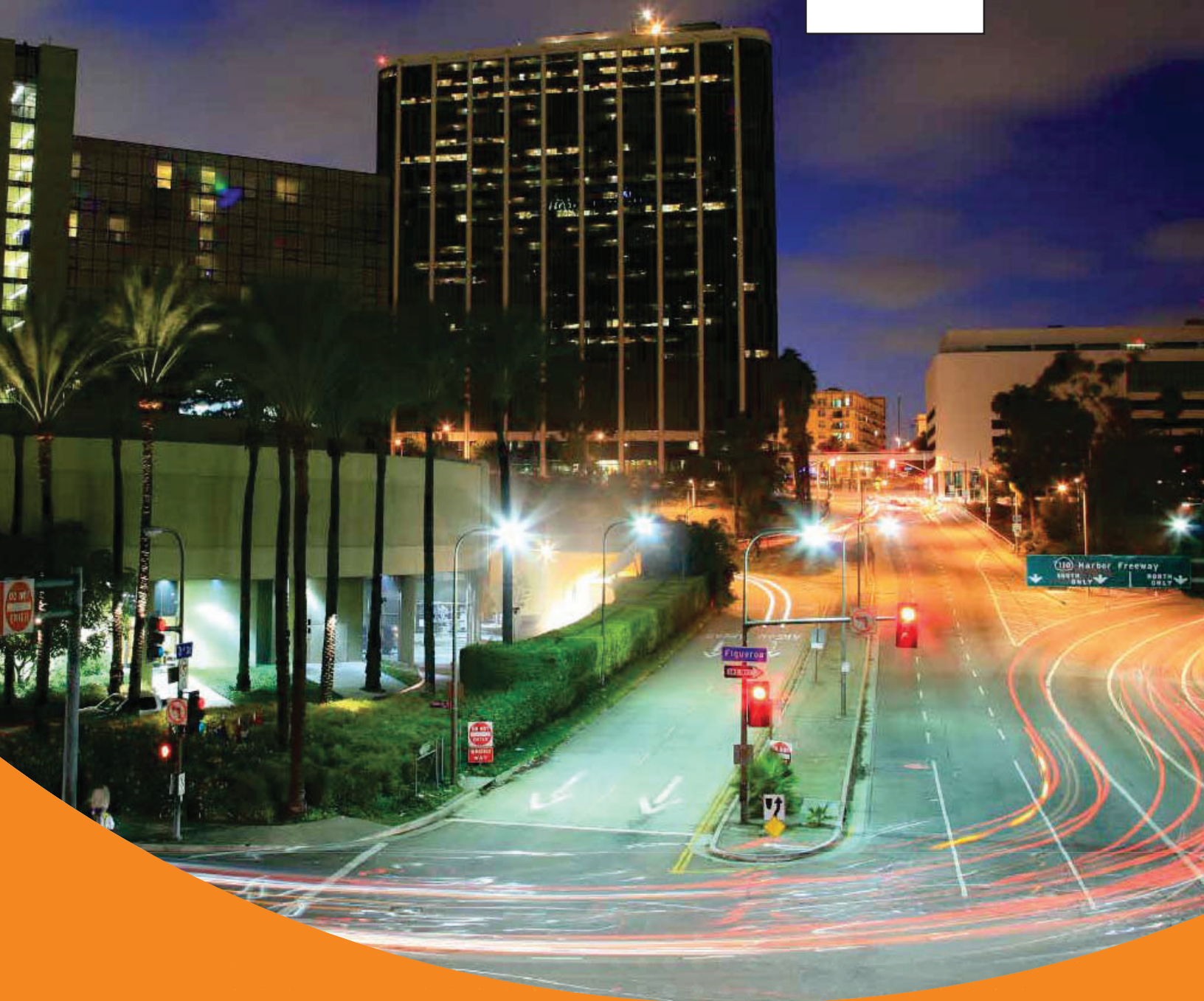
Part Number	Color	Lens Type	Dominant Wavelength (nm)	Typical Wattage at 25°C	Peak Minimum Maintained Luminous Intensity (cd)	*Meets ITE Spec	CSA Approved
432-1314-001XOD	Red	Tinted	628	6	56.8	•	•
432-1374-001XOD	Red	Clear	628	6	56.8	•	•
431-3334-901XOD	Yellow	Tinted	590	7	141.6	•	•
431-3374-901XOD	Yellow	Clear	590	7	141.6	•	•
432-2324-001XOD	Green	Tinted	500	6	73.9	•	•
432-2374-001XOD	Green	Clear	500	6	73.9	•	•



# .....Dialight

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 33  
Qty. 200

Red Ball LED



## ITE Compliant LED Signal Modules



# ITE Compliant LED Traffic Signal

## Module Performance Specifications

### All LED Ball Signal Modules - 8 inch (200mm) and 12 inch (300mm)

All shall be fully compliant to the ITE VTCSH LED Circular Supplement specifications dated and adopted June 27, 2005. Compliance to the ITE VTCSH-2 Interim Purchase Specification is not sufficient, and will not substitute for compliance to the ITE VTCSH LED Circular Supplement specifications. Additionally, prior to bid award, the manufacturer shall submit to purchaser, reports from ETL/Intertek, that certify full compliance of all LED ball signal modules to the entire ITE specification. These tests should include but not be limited to the luminous intensity measurements and requirements outlined in the ITE specification sections 6.4.4 through 6.4.4.4.2 (25°C and 74°C / 49°C). Evidence of full compliance to all required testing methods, procedures and sections as outlined in the above ITE document Figure 2, Design Qualification Testing Flow Chart must be included without any exceptions, changes or omissions. The manufacturer must also submit a datasheet showing the catalog number of the items submitted on the bid and the Independent Lab report must show full qualification of this catalog number.

### All LED 12 inch (300mm) Arrow Signal Modules

All shall be fully compliant to the “Omni-directional” specifications of the ITE VTCSH - LED Vehicle Arrow Traffic Signal Supplement adopted July 1, 2007. Additionally, prior to bid award, the manufacturer shall submit to purchaser, reports from ETL/Intertek that certify full compliance of all LED Arrow signal modules. These tests should include but not be limited to the luminous intensity measurements and requirements outlined in the ITE specification sections 6.4.4 through 6.4.4.4.2 (25°C and 74°C / 49°C). Evidence of full compliance to all required testing methods, procedures and sections as outlined in the above ITE document Attachment 1, “Design Qualification Testing Flow Chart” must be included without any exceptions, changes or omissions. The manufacturer must also submit a data sheet showing the catalog number of the items submitted on the bid and the Independent Lab report must show full qualification of this catalog number.

### All LED 16x18 Countdown Pedestrian Signal Modules

All shall be fully compliant to the ITE PTCSI Part-2: LED Pedestrian Traffic Signal Modules specifications adopted August 4, 2010 or the latest adopted version as listed on the ITE website at time of bid. Additionally, prior to bid award, the manufacturer shall submit to purchaser, reports from ETL/Intertek that certify full compliance of LED signal modules, to these specifications. Evidence of full compliance to all required testing methods, procedures and sections as outlined in the above ITE document Attachment 2, “Design Qualification Testing Flow Chart” must be included without any exceptions, changes or omissions. The manufacturer must also submit a data sheet showing the exact catalog number of the items submitted on the bid and the Independent Lab report must show full qualification of this catalog number. Combination hand/person pedestrian signal modules shall incorporate separate power supplies for the hand and the person icons.

In addition to, and in excess of the above applicable ITE specification compliance, the on-board circuitry of all LED traffic signal modules shall include voltage surge protection, to withstand high-repetition noise transients and low-repetition high-energy transients as stated in Section 2.1.8, NEMA Standard TS 2-2003. In addition, the module shall comply with the following standards: IEC 1000-4-5 at 3kV with a 2 ohm source impedance, ANSI/IEEE C62, 41-2002; IEC 61000-4-12 (6kV, 200A, 100kHz ring wave).

## Warranty

Manufacturer shall provide at time of bid, a written warranty which provides for repair or replacement of modules that fail to function as intended due to workmanship or material defects within the first 60 months from date of delivery. Modules which exhibit luminous intensities less than the minimum as specified in the ITE specifications as indicated above, within the first 60 months from date of delivery shall be replaced or repaired.



## Notes

CSA approved to the following applicable requirements:

- CSA Standard C22.2 No. 9.0-96 General Requirements for Luminaires
- CSA Std. No. C22.2 No. 250.0-04 Luminaires
- UL Std. No. 1598-2004 (May 2006) Luminaires

## Uniform Appearance LED Traffic Signal Modules

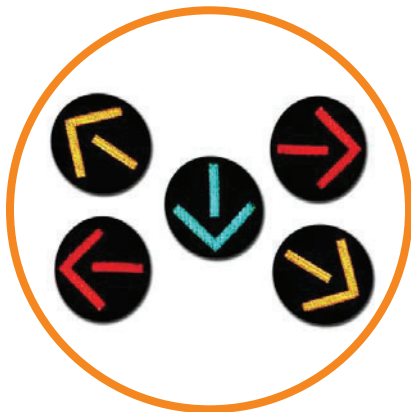


### Features & Benefits

- \*Fully compliant to ITE VTCSH-LED Circular Signal Supplement dated 6/27/2005
- Industry's lowest power for all colors
- Meets or exceeds ITE intensity, color & uniformity spec, including 49°C / 74°C requirements
- Temperature compensated power supplies for longer LED life
- Uniform appearance
- Expanded view radiation pattern suitable for span wire and steep grade applications
- Transient suppression exceeds ITE and NEMA specifications (Up to 6KV ring wave)
- Manufactured with anti-capillary wires
- Conformal coated power supply
- Secondary lens treatment for abrasion resistance
- Patent No. 7,281,818 and other patents pending
- Intertek/ETL certified and listed on ETL certification program
- All units operate at 80-135VAC RMS, 60+/-3Hz

Part Number	Color	Lens Type	Dominant Wavelength (nm)	Typical Wattage at 25°C	Peak Minimum Maintained Luminous Intensity (cd)	Size (in)	*Meets ITE Spec	CSA Approved
433-1110-003XL	Red	Tinted	625	7	165	8	•	•
433-1170-003XL	Red	Clear	625	7	165	8	•	•
433-3130-901XL	Yellow	Tinted	590	8	410	8	•	•
433-3170-901XL	Yellow	Clear	590	8	410	8	•	•
433-2120-001XL	Green	Tinted	500	7	215	8	•	•
433-2170-001XL	Green	Clear	500	7	215	8	•	•
433-1210-003XL	Red	Tinted	625	7	365	12	•	•
433-1270-003XL	Red	Clear	625	7	365	12	•	•
433-3230-901XL	Yellow	Tinted	590	9	910	12	•	•
433-3270-901XL	Yellow	Clear	590	9	910	12	•	•
433-2220-001XL	Green	Tinted	500	8	475	12	•	•
4332270-001XL	Green	Clear	500	8	475	12	•	•

## Omni-Directional Uniform Appearance LED Arrow



### Features & Benefits

- \*Fully compliant to ITE VTCSH-LED Vehicle Arrow Supplement dated 7/01/2007
- Allows for mounting in any orientation in the signal head
- Industry's lowest power for all colors
- Meets or exceeds ITE intensity, color & uniformity spec, including 49°C / 74°C requirements
- Temperature compensated power supplies for longer LED life
- Uniform appearance
- Transient suppression exceeds ITE and NEMA specifications (Up to 6KV ring wave)
- Manufactured with anti-capillary wires
- Conformal coated power supply
- Secondary lens treatment for abrasion resistance
- Intertek/ETL certified and listed on ETL certification program
- All units operate at 80-135VAC RMS, 60+/-3Hz

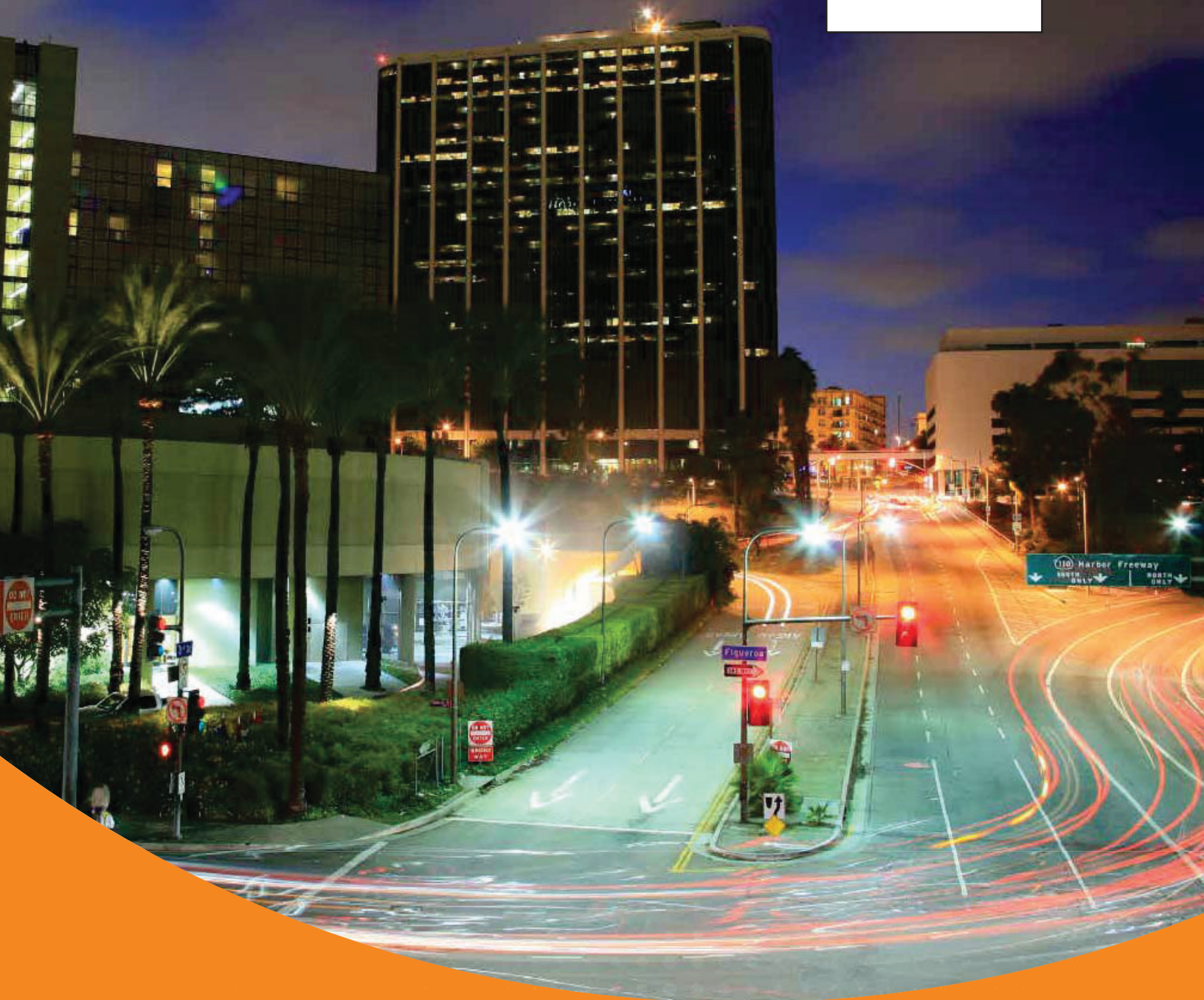
Part Number	Color	Lens Type	Dominant Wavelength (nm)	Typical Wattage at 25°C	Peak Minimum Maintained Luminous Intensity (cd)	*Meets ITE Spec	CSA Approved
432-1314-001XOD	Red	Tinted	628	6	56.8	•	•
432-1374-001XOD	Red	Clear	628	6	56.8	•	•
431-3334-901XOD	Yellow	Tinted	590	7	141.6	•	•
431-3374-901XOD	Yellow	Clear	590	7	141.6	•	•
432-2324-001XOD	Green	Tinted	500	6	73.9	•	•
432-2374-001XOD	Green	Clear	500	6	73.9	•	•



# .....Dialight

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 34  
Qty. 1

Green Arrow LED



## ITE Compliant LED Signal Modules

# ITE Compliant LED Traffic Signal

## Module Performance Specifications

### All LED Ball Signal Modules - 8 inch (200mm) and 12 inch (300mm)

All shall be fully compliant to the ITE VTCSH LED Circular Supplement specifications dated and adopted June 27, 2005. Compliance to the ITE VTCSH-2 Interim Purchase Specification is not sufficient, and will not substitute for compliance to the ITE VTCSH LED Circular Supplement specifications. Additionally, prior to bid award, the manufacturer shall submit to purchaser, reports from ETL/Intertek, that certify full compliance of all LED ball signal modules to the entire ITE specification. These tests should include but not be limited to the luminous intensity measurements and requirements outlined in the ITE specification sections 6.4.4 through 6.4.4.4.2 (25°C and 74°C / 49°C). Evidence of full compliance to all required testing methods, procedures and sections as outlined in the above ITE document Figure 2, Design Qualification Testing Flow Chart must be included without any exceptions, changes or omissions. The manufacturer must also submit a datasheet showing the catalog number of the items submitted on the bid and the Independent Lab report must show full qualification of this catalog number.

### All LED 12 inch (300mm) Arrow Signal Modules

All shall be fully compliant to the “Omni-directional” specifications of the ITE VTCSH - LED Vehicle Arrow Traffic Signal Supplement adopted July 1, 2007. Additionally, prior to bid award, the manufacturer shall submit to purchaser, reports from ETL/Intertek that certify full compliance of all LED Arrow signal modules. These tests should include but not be limited to the luminous intensity measurements and requirements outlined in the ITE specification sections 6.4.4 through 6.4.4.4.2 (25°C and 74°C / 49°C). Evidence of full compliance to all required testing methods, procedures and sections as outlined in the above ITE document Attachment 1, “Design Qualification Testing Flow Chart” must be included without any exceptions, changes or omissions. The manufacturer must also submit a data sheet showing the catalog number of the items submitted on the bid and the Independent Lab report must show full qualification of this catalog number.

### All LED 16x18 Countdown Pedestrian Signal Modules

All shall be fully compliant to the ITE PTCSI Part-2: LED Pedestrian Traffic Signal Modules specifications adopted August 4, 2010 or the latest adopted version as listed on the ITE website at time of bid. Additionally, prior to bid award, the manufacturer shall submit to purchaser, reports from ETL/Intertek that certify full compliance of LED signal modules, to these specifications. Evidence of full compliance to all required testing methods, procedures and sections as outlined in the above ITE document Attachment 2, “Design Qualification Testing Flow Chart” must be included without any exceptions, changes or omissions. The manufacturer must also submit a data sheet showing the exact catalog number of the items submitted on the bid and the Independent Lab report must show full qualification of this catalog number. Combination hand/person pedestrian signal modules shall incorporate separate power supplies for the hand and the person icons.

In addition to, and in excess of the above applicable ITE specification compliance, the on-board circuitry of all LED traffic signal modules shall include voltage surge protection, to withstand high-repetition noise transients and low-repetition high-energy transients as stated in Section 2.1.8, NEMA Standard TS 2-2003. In addition, the module shall comply with the following standards: IEC 1000-4-5 at 3kV with a 2 ohm source impedance, ANSI/IEEE C62, 41-2002; IEC 61000-4-12 (6kV, 200A, 100kHz ring wave).

## Warranty

Manufacturer shall provide at time of bid, a written warranty which provides for repair or replacement of modules that fail to function as intended due to workmanship or material defects within the first 60 months from date of delivery. Modules which exhibit luminous intensities less than the minimum as specified in the ITE specifications as indicated above, within the first 60 months from date of delivery shall be replaced or repaired.



## Notes

CSA approved to the following applicable requirements:

- CSA Standard C22.2 No. 9.0-96 General Requirements for Luminaires
- CSA Std. No. C22.2 No. 250.0-04 Luminaires
- UL Std. No. 1598-2004 (May 2006) Luminaires



## Uniform Appearance LED Traffic Signal Modules

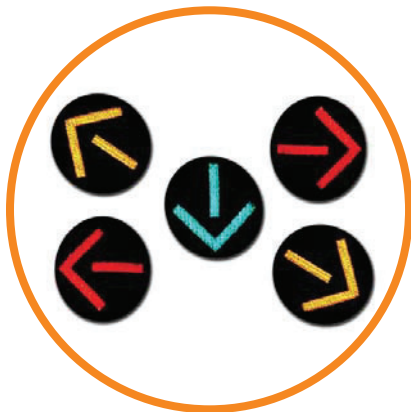


### Features & Benefits

- \*Fully compliant to ITE VTCSH-LED Circular Signal Supplement dated 6/27/2005
- Industry's lowest power for all colors
- Meets or exceeds ITE intensity, color & uniformity spec, including 49°C / 74°C requirements
- Temperature compensated power supplies for longer LED life
- Uniform appearance
- Expanded view radiation pattern suitable for span wire and steep grade applications
- Transient suppression exceeds ITE and NEMA specifications (Up to 6KV ring wave)
- Manufactured with anti-capillary wires
- Conformal coated power supply
- Secondary lens treatment for abrasion resistance
- Patent No. 7,281,818 and other patents pending
- Intertek/ETL certified and listed on ETL certification program
- All units operate at 80-135VAC RMS, 60+/-3Hz

Part Number	Color	Lens Type	Dominant Wavelength (nm)	Typical Wattage at 25°C	Peak Minimum Maintained Luminous Intensity (cd)	Size (in)	*Meets ITE Spec	CSA Approved
433-1110-003XL	Red	Tinted	625	7	165	8	•	•
433-1170-003XL	Red	Clear	625	7	165	8	•	•
433-3130-901XL	Yellow	Tinted	590	8	410	8	•	•
433-3170-901XL	Yellow	Clear	590	8	410	8	•	•
433-2120-001XL	Green	Tinted	500	7	215	8	•	•
433-2170-001XL	Green	Clear	500	7	215	8	•	•
433-1210-003XL	Red	Tinted	625	7	365	12	•	•
433-1270-003XL	Red	Clear	625	7	365	12	•	•
433-3230-901XL	Yellow	Tinted	590	9	910	12	•	•
433-3270-901XL	Yellow	Clear	590	9	910	12	•	•
433-2220-001XL	Green	Tinted	500	8	475	12	•	•
4332270-001XL	Green	Clear	500	8	475	12	•	•

## Omni-Directional Uniform Appearance LED Arrow



### Features & Benefits

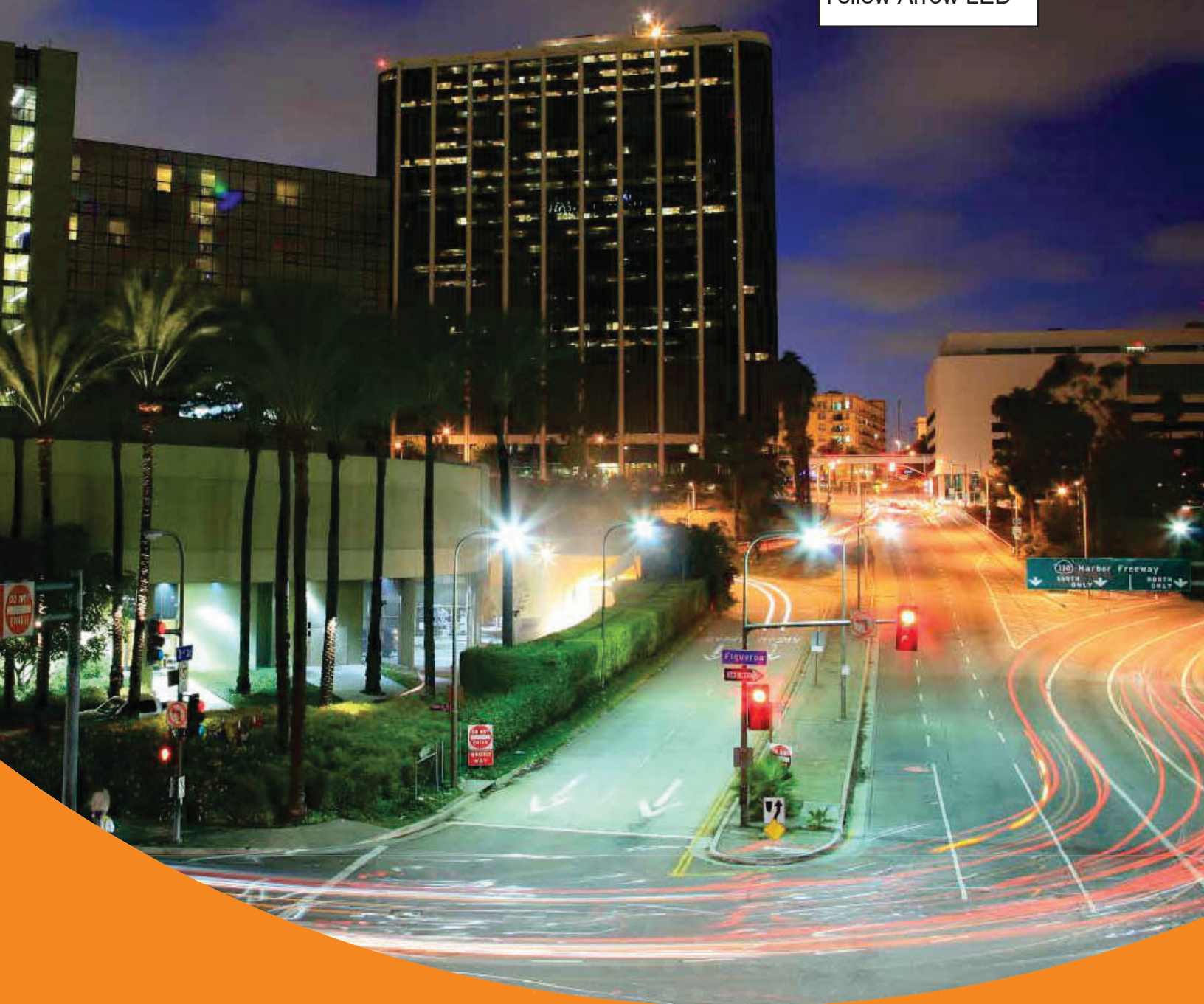
- \*Fully compliant to ITE VTCSH-LED Vehicle Arrow Supplement dated 7/01/2007
- Allows for mounting in any orientation in the signal head
- Industry's lowest power for all colors
- Meets or exceeds ITE intensity, color & uniformity spec, including 49°C / 74°C requirements
- Temperature compensated power supplies for longer LED life
- Uniform appearance
- Transient suppression exceeds ITE and NEMA specifications (Up to 6KV ring wave)
- Manufactured with anti-capillary wires
- Conformal coated power supply
- Secondary lens treatment for abrasion resistance
- Intertek/ETL certified and listed on ETL certification program
- All units operate at 80-135VAC RMS, 60+/-3Hz

Part Number	Color	Lens Type	Dominant Wavelength (nm)	Typical Wattage at 25°C	Peak Minimum Maintained Luminous Intensity (cd)	*Meets ITE Spec	CSA Approved
432-1314-001XOD	Red	Tinted	628	6	56.8	•	•
432-1374-001XOD	Red	Clear	628	6	56.8	•	•
431-3334-901XOD	Yellow	Tinted	590	7	141.6	•	•
431-3374-901XOD	Yellow	Clear	590	7	141.6	•	•
432-2324-001XOD	Green	Tinted	500	6	73.9	•	•
432-2374-001XOD	Green	Clear	500	6	73.9	•	•

# .....Dialight

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 35  
Qty. 1

Yellow Arrow LED



## ITE Compliant LED Signal Modules



# ITE Compliant LED Traffic Signal

## Module Performance Specifications

### All LED Ball Signal Modules - 8 inch (200mm) and 12 inch (300mm)

All shall be fully compliant to the ITE VTCSH LED Circular Supplement specifications dated and adopted June 27, 2005. Compliance to the ITE VTCSH-2 Interim Purchase Specification is not sufficient, and will not substitute for compliance to the ITE VTCSH LED Circular Supplement specifications. Additionally, prior to bid award, the manufacturer shall submit to purchaser, reports from ETL/Intertek, that certify full compliance of all LED ball signal modules to the entire ITE specification. These tests should include but not be limited to the luminous intensity measurements and requirements outlined in the ITE specification sections 6.4.4 through 6.4.4.4.2 (25°C and 74°C / 49°C). Evidence of full compliance to all required testing methods, procedures and sections as outlined in the above ITE document Figure 2, Design Qualification Testing Flow Chart must be included without any exceptions, changes or omissions. The manufacturer must also submit a datasheet showing the catalog number of the items submitted on the bid and the Independent Lab report must show full qualification of this catalog number.

### All LED 12 inch (300mm) Arrow Signal Modules

All shall be fully compliant to the “Omni-directional” specifications of the ITE VTCSH - LED Vehicle Arrow Traffic Signal Supplement adopted July 1, 2007. Additionally, prior to bid award, the manufacturer shall submit to purchaser, reports from ETL/Intertek that certify full compliance of all LED Arrow signal modules. These tests should include but not be limited to the luminous intensity measurements and requirements outlined in the ITE specification sections 6.4.4 through 6.4.4.4.2 (25°C and 74°C / 49°C). Evidence of full compliance to all required testing methods, procedures and sections as outlined in the above ITE document Attachment 1, “Design Qualification Testing Flow Chart” must be included without any exceptions, changes or omissions. The manufacturer must also submit a data sheet showing the catalog number of the items submitted on the bid and the Independent Lab report must show full qualification of this catalog number.

### All LED 16x18 Countdown Pedestrian Signal Modules

All shall be fully compliant to the ITE PTCSI Part-2: LED Pedestrian Traffic Signal Modules specifications adopted August 4, 2010 or the latest adopted version as listed on the ITE website at time of bid. Additionally, prior to bid award, the manufacturer shall submit to purchaser, reports from ETL/Intertek that certify full compliance of LED signal modules, to these specifications. Evidence of full compliance to all required testing methods, procedures and sections as outlined in the above ITE document Attachment 2, “Design Qualification Testing Flow Chart” must be included without any exceptions, changes or omissions. The manufacturer must also submit a data sheet showing the exact catalog number of the items submitted on the bid and the Independent Lab report must show full qualification of this catalog number. Combination hand/person pedestrian signal modules shall incorporate separate power supplies for the hand and the person icons.

In addition to, and in excess of the above applicable ITE specification compliance, the on-board circuitry of all LED traffic signal modules shall include voltage surge protection, to withstand high-repetition noise transients and low-repetition high-energy transients as stated in Section 2.1.8, NEMA Standard TS 2-2003. In addition, the module shall comply with the following standards: IEC 1000-4-5 at 3kV with a 2 ohm source impedance, ANSI/IEEE C62, 41-2002; IEC 61000-4-12 (6kV, 200A, 100kHz ring wave).

## Warranty

Manufacturer shall provide at time of bid, a written warranty which provides for repair or replacement of modules that fail to function as intended due to workmanship or material defects within the first 60 months from date of delivery. Modules which exhibit luminous intensities less than the minimum as specified in the ITE specifications as indicated above, within the first 60 months from date of delivery shall be replaced or repaired.



## Notes

CSA approved to the following applicable requirements:

- CSA Standard C22.2 No. 9.0-96 General Requirements for Luminaires
- CSA Std. No. C22.2 No. 250.0-04 Luminaires
- UL Std. No. 1598-2004 (May 2006) Luminaires



## Uniform Appearance LED Traffic Signal Modules

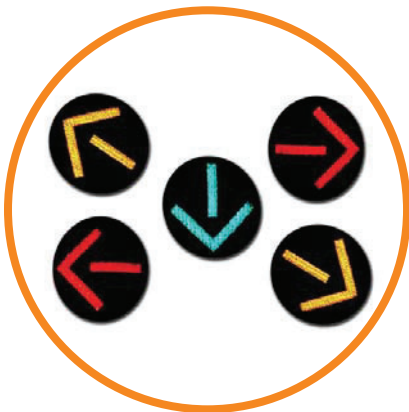


### Features & Benefits

- \*Fully compliant to ITE VTCSH-LED Circular Signal Supplement dated 6/27/2005
- Industry's lowest power for all colors
- Meets or exceeds ITE intensity, color & uniformity spec, including 49°C / 74°C requirements
- Temperature compensated power supplies for longer LED life
- Uniform appearance
- Expanded view radiation pattern suitable for span wire and steep grade applications
- Transient suppression exceeds ITE and NEMA specifications (Up to 6KV ring wave)
- Manufactured with anti-capillary wires
- Conformal coated power supply
- Secondary lens treatment for abrasion resistance
- Patent No. 7,281,818 and other patents pending
- Intertek/ETL certified and listed on ETL certification program
- All units operate at 80-135VAC RMS, 60+/-3Hz

Part Number	Color	Lens Type	Dominant Wavelength (nm)	Typical Wattage at 25°C	Peak Minimum Maintained Luminous Intensity (cd)	Size (in)	*Meets ITE Spec	CSA Approved
433-1110-003XL	Red	Tinted	625	7	165	8	•	•
433-1170-003XL	Red	Clear	625	7	165	8	•	•
433-3130-901XL	Yellow	Tinted	590	8	410	8	•	•
433-3170-901XL	Yellow	Clear	590	8	410	8	•	•
433-2120-001XL	Green	Tinted	500	7	215	8	•	•
433-2170-001XL	Green	Clear	500	7	215	8	•	•
433-1210-003XL	Red	Tinted	625	7	365	12	•	•
433-1270-003XL	Red	Clear	625	7	365	12	•	•
433-3230-901XL	Yellow	Tinted	590	9	910	12	•	•
433-3270-901XL	Yellow	Clear	590	9	910	12	•	•
433-2220-001XL	Green	Tinted	500	8	475	12	•	•
433-2270-001XL	Green	Clear	500	8	475	12	•	•

## Omni-Directional Uniform Appearance LED Arrow



### Features & Benefits

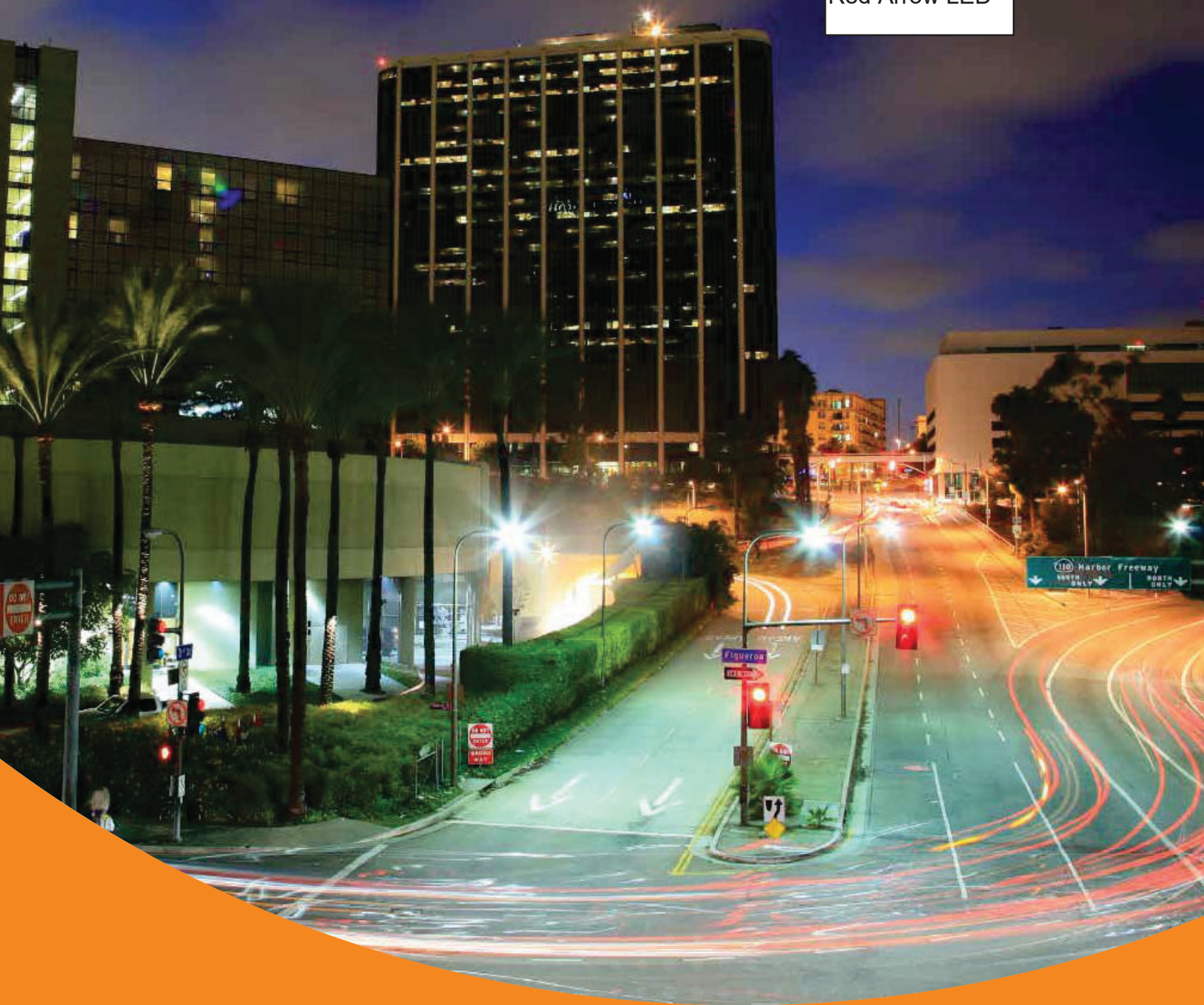
- \*Fully compliant to ITE VTCSH-LED Vehicle Arrow Supplement dated 7/01/2007
- Allows for mounting in any orientation in the signal head
- Industry's lowest power for all colors
- Meets or exceeds ITE intensity, color & uniformity spec, including 49°C / 74°C requirements
- Temperature compensated power supplies for longer LED life
- Uniform appearance
- Transient suppression exceeds ITE and NEMA specifications (Up to 6KV ring wave)
- Manufactured with anti-capillary wires
- Conformal coated power supply
- Secondary lens treatment for abrasion resistance
- Intertek/ETL certified and listed on ETL certification program
- All units operate at 80-135VAC RMS, 60+/-3Hz

Part Number	Color	Lens Type	Dominant Wavelength (nm)	Typical Wattage at 25°C	Peak Minimum Maintained Luminous Intensity (cd)	*Meets ITE Spec	CSA Approved
432-1314-001XOD	Red	Tinted	628	6	56.8	•	•
432-1374-001XOD	Red	Clear	628	6	56.8	•	•
431-3334-901XOD	Yellow	Tinted	590	7	141.6	•	•
431-3374-901XOD	Yellow	Clear	590	7	141.6	•	•
432-2324-001XOD	Green	Tinted	500	6	73.9	•	•
432-2374-001XOD	Green	Clear	500	6	73.9	•	•

# .....Dialight

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 36  
Qty. 1

Red Arrow LED



## ITE Compliant LED Signal Modules



# ITE Compliant LED Traffic Signal

## Module Performance Specifications

### All LED Ball Signal Modules - 8 inch (200mm) and 12 inch (300mm)

All shall be fully compliant to the ITE VTCSH LED Circular Supplement specifications dated and adopted June 27, 2005. Compliance to the ITE VTCSH-2 Interim Purchase Specification is not sufficient, and will not substitute for compliance to the ITE VTCSH LED Circular Supplement specifications. Additionally, prior to bid award, the manufacturer shall submit to purchaser, reports from ETL/Intertek, that certify full compliance of all LED ball signal modules to the entire ITE specification. These tests should include but not be limited to the luminous intensity measurements and requirements outlined in the ITE specification sections 6.4.4 through 6.4.4.4.2 (25°C and 74°C / 49°C). Evidence of full compliance to all required testing methods, procedures and sections as outlined in the above ITE document Figure 2, Design Qualification Testing Flow Chart must be included without any exceptions, changes or omissions. The manufacturer must also submit a datasheet showing the catalog number of the items submitted on the bid and the Independent Lab report must show full qualification of this catalog number.

### All LED 12 inch (300mm) Arrow Signal Modules

All shall be fully compliant to the “Omni-directional” specifications of the ITE VTCSH - LED Vehicle Arrow Traffic Signal Supplement adopted July 1, 2007. Additionally, prior to bid award, the manufacturer shall submit to purchaser, reports from ETL/Intertek that certify full compliance of all LED Arrow signal modules. These tests should include but not be limited to the luminous intensity measurements and requirements outlined in the ITE specification sections 6.4.4 through 6.4.4.4.2 (25°C and 74°C / 49°C). Evidence of full compliance to all required testing methods, procedures and sections as outlined in the above ITE document Attachment 1, “Design Qualification Testing Flow Chart” must be included without any exceptions, changes or omissions. The manufacturer must also submit a data sheet showing the catalog number of the items submitted on the bid and the Independent Lab report must show full qualification of this catalog number.

### All LED 16x18 Countdown Pedestrian Signal Modules

All shall be fully compliant to the ITE PTCSI Part-2: LED Pedestrian Traffic Signal Modules specifications adopted August 4, 2010 or the latest adopted version as listed on the ITE website at time of bid. Additionally, prior to bid award, the manufacturer shall submit to purchaser, reports from ETL/Intertek that certify full compliance of LED signal modules, to these specifications. Evidence of full compliance to all required testing methods, procedures and sections as outlined in the above ITE document Attachment 2, “Design Qualification Testing Flow Chart” must be included without any exceptions, changes or omissions. The manufacturer must also submit a data sheet showing the exact catalog number of the items submitted on the bid and the Independent Lab report must show full qualification of this catalog number. Combination hand/person pedestrian signal modules shall incorporate separate power supplies for the hand and the person icons.

In addition to, and in excess of the above applicable ITE specification compliance, the on-board circuitry of all LED traffic signal modules shall include voltage surge protection, to withstand high-repetition noise transients and low-repetition high-energy transients as stated in Section 2.1.8, NEMA Standard TS 2-2003. In addition, the module shall comply with the following standards: IEC 1000-4-5 at 3kV with a 2 ohm source impedance, ANSI/IEEE C62, 41-2002; IEC 61000-4-12 (6kV, 200A, 100kHz ring wave).

## Warranty

Manufacturer shall provide at time of bid, a written warranty which provides for repair or replacement of modules that fail to function as intended due to workmanship or material defects within the first 60 months from date of delivery. Modules which exhibit luminous intensities less than the minimum as specified in the ITE specifications as indicated above, within the first 60 months from date of delivery shall be replaced or repaired.



## Notes

CSA approved to the following applicable requirements:

- CSA Standard C22.2 No. 9.0-96 General Requirements for Luminaires
- CSA Std. No. C22.2 No. 250.0-04 Luminaires
- UL Std. No. 1598-2004 (May 2006) Luminaires

## Uniform Appearance LED Traffic Signal Modules

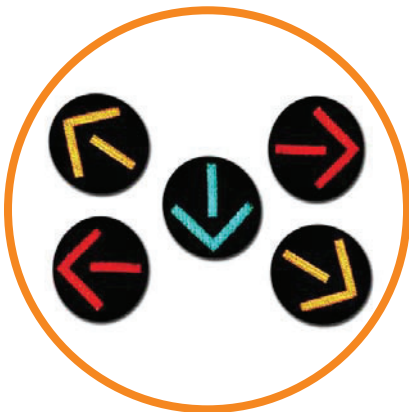


### Features & Benefits

- \*Fully compliant to ITE VTCSH-LED Circular Signal Supplement dated 6/27/2005
- Industry's lowest power for all colors
- Meets or exceeds ITE intensity, color & uniformity spec, including 49°C / 74°C requirements
- Temperature compensated power supplies for longer LED life
- Uniform appearance
- Expanded view radiation pattern suitable for span wire and steep grade applications
- Transient suppression exceeds ITE and NEMA specifications (Up to 6KV ring wave)
- Manufactured with anti-capillary wires
- Conformal coated power supply
- Secondary lens treatment for abrasion resistance
- Patent No. 7,281,818 and other patents pending
- Intertek/ETL certified and listed on ETL certification program
- All units operate at 80-135VAC RMS, 60+/-3Hz

Part Number	Color	Lens Type	Dominant Wavelength (nm)	Typical Wattage at 25°C	Peak Minimum Maintained Luminous Intensity (cd)	Size (in)	*Meets ITE Spec	CSA Approved
433-1110-003XL	Red	Tinted	625	7	165	8	•	•
433-1170-003XL	Red	Clear	625	7	165	8	•	•
433-3130-901XL	Yellow	Tinted	590	8	410	8	•	•
433-3170-901XL	Yellow	Clear	590	8	410	8	•	•
433-2120-001XL	Green	Tinted	500	7	215	8	•	•
433-2170-001XL	Green	Clear	500	7	215	8	•	•
433-1210-003XL	Red	Tinted	625	7	365	12	•	•
433-1270-003XL	Red	Clear	625	7	365	12	•	•
433-3230-901XL	Yellow	Tinted	590	9	910	12	•	•
433-3270-901XL	Yellow	Clear	590	9	910	12	•	•
433-2220-001XL	Green	Tinted	500	8	475	12	•	•
4332270-001XL	Green	Clear	500	8	475	12	•	•

## Omni-Directional Uniform Appearance LED Arrow



### Features & Benefits

- \*Fully compliant to ITE VTCSH-LED Vehicle Arrow Supplement dated 7/01/2007
- Allows for mounting in any orientation in the signal head
- Industry's lowest power for all colors
- Meets or exceeds ITE intensity, color & uniformity spec, including 49°C / 74°C requirements
- Temperature compensated power supplies for longer LED life
- Uniform appearance
- Transient suppression exceeds ITE and NEMA specifications (Up to 6KV ring wave)
- Manufactured with anti-capillary wires
- Conformal coated power supply
- Secondary lens treatment for abrasion resistance
- Intertek/ETL certified and listed on ETL certification program
- All units operate at 80-135VAC RMS, 60+/-3Hz

Part Number	Color	Lens Type	Dominant Wavelength (nm)	Typical Wattage at 25°C	Peak Minimum Maintained Luminous Intensity (cd)	*Meets ITE Spec	CSA Approved
432-1314-001XOD	Red	Tinted	628	6	56.8	•	•
432-1374-001XOD	Red	Clear	628	6	56.8	•	•
431-3334-901XOD	Yellow	Tinted	590	7	141.6	•	•
431-3374-901XOD	Yellow	Clear	590	7	141.6	•	•
432-2324-001XOD	Green	Tinted	500	6	73.9	•	•
432-2374-001XOD	Green	Clear	500	6	73.9	•	•

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 37  
Qty. 1  
NOTE: Please Specify Polycarbonate Or  
Aluminum Upon Order  
NOTE: Please Specify Cut Away or Tunnel  
Visor Upon Order

# 12-Inch Polycarbonate Signal

---

## What, exactly, is a signal?

A traffic signal is a signaling device that is positioned at road intersections, and other sites that control traffic. The signals are designed to ensure an orderly flow of traffic for vehicles, motorcycles, bicycles, and pedestrians by displaying colored lights in a sequence of phases. The colors signal the user to proceed (green), warn that a signal is changing to red (yellow) or prohibits any traffic from proceeding (red).

## Why do agencies use signals?

Traffic signals provide an opportunity for pedestrians or vehicles to safely cross an intersection from different directions. Traffic signals can also alleviate traffic capacity of an intersection or a given route which leads to lowering emissions from vehicles that are waiting in traffic.

## How do signals benefit the driving public?

Traffic signals increase the overall safety for all roadway users by reducing traffic collisions and providing efficient intersection operations. Traffic signals also provide a continuous movement of traffic at a defined speed along a given route which contributes to reducing commuting times.



## Housing

The housing of each section is a one-piece molded, ultraviolet, and heat-stabilized polycarbonate unit. Two integrally-cast hinge lugs and latch screws are cast on each side of the housing. Built upon a symmetrical concept, each housing is capable of providing either right or left-hand door openings. While the left hinge is standard, the right hinge must be specified. The top and bottom of the housing have openings to accommodate standard 1½-inch pipe brackets. Each signal section is rigidly attached, one above the other, by means of corrosion-resistant bolts and a washer attachment that allows sections to be rotated about a vertical axis. Alternate means for attaching sections together are available. The housing consists of four matching punch-out locations on the top and bottom of each section to allow sections to be bolted together with four 1½-inch and 10-32 corrosion-resistant screws.

The top and bottom of the signal housing have an integrally-cast Shurlock boss. The radial angular grooves of the Shurlock boss, when used with Shurlock fittings, provide positive five-degree increment positioning of the entire signal head to eliminate rotation or misalignment of the signal. Each housing has molded bosses for one five and one six-position terminal block. Each housing has provisions for easily adding a back-plate. Hinge pins, door latching hardware, visor back-plate, and lens clip screws are high-quality stainless steel.

## Housing Door

The housing door of each section is a one-piece molded ultraviolet and heat-stabilized polycarbonate unit. Two hinge lugs are molded into one side and two latch jaws are molded onto the other side. The door is attached to the housing by means of two stainless steel hinge pins. Two stainless steel "eye" bolts and wing nuts on one side of the door allow for opening and closing the signal door without the use of any special tools. A gasket groove on the inside of the door accommodates a weatherproof and mildew-proof resilient gasket which, when the door is closed, seals flat against the housing, creating a positive seal. The outer face of the door has four metal threaded inserts, equally spaced about the circumference of the lens opening, with four screws to accommodate the signal head visors. The door and visor overlap to prevent light escaping between visor and door.

## Basic Specifications

- **Dimensions** - 14 in. H x 15¼ in. W x 7¾ in. D
- **Weight, typical:**
  - Single Section: 3.4lbs
- **Standard Colors:**
  - Dark Olive Green (matches Federal Standard 595b-14056)
  - Yellow (matches Federal Standard 595b-13538)
  - Dull Black (matches Federal Standard 595b-37038)

## Terminal Block

Each complete signal face is provided with a terminal block. The terminal block is placed in the bottom section, unless otherwise specified. The terminal block for a standard three-section head is a five-position, ten-terminal, barrier-type strip. To one side of each "Fast-on" terminal strip is the attached AC common, red, yellow, and green signal section leads, leaving the opposite screw clamp terminal for field wires.

## Visors

Visors are tunnel, full-circle, or cap, and are a minimum of ten inches long. Visors are molded from ultraviolet and heat-stabilized polycarbonate and include attaching tabs to facilitate installation.





Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 37  
Qty. 1  
NOTE: Please Specify Polycarbonate Or  
Aluminum Upon Order  
NOTE: Please Specify Cut Away or Tunnel  
Visor Upon Order

## 12-Inch Aluminum Signal

---

### What, exactly, is a signal?

A traffic signal is a signaling device that is positioned at road intersections, and other sites that control traffic. The signals are designed to ensure an orderly flow of traffic for vehicles, motorcycles, bicycles, and pedestrians by displaying colored lights in a sequence of phases. The colors signal the user to proceed (green), warn that a signal is changing to red (yellow) or prohibits any traffic from proceeding (red).

### Why do agencies use signals?

Traffic signals provide an opportunity for pedestrians or vehicles to safely cross an intersection from different directions. Traffic signals can also alleviate traffic capacity of an intersection or a given route which leads to lowering emissions from vehicles that are waiting in traffic.

### How do signals benefit the driving public?

Traffic signals increase the overall safety for all roadway users by reducing traffic collisions and providing efficient intersection operations. Traffic signals also provide a continuous movement of traffic at a defined speed along a given route which contributes to reducing commuting times.



## Durable Housing

Housing and door assembly die castings were designed with the aid of a computer to deliver maximum strength with minimum weight for unmatched tolerance to wind loading and resistance to knock-down damage. Corrosion resistant aluminum alloy castings and stainless-steel hardware make the unit virtually immune to weathering.

## Corrosion Resistant Finishes

A 90,000V negative charge is applied to the paint to insure proper application to the aluminum components. The paint is then baked on and cured in Econolite's finishing department.

## Shurlock Boss

Radial angular grooves cast into the top and bottom of the signal head housing (along with Econolite Shurlock fittings) permit alignment adjustments in five-degree increments and hold the head firmly in place. Two attaching washers and three bolts make it easy to add sections. They also permit any section to be rotated independently about the vertical axis and hold each section securely in place to prevent misalignment.

## Terminal Block

One five-position terminal block with "Fast-On" tabs on one side and screw clamps on the other side is provided in a standard signal assembly. Mounting points for a second block are also present. Raised letters cast into the housing identify each position on the terminal block. Econolite offers multiple sizes and types of terminal blocks to meet agency requirements.

## Standard Colors:

- Dark Olive Green (matches Federal Standard 595b-14056)
- Yellow (matches Federal Standard 595b-13538)
- Dull Black (matches Federal Standard 595b-37038)

## Reversible Door Mounting

The door may be mounted on either side, permitting easy access to closely mounted signals. Two integrally-cast hinge lugs and latch screw slots are located on each side of the housing. Built upon a symmetrical concept, each housing is capable of providing either a right or left-hand door opening. While the left hinge is standard, the right hinge is optional and must be specified.

## Versatility

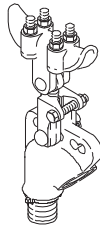
In addition to most other manufacturers' signals, the 8-inch section may be used vertically or horizontally as a single-section beacon or in combination with 12-inch sections. Flat-back housing simplifies mounting for special applications. A complete line of visors and back-plates are available.



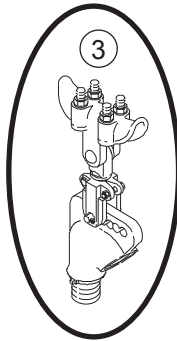
①



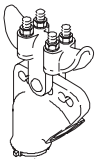
②



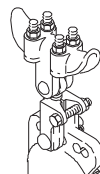
③



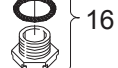
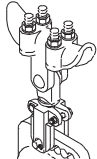
④



⑤



⑥



Color: Yellow

ITEM 1-6 OPTIONS

STAINLESS UPGRADE

PAINT

ITEM	DESCRIPTION	PART NO.
------	-------------	----------

SPAN WIRE HANGER ASSY:

①	Iron .....	SE-3070
②	Iron w/ Balance Adjuster .....	SE-3071
③	Iron w/ PAL Balance Adjuster .....	SE-3275
④	1-Way, Iron w/ Closure Kit .....	SE-3139
⑤	1-Way, Iron w/ Balance Adjuster .....	SE-3151
⑥	1-Way, Iron w/ PAL Balance Adjuster .....	SE-3277

UPPER & LOWER ARM ASSY:

⑦	2-Way, 16½" CTC, Iron .....	SE-3154
⑧	3-Way, 16½" CTC, Iron .....	SE-3156
⑨	4-Way, 16" CTC, Iron .....	SE-3158

UPPER ARM ASSY:

10	2-Way, 16½" CTC, Iron .....	SE-3153
11	3-Way, 16½" CTC, Iron .....	SE-3155
12	4-Way, 16½" CTC, Iron .....	SE-3157

LOWER ARM ASSY:

13	2-Way, 16½" CTC, Steel .....	SE-3022
14	3-Way, 16½" CTC, Steel .....	SE-3024
15	4-Way, 16½" CTC, Steel .....	SE-3026
16	UPPER ASSY KIT, Iron .....	SE-3150

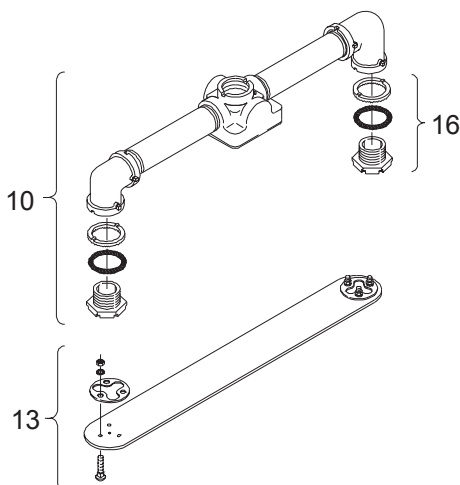
Notes:

1. All assemblies are supplied standard with stainless steel fasteners and galvanized hardware on span wire clamps. Stainless upgrade shall include stainless steel hardware on span wire clamps.
2. Please specify options when ordering.

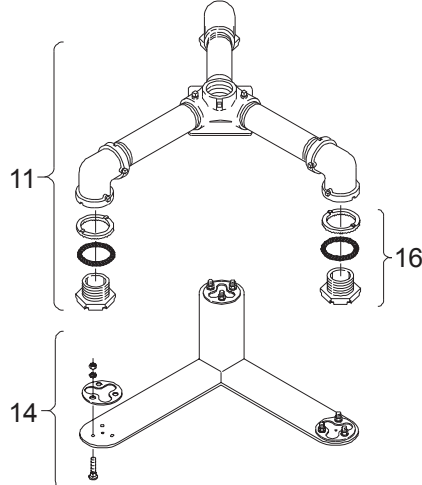
ITEM 7-9 OPTIONS

PAINT

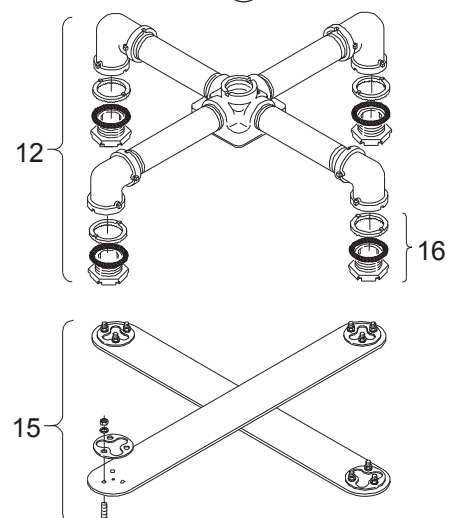
⑦

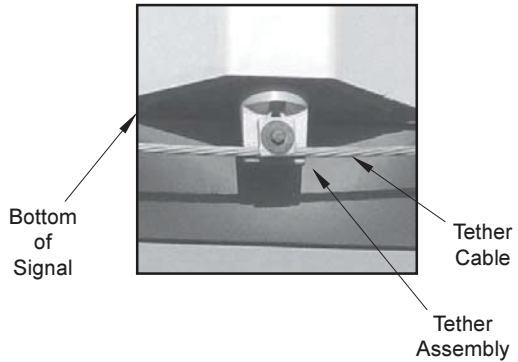


⑧



⑨





ITEM	DESCRIPTION	PART NO.
------	-------------	----------

**TETHER ASSEMBLY:**

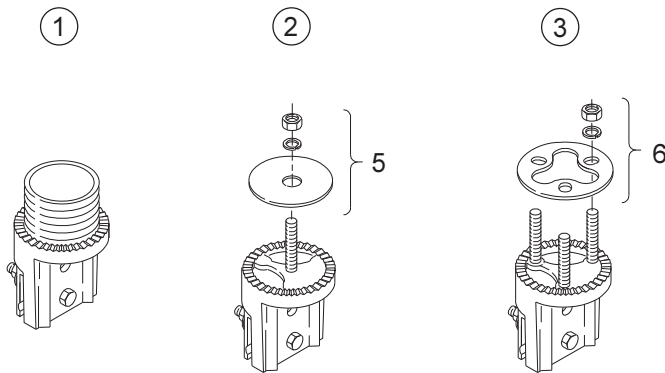
①	1½" Break-Away, Alum .....	SE-5121
②	Single-Stud Break-Away, Alum .....	SE-5058
③	Tri-Stud Break-Away, Alum .....	SE-5050
④	Break-Away Tether Assy, 1½" Pipe, Steel .....	SE-3055

**HARDWARE KIT:**

5	Single Stud, 5/16" .....	SE-5064
6	Tri-Stud w/o Gasket, 5/16 .....	SE-5035

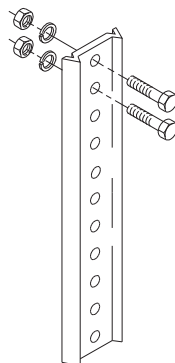
**Notes:**

1. All assemblies are supplied standard with stainless steel fasteners.
2. Please specify options when ordering.

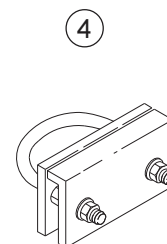


**COLOR: YELLOW**

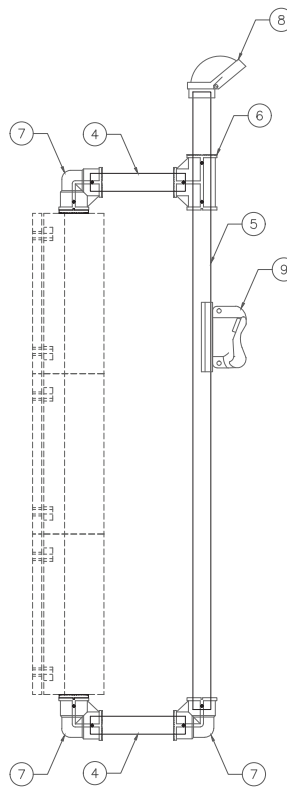
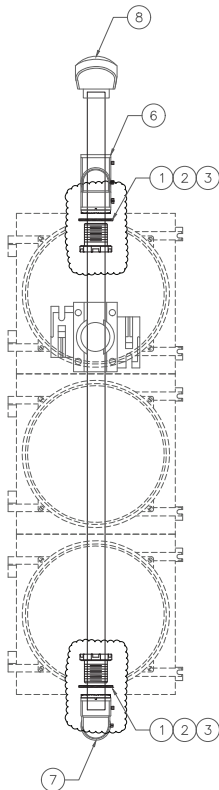
ITEM 1-3 OPTIONS
EXTENDER: 11", 19" or 72"
PAINT



Extender  
Option



OPTIONS
PAINT



BILL OF MATERIAL		
ITEM	QTY.	DESCRIPTION
1	2	NEOPRENE GASKET, 1-1/2"
2	2	SERRATED LOCKING RING
3	2	HEX CAST COLLARED NIPPLE, IRON
4	2	PIPE NIPPLE, 1.5"x8" IRON, PAINTED
5	1	PIPE NIPPLE, 1.5"x52", IRON, PAINTED
6	1	HORIZONTAL SLIP TEE, 1-1/2", IRON
7	3	SERRATED ELBOW, IRON YELLOW
8	1	BRIDGEPORT #1205 SVC ENT
9	1	CLAMP KIT, GALAXY SERIES W/96"
		PART NUMBER
		VSE-0354
		VSE-0360
		VSE-0435
		VSE-0469-08Y
		VSE-0469-52Y
		VSE-4092Y-SBE
		VSE-4415Y
		GR1205
		VOAB3055Y-96

Traffic Signal Parts & Equipment  
 CRFQ 0803 DOT2300000151  
 B/R# 37  
 Qty. 1  
 NOTE: Please Specify Type of Mounting  
 Hardware Upon Order



#### CONFIDENTIALITY AGREEMENT

All users of this document agree to respect and keep confidential all proprietary information pertaining to Path Master, Inc. and its customers. Any duplication or transmission of this entire document or any part thereof, without written consent of Path Master, Inc. is strictly prohibited.

TITLE		
SIGNAL MTG ASSY, 3-12" 1-W RIGID MA YELLOW IRON		
DRAWN BY	SJM	APPROVED BY
DATE	5-2-19	DATE
REFERENCE		CAD VSIG-6009-03Y
		SCALE 1"=8"
		DRAWING No. DB-1072

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 38  
Qty. 1  
NOTE: Please Specify Polycarbonate Or  
Aluminum Upon Order  
NOTE: Please Specify Cut Away or Tunnel  
Visor Upon Order

# 12-Inch Polycarbonate Signal

---

## What, exactly, is a signal?

A traffic signal is a signaling device that is positioned at road intersections, and other sites that control traffic. The signals are designed to ensure an orderly flow of traffic for vehicles, motorcycles, bicycles, and pedestrians by displaying colored lights in a sequence of phases. The colors signal the user to proceed (green), warn that a signal is changing to red (yellow) or prohibits any traffic from proceeding (red).

## Why do agencies use signals?

Traffic signals provide an opportunity for pedestrians or vehicles to safely cross an intersection from different directions. Traffic signals can also alleviate traffic capacity of an intersection or a given route which leads to lowering emissions from vehicles that are waiting in traffic.

## How do signals benefit the driving public?

Traffic signals increase the overall safety for all roadway users by reducing traffic collisions and providing efficient intersection operations. Traffic signals also provide a continuous movement of traffic at a defined speed along a given route which contributes to reducing commuting times.





## Housing

The housing of each section is a one-piece molded, ultraviolet, and heat-stabilized polycarbonate unit. Two integrally-cast hinge lugs and latch screws are cast on each side of the housing. Built upon a symmetrical concept, each housing is capable of providing either right or left-hand door openings. While the left hinge is standard, the right hinge must be specified. The top and bottom of the housing have openings to accommodate standard 1½-inch pipe brackets. Each signal section is rigidly attached, one above the other, by means of corrosion-resistant bolts and a washer attachment that allows sections to be rotated about a vertical axis. Alternate means for attaching sections together are available. The housing consists of four matching punch-out locations on the top and bottom of each section to allow sections to be bolted together with four 1½-inch and 10-32 corrosion-resistant screws.

The top and bottom of the signal housing have an integrally-cast Shurlock boss. The radial angular grooves of the Shurlock boss, when used with Shurlock fittings, provide positive five-degree increment positioning of the entire signal head to eliminate rotation or misalignment of the signal. Each housing has molded bosses for one five and one six-position terminal block. Each housing has provisions for easily adding a back-plate. Hinge pins, door latching hardware, visor back-plate, and lens clip screws are high-quality stainless steel.

## Housing Door

The housing door of each section is a one-piece molded ultraviolet and heat-stabilized polycarbonate unit. Two hinge lugs are molded into one side and two latch jaws are molded onto the other side. The door is attached to the housing by means of two stainless steel hinge pins. Two stainless steel "eye" bolts and wing nuts on one side of the door allow for opening and closing the signal door without the use of any special tools. A gasket groove on the inside of the door accommodates a weatherproof and mildew-proof resilient gasket which, when the door is closed, seals flat against the housing, creating a positive seal. The outer face of the door has four metal threaded inserts, equally spaced about the circumference of the lens opening, with four screws to accommodate the signal head visors. The door and visor overlap to prevent light escaping between visor and door.

## Basic Specifications

- **Dimensions** - 14 in. H x 15¼ in. W x 7¾ in. D
- **Weight, typical:**
  - Single Section: 3.4lbs
- **Standard Colors:**
  - Dark Olive Green (matches Federal Standard 595b-14056)
  - Yellow (matches Federal Standard 595b-13538)
  - Dull Black (matches Federal Standard 595b-37038)

## Terminal Block

Each complete signal face is provided with a terminal block. The terminal block is placed in the bottom section, unless otherwise specified. The terminal block for a standard three-section head is a five-position, ten-terminal, barrier-type strip. To one side of each "Fast-on" terminal strip is the attached AC common, red, yellow, and green signal section leads, leaving the opposite screw clamp terminal for field wires.

## Visors

Visors are tunnel, full-circle, or cap, and are a minimum of ten inches long. Visors are molded from ultraviolet and heat-stabilized polycarbonate and include attaching tabs to facilitate installation.



Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 38  
Qty. 1  
NOTE: Please Specify Polycarbonate Or  
Aluminum Upon Order  
NOTE: Please Specify Cut Away or Tunnel  
Visor Upon Order

## 12-Inch Aluminum Signal

---

### What, exactly, is a signal?

A traffic signal is a signaling device that is positioned at road intersections, and other sites that control traffic. The signals are designed to ensure an orderly flow of traffic for vehicles, motorcycles, bicycles, and pedestrians by displaying colored lights in a sequence of phases. The colors signal the user to proceed (green), warn that a signal is changing to red (yellow) or prohibits any traffic from proceeding (red).

### Why do agencies use signals?

Traffic signals provide an opportunity for pedestrians or vehicles to safely cross an intersection from different directions. Traffic signals can also alleviate traffic capacity of an intersection or a given route which leads to lowering emissions from vehicles that are waiting in traffic.

### How do signals benefit the driving public?

Traffic signals increase the overall safety for all roadway users by reducing traffic collisions and providing efficient intersection operations. Traffic signals also provide a continuous movement of traffic at a defined speed along a given route which contributes to reducing commuting times.



## Durable Housing

Housing and door assembly die castings were designed with the aid of a computer to deliver maximum strength with minimum weight for unmatched tolerance to wind loading and resistance to knock-down damage. Corrosion resistant aluminum alloy castings and stainless-steel hardware make the unit virtually immune to weathering.

## Corrosion Resistant Finishes

A 90,000V negative charge is applied to the paint to insure proper application to the aluminum components. The paint is then baked on and cured in Econolite's finishing department.

## Shurlock Boss

Radial angular grooves cast into the top and bottom of the signal head housing (along with Econolite Shurlock fittings) permit alignment adjustments in five-degree increments and hold the head firmly in place. Two attaching washers and three bolts make it easy to add sections. They also permit any section to be rotated independently about the vertical axis and hold each section securely in place to prevent misalignment.

## Terminal Block

One five-position terminal block with "Fast-On" tabs on one side and screw clamps on the other side is provided in a standard signal assembly. Mounting points for a second block are also present. Raised letters cast into the housing identify each position on the terminal block. Econolite offers multiple sizes and types of terminal blocks to meet agency requirements.

## Standard Colors:

- Dark Olive Green (matches Federal Standard 595b-14056)
- Yellow (matches Federal Standard 595b-13538)
- Dull Black (matches Federal Standard 595b-37038)

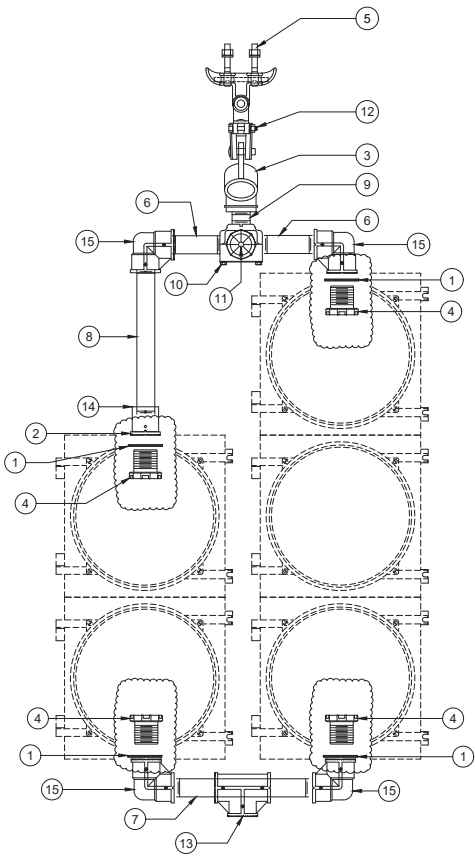
## Reversible Door Mounting

The door may be mounted on either side, permitting easy access to closely mounted signals. Two integrally-cast hinge lugs and latch screw slots are located on each side of the housing. Built upon a symmetrical concept, each housing is capable of providing either a right or left-hand door opening. While the left hinge is standard, the right hinge is optional and must be specified.

## Versatility

In addition to most other manufacturers' signals, the 8-inch section may be used vertically or horizontally as a single-section beacon or in combination with 12-inch sections. Flat-back housing simplifies mounting for special applications. A complete line of visors and back-plates are available.





**BILL OF MATERIAL**

ITEM	QTY	DESCRIPTION	CATALOG
1	4	NEOPRENE, GASKET	VSE-0354
2	1	SERRATED LOCKING RING	VSE-0360
3	1	WIRE OUTLET BODY, IRON,	VSE-0373*
4	4	HEX CAST COLLARED NIPPLE, IRON	VSE-0435
5	1	SPAN WIRE CLAMP, IRON W/"J" BOLTS	VSE-0441
6	2	PIPE NIPPLE, 1.5"x6" IRON PAINTED	VSE-0469-06*
7	1	PIPE NIPPLE, 1.5"x 13" IRON, PAINTED	VSE-0469-13*
8	1	PIPE NIPPLE, 1.5"x 14" IRON, PAINTED	VSE-0469-14*
9	1	NIPPLE, ALL THREAD, 1.5"x 3" STEEL,ZINC	VSE-0492-03
10	1	CENTER SUPPORT, FOUR WAY, IRON, PAINTED	VSE-0496*
11	2	LONG ROSETTE, POLY	VSE-0499*
12	1	BALANCE ADJUSTER, 1/2" SLOT, 1/2" EYE	VSE-3219
13	1	HORIZONTAL SLIP TEE, 1 1/2" IRON	VSE-4092*-SBE
14	1	NOTCHED COUPLING, 1-1/2" NPS x 2" STEEL	VSE-4170*
15	4	SERRATED ELBOW, IRON,	VSE-4415*

NS= NOT SHOWN

COLOR DETAIL	
REPLACE "X" IN PART NUMBER WITH COLOR LISTED BELOW	COLOR
COLOR CODE	COLOR
7	YELLOW
8	BLACK
9	BROWN
10	GREEN
11	GREEN
12	EASTON BLUE
13	EASTON BLUE
14	EASTON BLUE
15	NEW ALBANY GREEN
16	CHRYSLER GREEN
17	IND. GREEN
18	URBANA GREEN

COLOR: YELLOW

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 38  
Qty. 1  
NOTE: Please Specify Type of Mounting  
Hardware Upon Order

**CONFIDENTIALITY AGREEMENT**

All users of this document agree to respect and keep confidential all proprietary information pertaining to Path Master, Inc. and its customers. Any duplication or transmission of this entire document or any part thereof, without written consent of Path Master, Inc. is strictly prohibited.



TITLE		
KIT, 1-W SPAN WIRE CLUSTER, WDOH FOR TETHER, IRON PIPE		
DRAWN BY	SJM	APPROVED BY
DATE	11-12-20	DATE
REFERENCE		SCALE
		1"=8"
		DRAWING No. DB-1105

# Signal Accessories

Pelco supplies various accessories for span wire mounted signs and signals. See section T14 for additional components.



Lower Arm Assy, 2-Way, 16-1/2" CTC, Steel

SE-3162 -  Coating  
P\_\_=Paint



Lower Arm Assy, 3-Way, 16-1/2" CTC, Steel

SE-3163 -  Coating  
P\_\_=Paint



Lower Arm Assy, 4-Way, 16-1/2" CTC, Steel

SE-3164 -  Coating  
P\_\_=Paint



Tether Assembly, Break-Away, 1-1/2" Pipe, Steel

SE-3055 -  Coating  
ZN1=Zinc1 Plated  
P\_\_=Paint



Tether Assembly, Extended Bottom, Alum

SE-3307 -  Length -  Coating  
6=6" PNC=Process No Color  
18=18" P\_\_=Paint  
28=28"



Tether Assembly, Non-Break-Away, Alum

SE-3293 -  Coating  
PNC=Process No Color  
P\_\_=Paint



Tether Assembly, 1-1/2" Break-Away, Alum

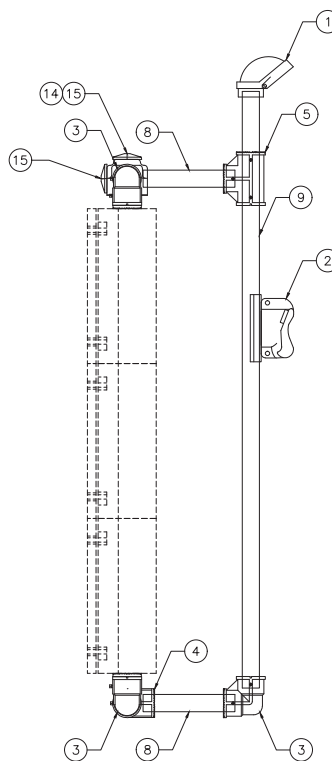
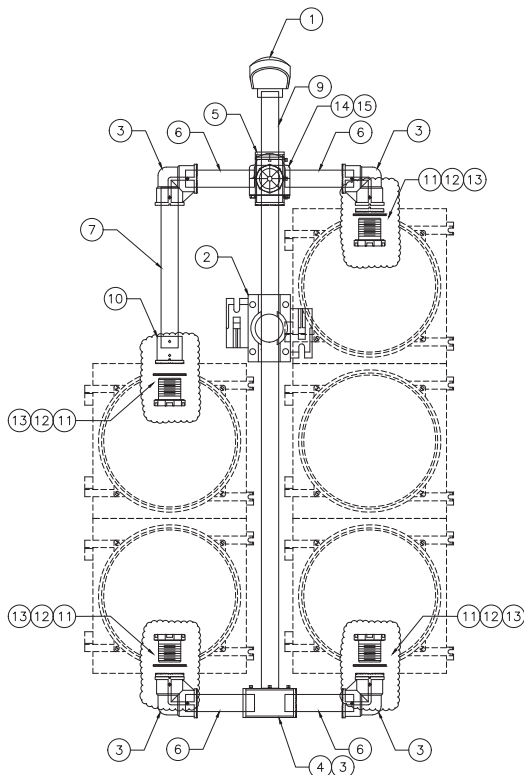
SE-5121 -  Extender -  Coating  
Blank=No Extender PNC=Process No Color  
11=11" P\_\_=Paint  
19=19"  
72=72"

COLOR: YELLOW



Note:  
Available with or  
without Extender Bar.

Note: 1. All assemblies are supplied standard with stainless steel fasteners.  
2. See Reference Section for available paint colors.



BILL OF MATERIAL			
ITEM	QTY.	DESCRIPTION	PART NUMBER
1	1	BRIDGEPORT #1205 SVC ENT	GR1205
2	1	CLAMP KIT, GALAXY SERIES W/96"	VOAB3055Y-96
3	5	SERRATED ELBOW, IRON YELLOW	VSE-4415Y
4	1	PIPE TEE, 1-1/2" IRON, PAINTED	VSE-4092Y
5	1	HORIZONTAL SLIP TEE, 1-1/2", IRON	VSE-4092Y-SBE
6	4	PIPE NIPPLE, 1.5"x6" IRON, PAINTED	VSE-0469-06Y
7	1	PIPE NIPPLE, 1.5"x14" IRON	VSE-0469-14Y
8	2	PIPE NIPPLE, 1.5"x8" IRON, PAINTED	VSE-0469-08Y
9	1	PIPE NIPPLE, 1.5"x52", IRON, PAINTED	VSE-0469-52Y
10	1	NOTCHED COUPLING, 1-1/2"x2"	VSE-4170Y
11	4	SERRATED LOCKING RING	VSE-0360
12	4	NEOPRENE GASKET, 1-1/2"	VSE-0354
13	4	HEX CAST COLLARED NIPPLE, IRON	VSE-0435
14	1	CENTER SUPPORT, FOUR WAY	VSE-0496Y
15	2	LONG ROSETTE, POLY YELLOW	VSE-0499Y

COLOR: YELLOW

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 38  
Qty. 1  
NOTE: Please Specify Type of Mounting  
Hardware Upon Order



#### CONFIDENTIALITY AGREEMENT

All users of this document agree to respect and keep confidential all proprietary information pertaining to Path Master, Inc. and its customers. Any duplication or transmission of this entire document or any part thereof, without written consent of Path Master, Inc. is strictly prohibited.

TITLE KIT, 1-W 5-SEC CLUSTER, WDOH FOR RIGID MOUNT, IRON PIPE			
DRAWN BY SJM	APPROVED BY —	CAD VSI6-6355Y-WVRM	
DATE 5-2-19	DATE —	SCALE 1"=8"	
REFERENCE PMI P/N: VSI6-6355Y-WVRM			DRAWING No. DB-1071



# 16-Inch LED Aluminum Pedestrian Signal

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 39  
Qty. 30  
Black Housing

▷ ▷ All Econolite signals are designed to meet or exceed the Institute of Transportation Engineers (ITE) standards.

## About Signals

Traffic and pedestrian signals represent the foundation of safety at any signalized intersection. They also represent the first, and arguably the most important, interaction motorists, bicyclists and pedestrians have with Intelligent Transportation Systems (ITS).

For more than eight decades, Econolite has led the industry in both innovation and breadth of traffic and pedestrian signal solutions for virtually every application, helping transportation agencies and Metropolitan Planning Organizations (MPOs) efficiently and cost-effectively meet evolving traffic management programs.

Econolite also leads the way in ultra-bright LED (Light Emitting Diode) technology's use in traffic signal applications. More visible than traditional incandescent bulbs, LED signals increase overall safety for all roadway users. In addition, since LEDs are longer-lasting and require significantly less energy than their incandescent counterparts, which yields significant budgetary savings.

### At A Glance

- ▷ Slim profile, allowing for 5% less weight than the alternatives
- ▷ Mounts left or right with use of the side mount bracket
- ▷ Reduced energy consumption - up to 90% less energy consumption than pedestrian signals with incandescent lamps
- ▷ Meets or exceeds applicable Institute of Transportation Engineers (ITE) specification
- ▷ Outlasts neon and incandescent lighting
- ▷ No LED "Hot Spots"



## LED Specifications

- Voltage Range 80V to 135V AC; normal 120V AC (less than 10% variation in intensity)
- Power: Maximum 15W Hand; maximum 10W Pedestrian
- Operating Temperature: -40°C to +74°C
- Storage Temperature: -40°C to +93°C
- Power Factor Correction: >0.90
- Total Harmonic Distortion: <20%
- Dimensions: 18 in. x 16 in. x 4.5 in.
- Fuse and transient suppressor incorporated for line and load protection
- LEDs interconnected to minimize effect of LED string failure
- Meets or exceeds NEMA Moisture Resistance STD 250-1991 for Type-4 enclosures (ITE 6.4.6.2 Moisture Resistance)

## Basic Specifications

### ► Overall Dimension

- 18" W x 16.5" H x 5" D (457 x 419 x 178 mm)

### ► Weight

- The weight of the signal, excluding mounting hardware, is 23 pounds, maximum.

## Field Terminal Assembly

The field terminal assembly includes a three-terminal pair (six-screw) type terminal block for termination of the three field wires for AC (+) for the HAND display, AC (+) for the PEDESTRIAN display, and AC (-). Connected to the opposite side of these terminals is a pigtail lead. The free end of each lead is terminated with an insulated female quick-disconnect socket that mates with the male lug, supplied on the message module. The field terminal assembly includes an aluminum base or back-plate that is bolted to the signal housing.

Messages are displayed in the Portland Orange "HAND" and the Lunar White "PEDESTRIAN", illuminated by multiple configuration Light-Emitting Diodes. The "HAND" and "PEDESTRIAN" symbols are each a minimum of 12 inches in height and seven inches in width and are configured as shown in the Manual on Uniform Traffic Control Devices (MUTCD).

## LED Option

The LED module is a fully-encapsulated LED HAND/PEDESTRIAN module. The LED PC board is enclosed in a plastic module and is mounted to be impervious to shocks generated during shipping, handling, and installation. In order to facilitate installation and maintenance, the signal is designed so that the LED message module is removable and the field wiring terminals are readily accessible from the front by merely opening the signal door. The rear of the tray provides three male quick-disconnect lugs for connection of AC (+) for the HAND display, AC (+) for the PEDESTRIAN display, and AC (-). The tray is sealed with a 1/8-inch (3 mm) clear, UV-stabilized, refraction-type, 3/16-inch polycarbonate lens which is weather, craze, and heat resistant. The module is further sealed with a one-piece Ethylene Propylene Diene Monomer (EPDM) neoprene gasket fitted around the perimeter to provide positive protection of the enclosed LEDs and electronics from handling, weather, and moisture. Removal and insertion of the module does not require the use of tools.

## Solar Screen Visor Option

The Solar Screen visor option is designed to eliminate sun phantom and minimize damage to the LED signal module.

The Solar Screen visor is installed parallel to the face of the "HAND/PEDESTRIAN" symbol. The Solar Screen visor assembly is held in place by the use of stainless steel screws.

The Solar Screen assembly consists of a minimum of 20 straight horizontal louvers and 21 zigzag pattern horizontal louvers.

## Warranty

The entire pedestrian signal, including LEDs, solid-state control, and polycarbonate parts, are warranted for one year from the date of original shipment against defects in workmanship and/or materials.



# .....Dialight

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 39  
Qty. 30



## ITE Compliant LED Signal Modules



# ITE Compliant LED Traffic Signal

## Module Performance Specifications

### All LED Ball Signal Modules - 8 inch (200mm) and 12 inch (300mm)

All shall be fully compliant to the ITE VTCSH LED Circular Supplement specifications dated and adopted June 27, 2005. Compliance to the ITE VTCSH-2 Interim Purchase Specification is not sufficient, and will not substitute for compliance to the ITE VTCSH LED Circular Supplement specifications. Additionally, prior to bid award, the manufacturer shall submit to purchaser, reports from ETL/Intertek, that certify full compliance of all LED ball signal modules to the entire ITE specification. These tests should include but not be limited to the luminous intensity measurements and requirements outlined in the ITE specification sections 6.4.4 through 6.4.4.4.2 (25°C and 74°C / 49°C). Evidence of full compliance to all required testing methods, procedures and sections as outlined in the above ITE document Figure 2, Design Qualification Testing Flow Chart must be included without any exceptions, changes or omissions. The manufacturer must also submit a datasheet showing the catalog number of the items submitted on the bid and the Independent Lab report must show full qualification of this catalog number.

### All LED 12 inch (300mm) Arrow Signal Modules

All shall be fully compliant to the “Omni-directional” specifications of the ITE VTCSH - LED Vehicle Arrow Traffic Signal Supplement adopted July 1, 2007. Additionally, prior to bid award, the manufacturer shall submit to purchaser, reports from ETL/Intertek that certify full compliance of all LED Arrow signal modules. These tests should include but not be limited to the luminous intensity measurements and requirements outlined in the ITE specification sections 6.4.4 through 6.4.4.4.2 (25°C and 74°C / 49°C). Evidence of full compliance to all required testing methods, procedures and sections as outlined in the above ITE document Attachment 1, “Design Qualification Testing Flow Chart” must be included without any exceptions, changes or omissions. The manufacturer must also submit a data sheet showing the catalog number of the items submitted on the bid and the Independent Lab report must show full qualification of this catalog number.

### All LED 16x18 Countdown Pedestrian Signal Modules

All shall be fully compliant to the ITE PTCSI Part-2: LED Pedestrian Traffic Signal Modules specifications adopted August 4, 2010 or the latest adopted version as listed on the ITE website at time of bid. Additionally, prior to bid award, the manufacturer shall submit to purchaser, reports from ETL/Intertek that certify full compliance of LED signal modules, to these specifications. Evidence of full compliance to all required testing methods, procedures and sections as outlined in the above ITE document Attachment 2, “Design Qualification Testing Flow Chart” must be included without any exceptions, changes or omissions. The manufacturer must also submit a data sheet showing the exact catalog number of the items submitted on the bid and the Independent Lab report must show full qualification of this catalog number. Combination hand/person pedestrian signal modules shall incorporate separate power supplies for the hand and the person icons.

In addition to, and in excess of the above applicable ITE specification compliance, the on-board circuitry of all LED traffic signal modules shall include voltage surge protection, to withstand high-repetition noise transients and low-repetition high-energy transients as stated in Section 2.1.8, NEMA Standard TS 2-2003. In addition, the module shall comply with the following standards: IEC 1000-4-5 at 3kV with a 2 ohm source impedance, ANSI/IEEE C62, 41-2002; IEC 61000-4-12 (6kV, 200A, 100kHz ring wave).

## Warranty

Manufacturer shall provide at time of bid, a written warranty which provides for repair or replacement of modules that fail to function as intended due to workmanship or material defects within the first 60 months from date of delivery. Modules which exhibit luminous intensities less than the minimum as specified in the ITE specifications as indicated above, within the first 60 months from date of delivery shall be replaced or repaired.



## Notes

CSA approved to the following applicable requirements:

- CSA Standard C22.2 No. 9.0-96 General Requirements for Luminaires
- CSA Std. No. C22.2 No. 250.0-04 Luminaires
- UL Std. No. 1598-2004 (May 2006) Luminaires

## Uniform Appearance Hand & Person Pedestrian Signals



### Features & Benefits

- \*Fully compliant to ITE PTCSI Part 2 LED Pedestrian Traffic Signal Module Specification dated 3/09/2004
- Meets or exceeds ITE uniformity ration of not more than 1 to 5 between the max and the min luminance values as measured in (.5") dia spots
- Manufactured with anti-capillary wires
- Conformal coated power supply
- Fuse and transient suppressor incorporated for superior line and load protection
- Independent dedicated power supplies for added safety and reliability
- Intertek/ETL certified and listed on ETL certification program
- Transient suppression exceeds ITE and NEMA specifications (Up to 6KV ring wave)
- All units operate at 80-135VAC RMS, 60+/-3Hz

Part Number	Size	Description	Typical Wattage at 25°C		Min. Luminance (cd/m2)		*Meets ITE Spec	CSA Approved
			Hand	Person	Hand	Person		
430-6450-001X	16 x 18	Side-by-side Hand and Person	9	7	1,400	2,200	•	•
430-6472-001X	16 x 18	Overlay Hand and Person	11	7	1,400	2,200	•	•
430-5770-001X	12 x 12	Hand Only	8	N/A	1,400	N/A	•	•
430-7771-001X	12 x 12	Person Only	N/A	6	N/A	2,200	•	•
430-6772-001X	12 x 12	Overlay Hand and Person	8	10	1,400	2,200	•	•

## Uniform Appearance Countdown Pedestrian Signals



### Features & Benefits

- \*Fully compliant to ITE PTCSI Part 2 LED Pedestrian Traffic Signal Module Specification dated 8/04/2010
- MUTCD compliant for countdown applications
- Full preemption compatibility
- Up to 8 units can be connected in parallel without affecting the monitoring of the Hand/Person
- Manufactured with anti-capillary wires
- Three (3) independent dedicated power supplies for added safety and reliability
- Intertek/ETL certified and listed on ETL certification program
- Reduced off state icon visibility results in increased pedestrian safety by eliminating the potential to misinterpret the signal
- Conformal coated power supply
- New improved one piece housing design
- Improved optical design to provide superior uniform appearance of the icons
- Transient suppression exceeds ITE and NEMA specifications (Up to 6KV ring wave)
- All units operate at 80-135V AC RMS, 60+/-3Hz

Part Number	Housing Size	Symbol Color			Typical Wattage at 25°C			Min. Luminance (cd/m2)			*Meets ITE Spec	CSA Approved
		Countdown	Hand	Person	Countdown	Hand	Person	Countdown	Hand	Person		
430-6479-001X	16 x 18	Portland Orange	Portland Orange	Lunar White	8	11	10	1,400	1,400	2,200	•	•
430-7773-001X	12 x 12	Portland Orange	N/A	N/A	5	N/A	N/A	1,400	N/A	N/A	•	•

## IntelliCross APS

The IntelliCross APS is the state-of-the-art solution for solving traffic challenges. The IntelliCross turns a pre-timed pedestrian into a fully actuated intersection. Pre-loaded or custom audio messages with remote or local configuration access are only two of the many key features of Pelco's intelligent pedestrian system. Contact Pelco for additional information.

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 40  
Qty. 30  
**NOTE: Advise Sign Type Upon Order**



### APS Assy, IntelliCross w/ Single Arrow, for 5" x 7-3/4" Sign, Alum

SE-2900 -  Coating  
PNC=Process No Color  
P\_\_=Paint

### APS Assy, IntelliCross w/ Single Arrow, Custom Configured for 5" x 7-3/4" Sign, Alum

SE-2901 -  Buttons per Intersection -  Coating  
2=2 Buttons  
4=4 Buttons  
6=6 Buttons  
8=8 Buttons  
PNC=Process No Color  
P\_\_=Paint  
**COLOR: YELLOW**

Note:  
PIM - Power Interface Module included.  
Pedestrian signs, sign adapters, and double arrow kits sold separately.



### CIU, Communication Interface Unit, Compact for APS IntelliCross Button

SE-6172-PNC

Note:  
CUI is optional. Only required for advanced features.

- Note: 1. All assemblies are supplied standard with stainless steel fasteners.  
2. For pedestrian signs available refer to pages T8-27 through T8-29.  
3. See Reference Section page v for available paint colors.





# IntelliCross APS

The IntelliCross APS is the state-of-the-art solution for solving pedestrian traffic challenges. The IntelliCross turns a pre-timed pedestrian intersection into a fully actuated intersection. Pre-loaded or custom audio messages with remote or local configuration access are only two of the many key features of Pelco's intelligent pedestrian system. Contact Pelco for additional information.

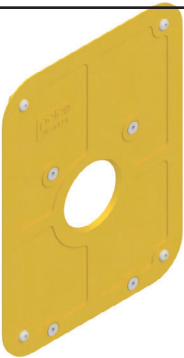
Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 40  
Qty. 30



## Adapter Assy, 9" x 15", w/ Hardware IntelliCross, Alum

SE-2174 -  Coating  
PNC=Process No Color  
P\_\_=Paint

COLOR; YELLOW



## Adapter Assy, 9" x 12", w/ Hardware IntelliCross, Alum

SE-2171 -  Coating  
PNC=Process No Color  
P\_\_=Paint



## Adapter Assy, 9" x 3", w/ Hardware IntelliCross, Alum

SE-2175 -  Coating  
PNC=Process No Color  
P\_\_=Paint



## Arrow, Double for APS IntelliCross Push Button, w/ Hardware, Alum

SE-6170-2 -  Coating  
P\_\_=Paint

Note: 1. All assemblies are supplied standard with stainless steel fasteners.  
2. See Reference Section page v for available paint colors.





# PS-250

## Heavy Duty Cabinet Power Supply

The ideal power source when using high current devices such as video detection cards.

The PS-250 Cabinet Power Supply is a shelf mounted unit which supplies regulated DC power, unregulated AC power, and a line frequency reference for the Detector Rack, BIUs, load switches, and other auxiliary equipment. The PS-250 meets and/or exceeds all requirements of the NEMA TS2-2003 (R2008) Standard.

All TS-2 Type 1 cabinet assemblies require the use of this unit as well as any TS-2 Type 2 cabinet assemblies that utilize Bus Interface Units (BIU).

Each EDI PS-250 Cabinet Power Supply is put through a rigorous three part Total Quality Assurance program and tested under the extreme environmental conditions experienced on the street. It is this commitment to quality and performance that EDI products are known for, providing years of trouble free operation.

## PS-250 OPERATIONAL FEATURES

**Basic Functions:** The PS-250 provides four outputs rated over the full -30°F to 165°F (-34°C to +74°C) Nema operating temperature range:

- ☒ +12 VDC rated at 5 Amps
- ☒ +24 VDC rated at 3 Amps
- ☒ 12 VAC rated at 0.25 Amps
- ☒ 60 Hz Line Frequency Reference rated at 50 mAmps
- ☒ Input Voltage Operating Range is 89 Vac to 135 Vac at 50/60 Hz
- ☒ Power Factor Corrected

**Display Indicators:** A separate LED indicator is provided to display output status and fuse integrity for the four supply outputs. The Line Frequency Reference LED indicator pulses to show 60 Hz activity.

Input / Output Pins:	Pin	Function
	A	AC Neutral
	B	Line Frequency Reference Output
	C	AC Line Input
	D	+12 VDC Output
	E	+24 VDC Output
	F	Reserved
	G	Logic Ground
	H	Earth Ground
	I	12 VAC Output
	J	Reserved

**Test Points:** Individual test jacks are provided for the +12 VDC output, +24 VDC output, and Logic Ground reference.

**Output Protection:** The +12 VDC, +24VDC, and 12 VAC outputs are fused for over-current protection. Each output is protected against voltage transients by a 1500 Watt suppressor.

**Dimensions:** **Compact Size:** 6.0 inches High x 4.0 inches Wide x 8.4 inches Deep

EBERLE DESIGN INC.

3510 East Atlanta Avenue  
Phoenix, AZ 85040 USA  
www.EDIttraffic.com

Tel (480) 968-6407  
Fax (602) 437-1996



# Model TR-200

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 44  
Qty. 20



## FLASH TRANSFER RELAY



- Operating voltage range: 89 to 135 VAC RMS  
47 to 63 Hz
- Operating temperature range: -40° to +180° F  
(-40° to 82° C)
- Operating humidity range: 5% to 95%  
(non-condensing)
- Coil specifications:
  - Maximum pull-in voltage: 85 VAC
  - Minimum dropout voltage: 25 VAC
  - Nominal power: 4 VA at 120 VAC
- Contact material: Silver alloy
- Contact ratings:
  - 30 Amps resistive at 120 / 240 VAC
  - 20 Amps resistive at 28 VDC
  - 10 Amps tungsten at 120 VAC
  - 175 Amps one cycle surge RMS at 120 VAC
  - 100,000 operations at rated load
- Dielectric strength:
  - Across open contacts: 600V RMS
  - Contact to coil: 1500 V RMS
  - Contact to frame: 1500 V RMS
  - Leakage current:  $\leq 1$  mA
- LED provides visual indication of coil voltage
- Solid polarizing pin
- Dimensions: 2.47 inches (6.27 cm) high x 1.85 inches (4.70 cm) wide x 3.90 (9.91 cm) deep  
(including connector)

### Overview:

The Model TR-200 Flash Transfer Relay is designed to meet or exceed NEMA Standard TS 2-2003. Model TR-200 Flash Transfer Relays are constructed with a transient suppressed full wave rectified coil to provide chatter free operation in brownout conditions down to 89 VAC. The rectified coil provides lower power consumption than conventional AC coils. A rear mounted eight pin polarized connector mates with a Cinch-Jones 2408SB socket.



**Reno A & E**  
4655 Aircenter Circle • Reno, Nevada • 89502 • USA  
Tel: (775) 826-2020 • Fax: (775) 826-9191 • E-mail: [sales@renoae.com](mailto:sales@renoae.com)  
Visit our Website at [www.renoae.com](http://www.renoae.com) for the most current product information.



## 1kVA Double Conversion Unit

010-028-20



### Product Description

The Multilink EDP Double Conversion UPS is an uninterruptible power supply designed to provide high quality, stable AC power to critical equipment that requires continuous, regulated power. With a pure sine wave output, the Multilink EDP Double Conversion UPS provides less electrical interference to sensitive loads with zero loss in output power. With 4 LEDs and a 4 line LCD display, UPS operating statistics scroll across the screen to provide at-a-glance monitoring. Ethernet connectivity is standard and includes an embedded web page for status monitoring and configuration. Compatibility with generators using the Safety Automatic Transfer Switch (SATS) provides lasting back-up power during long utility outages and low battery shutdown. With 3 models to choose from, The Multilink EDP Double Conversion UPS is scalable to provide the most efficiency with superior confidence.

### Features & Benefits

Pure Sine Wave Output
Power Factor Corrected Input
Temperature Controlled Battery Charger
Temperature Controlled Fans
Overload Protection
Multi-Stage Battery Charger
LCD Display with 4 LED's
Duplex Outlet

## Specifications

General Specifications	
Parameter	Specification
<b>Dimensions:</b>	17.25"W x 3.485"H x 13.625"D
<b>Output Power:</b>	1.0kVA (0.7kW)
<b>Cooling:</b>	Forced Air
<b>Number of phase / wire:</b>	Single-Phase / 3 wire
<b>Nominal Voltage:</b>	120VAC
<b>Voltage Range:</b>	55V - 150V (Load Dependent)
<b>Frequency:</b>	AC Input/Output - 60Hz
<b>Battery Voltage:</b>	24VDC
<b>Frequency Range:</b>	Input: $\pm 8\%$ Output: $\pm 2\%$ Battery Operation: $\pm 1\%$
<b>Input Protection</b>	20A Circuit Breaker
<b>Overcurrent Capacity:</b>	105% for 10 minutes 150% for 10 seconds (45 second interval) 200% for .05 seconds
<b>Overcurrent Protection:</b>	Bypass Non-Hit Change (Auto Return)
<b>Battery Type:</b>	AGM or GEL
<b>Battery Backup Time:</b>	Up to 8 Hrs. or Longer (Load Dependent)
<b>Environment Temperature Range:</b>	-37°C to +74°C (-29°F to 165°F)
<b>Protocols:</b>	TCP/IP, HTTP, SNMP, SNTP, SMTP, NTCIP, FTP, UDP, SSH, TFTP
<b>Standards:</b>	UL1778 CE:IEC62040-1:2008
<b>Construction:</b>	DSP (Digital Signal Processing) & IGBT throughout

### Contact Us

North America	Europe, Middle East & Africa	Latin & South America
Tel: +1 440 366 6966 Fax: +1 440 366 6802 Email: <a href="mailto:engsupport@gomultilink.com">engsupport@gomultilink.com</a>	Tel: +1 440 366 6966 Fax: +1 440 366 6802 Email: <a href="mailto:engsupport@gomultilink.com">engsupport@gomultilink.com</a>	Tel: +1 954 499 9203 Mobile: +1 305 684 2388 Email: <a href="mailto:hquinones@gomultilink.com">hquinones@gomultilink.com</a>



## Specifications Cont.

Ethernet Communication Card	
Parameter	Specification
<b>CPU:</b>	Microchip PIC24HJ128/ENC44J600
<b>Memory:</b>	1MB Flash
<b>Peripherals:</b>	Real Time Clock
<b>Software:</b>	Microchip
<b>Network Interface:</b>	10/100 BaseT with Auto-Detect
<b>Connection:</b>	RJ45 with LEDs
<b>Power Supply:</b>	12-60VDC, 200mA max
<b>Protocols</b>	TCP/IP, HTTP, SNMP, SNT, SMTP, NTCIP, FTP, UDP, SSH, TFTP
<b>Operating Range:</b>	-40°C to +74°C
<b>Humidity:</b>	5 to 95%
<b>Mounting:</b>	Embedded Card on Front Panel
<b>Connectors:</b>	RJ11; Two, Nine Position Terminal Blocks
<b>Web Browsers:</b>	Chrome, IE, FireFox, Safari, Edge
<b>Operating Systems:</b>	Windows, OS, Linux
<b>Firmware Upgrades:</b>	Embedded webpage or TFTP upgradeable

### Contact Us

North America	Europe, Middle East & Africa	Latin & South America
Tel: +1 440 366 6966 Fax: +1 440 366 6802 Email: <a href="mailto:engsupport@gomultilink.com">engsupport@gomultilink.com</a>	Tel: +1 440 366 6966 Fax: +1 440 366 6802 Email: <a href="mailto:engsupport@gomultilink.com">engsupport@gomultilink.com</a>	Tel: +1 954 499 9203 Mobile: +1 305 684 2388 Email: <a href="mailto:hquinones@gomultilink.com">hquinones@gomultilink.com</a>





Multilink Inc.  
580 Ternes Ln  
Elyria, OH 44035  
Tel: (440) 366-6966  
Fax: (440) 366-6802



[facebook.com/GoMultilink](https://facebook.com/GoMultilink)



[twitter.com/GoMultilink](https://twitter.com/GoMultilink)



[youtube.com/GoMultilink](https://youtube.com/GoMultilink)

© Multilink Inc. 2019 • All Rights Reserved

Contact Us

North America	Europe, Middle East & Africa	Latin & South America
Tel: +1 440 366 6966 Fax: +1 440 366 6802 Email: <a href="mailto:engsupport@gomultilink.com">engsupport@gomultilink.com</a>	Tel: +1 440 366 6966 Fax: +1 440 366 6802 Email: <a href="mailto:engsupport@gomultilink.com">engsupport@gomultilink.com</a>	Tel: +1 954 499 9203 Mobile: +1 305 684 2388 Email: <a href="mailto:hquinones@gomultilink.com">hquinones@gomultilink.com</a>

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 48  
Qty. 2

*Simply More...*

## Safety Automatic Transfer Switch

**EDP Series**  
**010-505-10**



### Product Description

The Safety Automatic Transfer Switch pairs with the EDP double conversion series of UPS systems. It provides automatic power source selection, generator capabilities, and alarm reporting via dry contact relays. Includes maintenance bypass switch.

### Specifications

Parameter	Specification
Output Capacity	2kW
Cooling System	Convection
Operating Temperature	-37°C - + 74°C
Dimensions (W x H x D)	19" x 3.5" x 10"

## Specifications Cont.

AC Input	Specification
Connections	Terminal Blocks 4-14AWG
Phase	Single Phase 3-Wire
Voltage	120V Nominal
Frequency	60Hz
Input Power Factor	0.98-1.0
Power Consumption	3W

AC Output	Specification
Output Power Connection	Terminal Block 4-14AWG
Phases	Single Phase 3-Wire
Voltage	120V Nominal
Voltage Regulation	Rated Voltage $\pm 5\%$
Current Capacity	16.67A @120V
Rated Frequency	60Hz
Voltage Waveform	Sine Wave
Transfer Time	5 Cycles or Less
Load Power Factor	0.7-1.0
Over Current Protection	20A UPS Input Circuit Breaker and Internal Fuses
Overload Capability	150%

Transfer Relays	Specification
Output Transfer Relay	30A/277VAC
MAINS/GEN Power Relay	30A/277VAC

Dry Contact Sense Relays	Specification
Switching Power	60W
Switching Voltage	12VDC
Max Switching Current	5A
Carrying Current	2A

Contact Us

North America	Europe, Middle East & Africa	Latin & South America
Tel: +1 440 366 6966 Fax: +1 440 366 6802 Email: <a href="mailto:engsupport@gomultilink.com">engsupport@gomultilink.com</a>	Tel: +1 440 366 6966 Fax: +1 440 366 6802 Email: <a href="mailto:engsupport@gomultilink.com">engsupport@gomultilink.com</a>	Tel: +1 954 499 9203 Mobile: +1 305 684 2388 Email: <a href="mailto:hquinones@gomultilink.com">hquinones@gomultilink.com</a>



Scan  
QR for  
website.

Multilink, Inc  
580 Ternes Ln  
Elyria, OH 44035  
Tel: (440) 366-6966  
Fax: (440) 366-6802



[facebook.com/GoMultilink1](https://facebook.com/GoMultilink1)



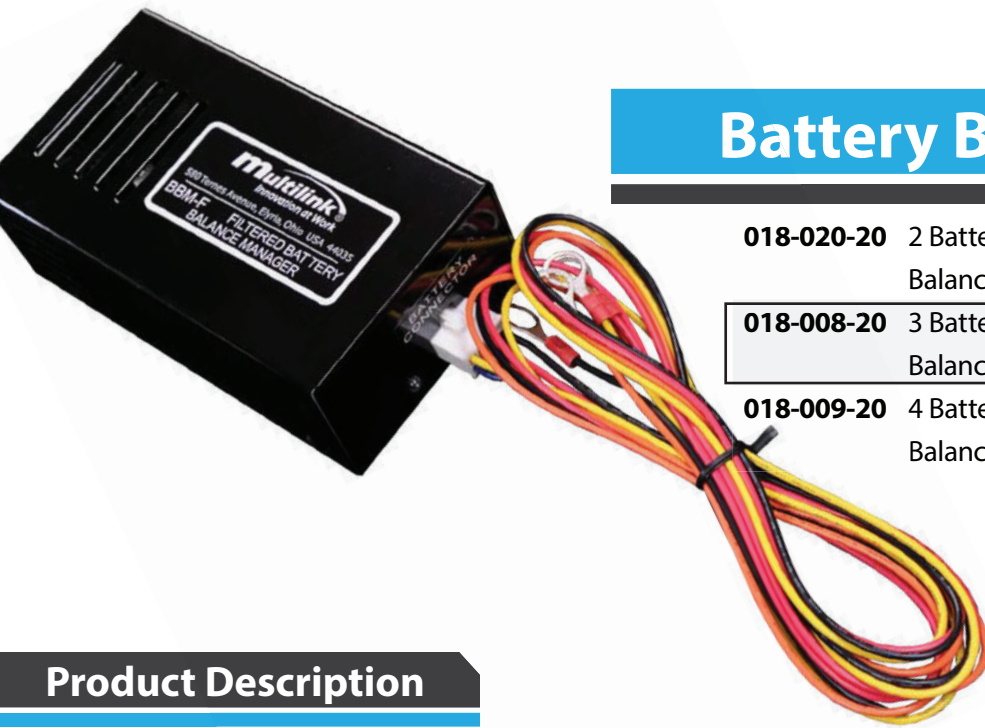
[twitter.com/GoMultilink](https://twitter.com/GoMultilink)



[youtube.com/GoMultilink](https://youtube.com/GoMultilink)

## Contact Us

North America	Europe, Middle East & Africa	Latin & South America
Tel: +1 440 366 6966	Tel: +1 440 366 6966	Tel: +1 440 366 6966
Fax: +1 440 366 6802	Fax: +1 440 366 6802	Mobile: +1 440 366 6802
Email: <a href="mailto:engsupport@gomultilink.com">engsupport@gomultilink.com</a>	Email: <a href="mailto:engsupport@gomultilink.com">engsupport@gomultilink.com</a>	Email: <a href="mailto:lasupport@gomultilink.com">lasupport@gomultilink.com</a>



## Battery Balancer

**018-020-20** 2 Battery External Battery  
Balancer Kit, 24V

**018-008-20** 3 Battery External Battery  
Balancer Kit, 36V

**018-009-20** 4 Battery External Battery  
Balancer Kit, 48V

### Product Description

The BBM PLUS Second Generation Battery Balance Manager has been designed as a universal battery balancer for both three and four battery systems. The BBM PLUS auto-configures for a three or four battery string, depending on the output wire harness connected. An additional feature provides a low voltage disconnect which disables the battery balancer if battery voltage decreases to a preset limit. This feature protects the batteries from extremely deep discharge and permanent damage if the charger in the CATV power supply cannot charge the batteries for any reason.

### Features & Benefits

No need to maintain matched battery sets for field replacement.

Combine new replacements with older batteries in existing strings. (\*1)

Active battery charge equalization at float voltages.

Automatically and correctly tracks charger voltage and temperature compensation.

Battery string charges at full charger current, up to maximum of CATV supply capability.

Evenly distributes charge across all batteries in the string preventing potential undercharge and overcharge damage.

Low battery cutoff reduces risk of over-discharge damage during prolonged periods of no charge.

<sup>1</sup> Replacement battery must be same type, chemistry, size, and AH rating.

## Specifications

General	
Parameter	Specification
Balance Rate	150 hours typical to +/-65 mV after complete discharge/charge cycle, using new 100AH gel batteries.
Maximum String Charge	Up to the maximum delivered by CATV power supply charger.
Maximum Balance Current	Up to 1A
Balance Accuracy	±65mVDC, between batteries
Protection	One Time Fuse
Environmental	-40C to +60C, 0-99% RH non-condensing
Dimensions	2.125"H x 6.000"W x 3.437"D
Weight Approx.	1.25 lbs.





Multilink Inc.  
580 Ternes Ln  
Elyria, OH 44035  
Tel: (440) 366-6966  
Fax: (440) 366-6802



[facebook.com/GoMultilink1](https://facebook.com/GoMultilink1)



[twitter.com/GoMultilink](https://twitter.com/GoMultilink)



[youtube.com/GoMultilink](https://youtube.com/GoMultilink)

© Multilink Inc. 2021 • All Rights Reserved

## SLA1185

### Technical Specifications

Nominal Voltage	12V
Nominal Capacity	100Ah (10 Hr Rate to 1.75V/cell)
Chemistry	Lead Acid -AGM

### Physical Specifications

Length	307mm	12.09in
Width	168mm	6.61in
Height	208mm	8.19in
Height w/Terminal	230mm	9.06in
Weight (+/- 5%)	29.5kg	64.9lbs
Terminal Type	Flag	
Case Material	ABS	

### Charging Specifications

Charge Voltage	Battery	Per Cell
Float	13.5V~13.8V	2.25V~2.30V
Cycle	14.4V~15.0V	2.40V~2.45V
Max. Charge Current	30A	

### Capacity Specifications

5 Second Discharge Current	1200A
Self Discharge (to 80% capacity)	3 Months 91%
	6 Months 82%
	12 Months 64%
Internal Resistance	5mΩ(25°C)

### Temperature Specifications

Operating Temperature Capability -40° F (-40° C) to 140° F (60° C)

Recommended parameters for optimal battery life and performance:

Charging: 32° F to 104° F (0° C to 50° C), Discharging: 5° F to 122° F (-15° to 50° C),

Storage: 50° to 77° F (10° C to 25° C)

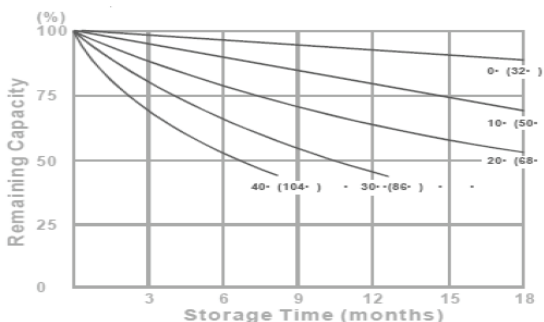


### FEATURES:

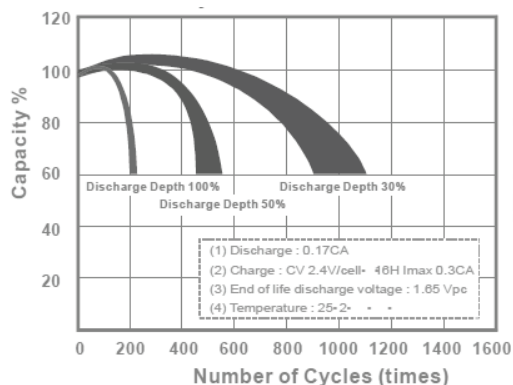
- Used in several types of application
- Approved for all modes of transport
- More efficient connections between plates & terminals
- VRLA technology to eliminate spills and over-pressure
- Maintenance-free



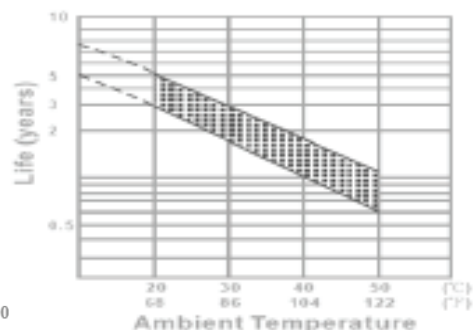
**Capacity Retention Characteristics**



**Cycle Service Life**



**Trickle (of float) Service Life**

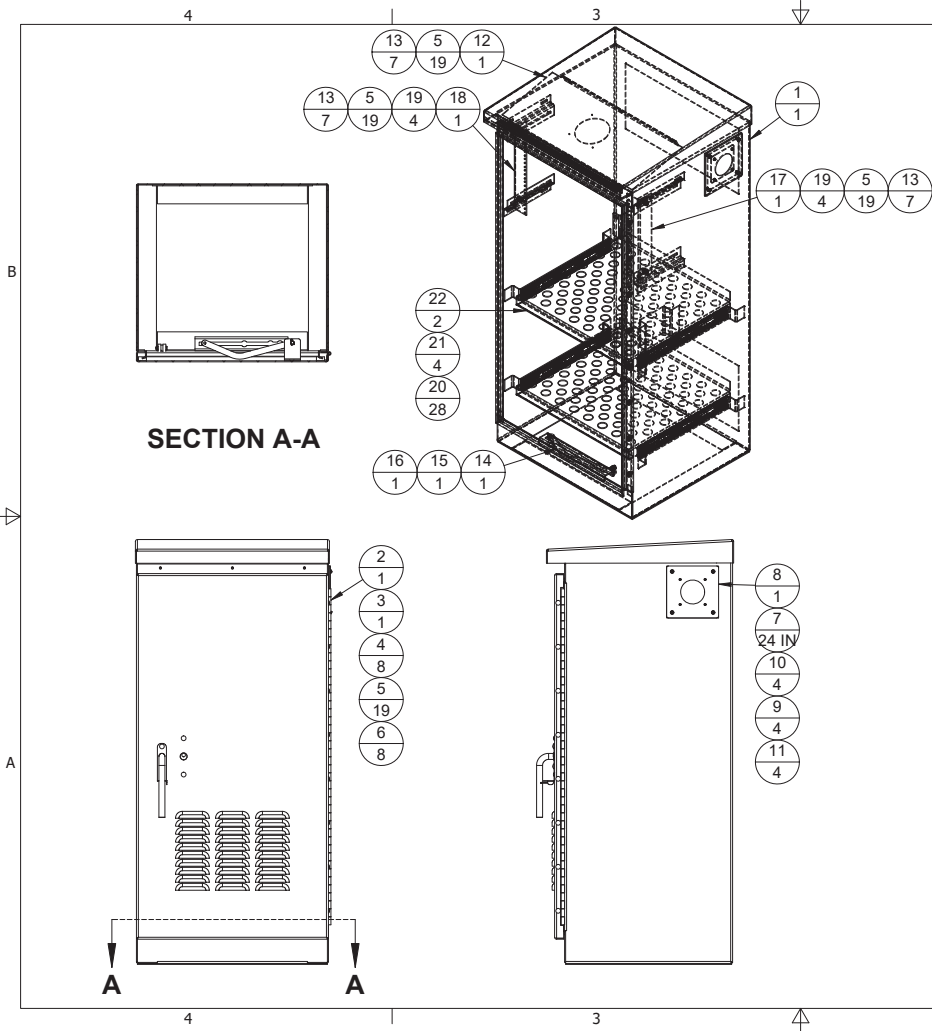


**Constant Current Discharge Characteristics: A (25°C)**

F.V/Time	5 min	30 min	1 hr	3 hr	5 hr	10 hr	20 hr
1.85V/cell	202.00	7.12	43.60	22.60	16.10	9.71	5.09
1.80V/cell	267.00	83.70	50.80	23.70	16.70	10.00	5.26
1.75V/cell	305.00	92.10	56.50	24.80	17.20	10.20	5.38
1.70V/cell	336.00	101.00	60.60	25.70	17.60	10.40	5.48
1.67V/cell	346.00	103.00	61.50	26.10	17.80	10.50	5.53
1.60V/cell	375.00	111.00	64.90	27.20	18.10	10.70	5.64

**Constant Power Discharge Characteristics: W (25°C)**

F.V/Time	5 min	30 min	1 hr	3 hr	5 hr	10 hr	20 hr
1.85V/cell	458.00	163.00	112.00	47.20	31.30	18.00	10.40
1.80V/cell	512.00	174.00	116.00	49.70	32.80	19.20	10.70
1.75V/cell	549.00	183.00	119.00	51.80	34.20	20.00	11.00
1.70V/cell	584.00	191.00	122.00	52.20	35.20	20.80	11.20
1.67V/cell	600.00	195.00	125.00	54.00	36.00	21.50	21.80
1.60V/cell	649.00	206.00	126.00	55.20	36.70	21.80	11.50



PARTS LIST			
ITEM	PART NUMBER	QTY.	DESCRIPTION
1	2-150-006883	1	Cab Weld-LS532421A1253R
2	2-150-006891	1	Door Assy-LS5324XXA1253R
3	6-185-001521	1	BRKT-SWITCH-ADJ-S075-TYP 316L-MULTILINK CUSTOM
4	7-111-141205	8	BOLT-CARR-1/4-20X3/4 LG SST WAXED
5	7-960-140020	19	FLATWASHER-SST-1/4 SST MED
6	7-660-141010	8	HEX NUT-NYLOCK-SST-1/4-20 WAXED
7	7-485-000017	24 IN	GASKET-4X3/8-1/8"x1/5"x50/ROLL
8	4-150-006892	1	Cover Plate-Gen Plug Mtg
9	7-960-100005	4	LOCKWASHER-SST-#10 EXT TOOTH
10	7-101-100821	4	PHMS-PHILLIPS-#10-32 X 1/2 LG SST
11	7-960-100020	4	FLATWASHER-SST-#10 MED
12	4-150-006879	1	FAN PLATE-LSXX24XXA125
13	7-660-141015	7	NUT-KEPS-SST-1/4-20
14	7-055-000148	1	RESTRAINT BAR-RH-ZPL STEEL-TRA
15	7-960-160020	1	WASHER-FLAT-3/8".(875ODX.410ID) SST
16	7-685-000001	1	COTTER PIN-SST-1/8"DIA X 1" LG
17	6-689-000620	1	Rack Rail-7RU-.125 Alum-10-32 RH
18	6-689-000624	1	Rack Rail-7RU-.125 Alum-10-32 LH
19	7-111-141050	4	HHCS-1/4-20X.625 LG SST
20	7-111-080821	28	PHMS-PHILLIPS-#8-32 X 1/2 LG SST
21	7-695-000015	4	Slide-Writing Desk/Dwr-16"-100#
22	6-820-000446	2	SHELF-SLIDEOUT-A125-FOR LSXX2421

NOTES: INSTALL RACK RAILS AND SLIDE OUT SHELVES.  
ZIP TIE SHELVES IN PLACE SO THEY DO NOT SLIDE DURING SHIPPING.

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 51  
Qty. 2

01	—	PROTOTYPE RELEASE	01/10/20	CAA
REV	ECN	DESCRIPTION	DATE	ENGINEER
REVISIONS				
DIMENSIONS ARE IN INCHES. UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± 1/16 .XXX ± .015 ± 1°				
THIS DRAWING CONTAINS PROPRIETARY INFORMATION AND IS THE PROPERTY OF APX ENCLOSURES, INC. AND SHALL NOT BE TRANSMITTED OR REPRODUCED OR USED AS THE BASIS FOR MANUFACTURE OR SALE WITHOUT PRIOR WRITTEN PERMISSION.				
APX ENCLOSURES, INC.				
TCL5532421A1253R9-SPECIAL-MULTILINK STYLE				
BEND RADIUS 90°				
BEND DEDUCTION				
WEIGHT (LBS): 116.92				
3RD ANGLE PROJECTION				
TCL5532421A1253R9-SPECIAL-MULTILINK STYLE				
SIZE B DWG. NO. 1-150-006859				
SCALE: 1:12 SHEET 1 OF 1				

Twist-Lock® Devices  
30A, 125V AC, 2 Pole, 3 Wire Grounding  
Watertight Safety-Shroud® Flanged Inlet

Features

- One-piece, engineered thermoplastic housing is impact-resistant for heavy-duty industrial environments
- Alignment arrows and lock and unlock symbols provide a visual indication that devices are properly connected.
- Closure cap is included for environmental seal when device is not in use
- Catalog number and color-coded voltage rating are easily visible even when in use

Ordering Information

Description	Device Color	UPC	Catalog Number
Gray PBT housing and flange	Gray	783585231648	HBL2615SW

Listings

Listed to UL 498  
Fed.Spec. W-C-596  
Certified to CSA C22.2 No.42  
UL Listed, CSA Certified to Type 4, 4X and Type 12

Specifications

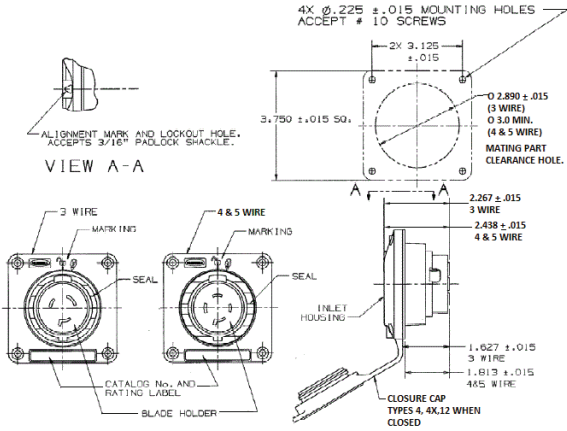
Housing / Flange	Gray PBT
Terminal Retainer	Clear polycarbonate
Blades	Brass
Terminal Screws	#10-32 Brass (Phillips / Slotted / Robertson)
Assembly Screws	Stainless Steel
Mounting Sscrew	Stainless Steel

Performance

<b>Electrical</b>	
Current Interrupting	Certified for current interrupting at full rated current
Dielectric Voltage	Withstands 2,000V minimum
<b>Mechanical</b>	
Terminal Accommodation	#16 AWG - #8 AWG solid or stranded copper wire only.
Terminal Identification	Terminals identified in accordance with UL 498
<b>Environmental</b>	
Flammability	V0 per UL94 or CSA 22.2 No.0.17
Moisture Resistance	Type 4, 4X, 12, IP66 suitability
Operating Temperatures	Maximum Continuous 75°C; Minimum -40°C (w/o impact)

HUBBELL

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 52  
Qty. 2



Accessories

Watertight Safety Shroud Connector	HBL2613SW
Non-Metallic Backbox	BB2030N
2-Gang Weatherproof Box Adapter Plate	HBL2030AP

Resources

Customer Use Drawing  
eCatalog



# EB-X

## 900MHz HIGH-SPEED SERIAL/ETHERNET TRANSCEIVER

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 54  
Qty. 10



Intuicom's EB-X is a long-range, high-speed industrial wireless radio enabling both IP and serial connectivity. The EB-X provides remote serial and IP data connectivity to IP based networks, enabling high performance data transport and mobile wireless access for vehicle based operations.

### FUNCTIONALITY & FLEXIBILITY

Providing Ethernet and dual serial port connectivity simultaneously, the EB-X offers a single solution to a broad range of applications. With up to 4 Mbps of available bandwidth, the EB-X is flexible enough to support legacy serials as well as the most current IP devices. The EB-X is multi-functional and may be operated as the access point or end-point in point-to-point, point to multipoint, and peer to peer communications.

Employing Intuicom's robust and secure frequency hopping spread spectrum technology, the EB-X PLUS is inherently resistant to interference from other RF equipment including other spread spectrum radios. Empowered with an ultra-sensitive and highly-selective RF receiver, the EB-X provides real-time, robust data transport. With top performance and security that includes 128-bit or 256 AES encryption; the EB-X provides superior "real world" throughput and performance over other wireless products.

### KEY FEATURES

- Best-in-Class 900 MHz Performance
- Ethernet and Dual Serial Port interfaces
- High-Speed Performance up to 4 Mbps
- 60 mile range (LOS)
- Secure: 128-bit & 256-bit AES Encryption

### EASE OF USE

EB-X's embedded web-based set-up makes getting up and running a straight-forward and simple process. Our robust design and ruggedized enclosure makes certain your applications keep running in the most difficult environments.

Like all our radios, the EB-X is designed and built in Colorado, USA.



## GENERAL SPECIFICATIONS

<b>Enclosure</b>	cast aluminum
<b>Size</b>	165mm x 107mm x 53mm
<b>Weight</b>	680g
<b>Operating Temperature</b>	-40°C to +75°C
<b>Humidity</b>	0 to 95%, non-condensing
<b>Reliability</b>	62,000 hours MTBF
<b>RoHS</b>	Directive 2011/65/EU

## INTERFACES

<b>Ethernet</b>	RJ45
<b>Serial</b>	DB-9 (two)
<b>USB</b>	Micro USB
<b>RF Connector</b>	TNC (f)

## POWER REQUIREMENTS

<b>Operating Voltage</b>	9-36 VDC
<b>Transmit Current</b>	350 mA @12 VDC
<b>Receive/Idle Current</b>	100 mA @ 12VDC

## DATA TRANSMISSION

<b>Error Detection</b>	CRC, FEC, and ARQ
<b>Link Throughput</b>	Up to 1.6 Mbps; 4 Mbps with Compression
<b>User Interface Rates</b>	Ethernet Rate: 10/100 Mbps Serial: up to 115 kbps
<b>Data Encryption</b>	128-bit and 256-bit AES CCM
<b>Advanced Features</b>	Packet Compression and Packet Aggregation

## TRANSMITTER

<b>Frequency Range</b>	902-928 MHz
<b>Output Power</b>	Up to 1 Watt, user selectable
<b>Range</b>	60+ Miles (LOS)
<b>Data Rates</b>	115.2 kbps to 4 Mbps
<b>Channel Size</b>	230.4 to 32225.6 kHz
<b>Modulation</b>	.
<b>Hopping Rates</b>	25ms to 400ms
<b>Hopping Channels</b>	Up to 112

## RECEIVER

<b>System Gain</b>	136 dB	
<b>IF Selectivity</b>	>40 dB	
<b>Sensitivity</b>		
<b>RF Data Rate</b>	<b>Without FEC</b>	<b>With FEC</b>
115 kbps	-105 dBm	-108dBm
250 kbps	-102 dBm	-105 dBm
500 kbps	-99 dBm	-102 dBm
1 Mbps	-95 dBm	-98 dBm
4 Mbps	-83 dBm	-86 dBm



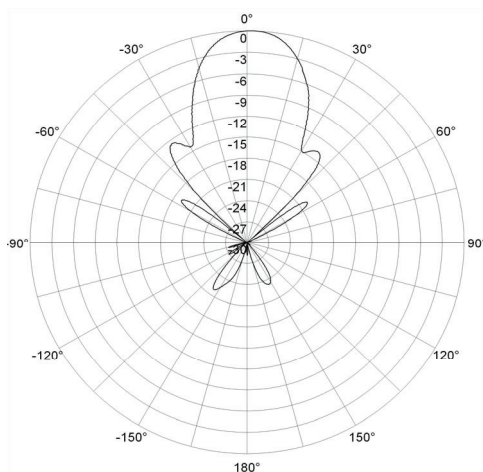
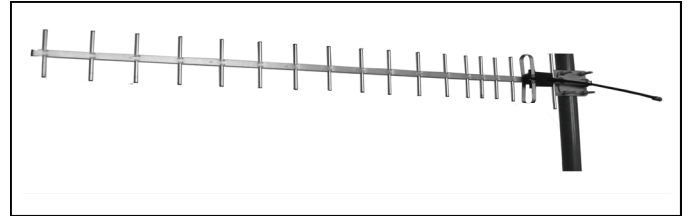


Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 54  
Qty. 10  
13 dBi Antenna

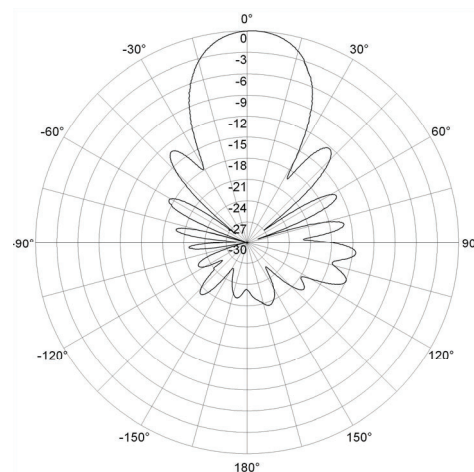
## TerraWave Solutions® 824-960 MHz 15 dBi Yagi Antenna with N-Style Jack Connector

TerraWave's 15 dBi directional yagi antenna is designed for applications in the 900 MHz frequency, including, radio frequency identification (RFID) applications, cellular systems, global system for mobile (GSM) communications, code-division multiple access systems (CDMA) applications, multipoint applications and wireless video links. It features a high gain and can be mounted in a horizontal or vertical polarization. Includes heavy-duty steel mounting brackets and an N-style jack connector. All TerraWave antennas are covered by the Company's two-year TerraNet warranty program. For questions and to purchase product, contact a wireless networking solutions sales engineer at 210-375-8482, 800-851-4965 or [sales@terrawave.com](mailto:sales@terrawave.com). Visit [www.terrawave.com](http://www.terrawave.com) for additional information.

Specifications	
Model	T09150Y11206T
Frequency Range	824 ~ 960 MHz
Bandwidth	136 MHz
Gain	15 dBi
Horizontal Beamwidth	28°
Vertical Beamwidth	28°
Front-to-Back Ratio	≥ 18 dB
VSWR	≤ 1.5
Nominal Impedance	50 Ohms
Maximum Power Rating	50 Watts
Polarization	Vertical or Horizontal
Connector	N-Style Jack
Antenna Length	50.4"
Weight	1.45 lbs
Wind Load	120 mph
Element Material	Aluminum
Mast Mount Diameter	Ø1.57" ~ Ø2.76"
Operating Temperature Range	-40°F to +158°F



E-Plane Pattern



H-Plane Pattern



## TerraWave Solutions® 824-960 MHz 15 dBi Yagi Antenna with N-Style Jack Connector

### Mounting Bracket Information for T09150Y11206T

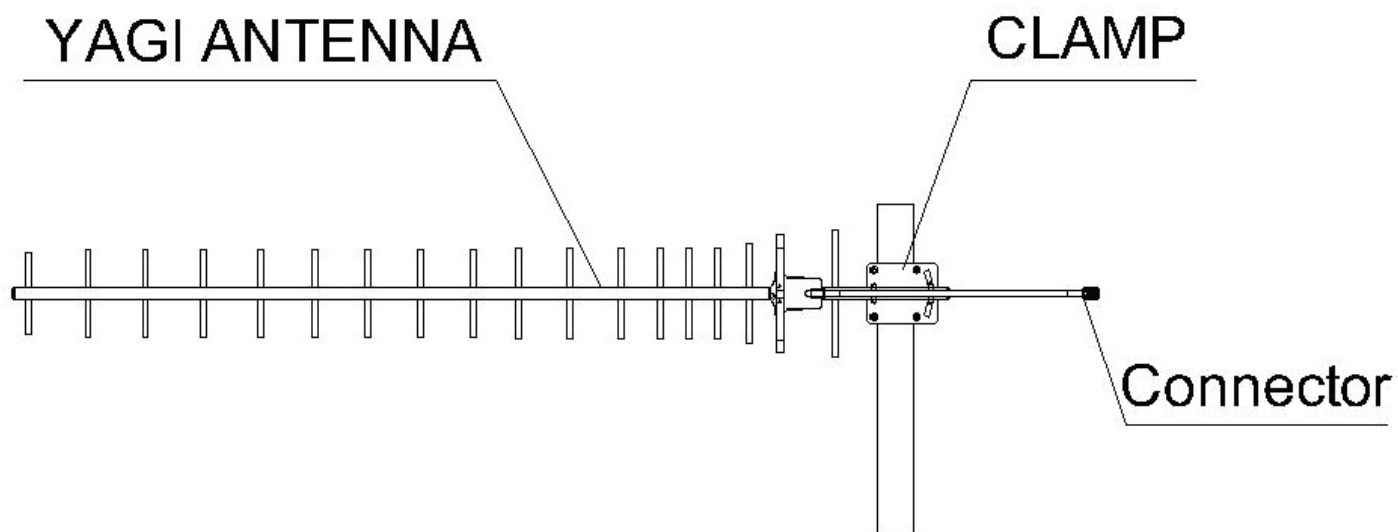
#### Polarization Information

##### Vertical Polarization

As shown in the picture below, all antenna grids are vertically pointing to ground.

##### Horizontal Polarization

1. Loosen the clamp and pull out the antenna
2. Rotate the clamp by 90 degree and push back onto the antenna. Tighten the clamp firmly.
3. Install the antenna such that all grids are pointing parallel (horizontally) to the ground.



## COAXIAL RF SURGE PROTECTION

### IS-50 Series

The IS-50 Series of DC block surge arrestors are designed to protect against lightning events and are ideal for HF, UHF and VHF radios. The IS-50 family of RF protectors can be used for general radio use with frequency ranges between 1.5 MHz to 1000 MHz.

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 54  
Qty. 10



#### FEATURES

- Broad frequency ranges from 1.5 MHz to 1000 MHz
- Connectors: N-Type, F-Type and UHF
- High power versions capable to 2kW
- Industry leading surge rating of 20kA
- 75Ω version available (IS-75F-C1)

#### STANDARDS

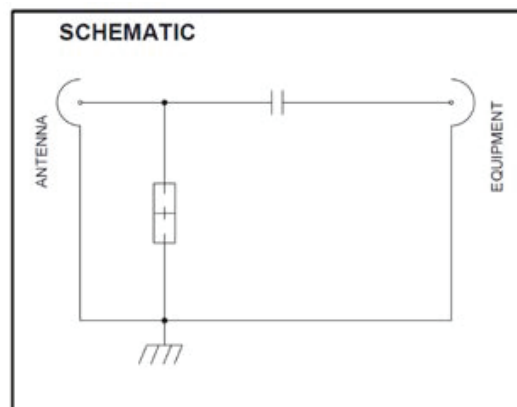
- CE Compliant
- RoHS Compliant

#### GENERAL SPECIFICATIONS

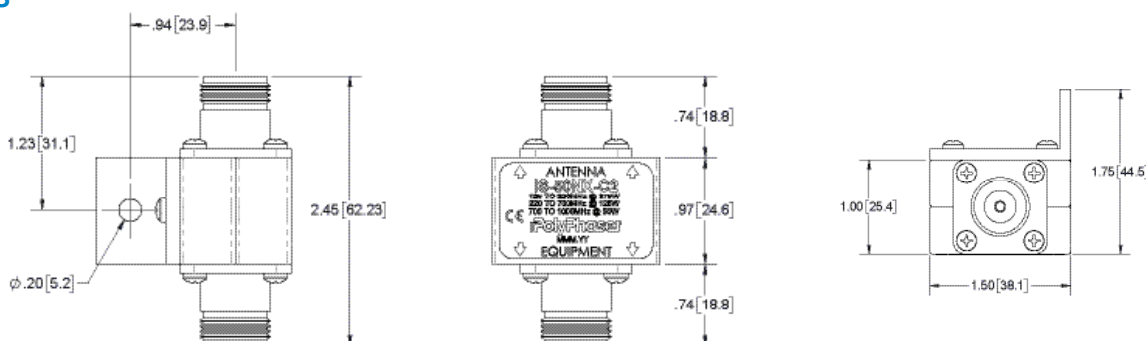
Insertion Loss	≤0.1dB
VSWR	≤1.2:1 or Better Over Frequency Range
Return Loss	<20db
Surge Withstand	20kA 8/20μs Waveform
Weathering Kit Available	Part Number: WK-1

#### PATENTED LIGHTNING ARRESTOR TECHNOLOGY

The IS-50 product family is based on PolyPhaser's market establishing surge protection technology. This engineered surge suppressor has been the cornerstone for ham radio operators, land mobile communications and remote industrial monitoring. The IS-50 is approved by major OEMs for use in critical applications such as emergency response, SCADA and public safety communications.



#### DIMENSIONS



## AVAILABLE IS-50 PART NUMBERS

Part Number	Frequency Range	Connector	Mounting Configuration	RF Power**	Let-Through Energy
IS-50NX-C0	1.5MHz - 700MHz	N-Type	Flange	Up to 2kW	≤10mJ
IS-50NX-C0-MA	1.5MHz - 700MHz	N-Type	Flange	Up to 2kW	≤10mJ
IS-50NX-C0-ME	1.5MHz - 700MHz	N-Type	Flange	Up to 2kW	≤10mJ
IS-50NX-C2	125MHz - 1GHz	N-Type	Flange	Up to 375W	≤200μJ
IS-50NX-C2-MA	125MHz - 1GHz	N-Type	Flange	Up to 375W	≤200μJ
IS-50NX-C2-ME	125MHz - 1GHz	N-Type	Flange	Up to 375W	≤200μJ
IS-50UX-C0	1.5MHz - 700MHz	UHF	Flange	Up to 2kW	≤10mJ
IS-50UX-C1-MA	50MHz - 700MHz	UHF	Flange	Up to 375W	≤600μJ
IS-50UX-C1-ME	50MHz - 700MHz	UHF	Flange	Up to 375W	≤600μJ
IS-75F-C1	4MHz - 900MHz	F-Type	Flange	Up to 100W	–

- MA for Male Surge (Antenna) Connector
- ME for Male Protected (Equipment) Connector

\*\*Power depends on frequency being used – see individual product specifications for details

# Aluminum Tubes

Supplied in lengths shown below, Pelco's vertical support tubing is made from high strength aluminum alloy. A unique shape and vinyl insert insures a complete weather proof wiring installation anywhere along the entire length of the tube.

The standard 46" tube will accommodate all signal combinations up to 3-Section 12". Tubes are also available in 58" and 74" lengths for 4 and 5-Section combinations.

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 54  
Qty. 10



## Astro-Brac Gusseted Tube w/ Vinyl Insert, 1-1/2" x Length, Threaded One End



AB-0306  
Gusseted Tube



AB-0233  
Vinyl Insert

AB-2003

Length

Coating

23=23"

37=37"

46=46"

58=58"

74=74"

PNC=Process No Color

P\_\_=Paint

## Astro-Brac Gusseted Tube w/ Vinyl Insert, 1-1/2" x Length, Threaded Both Ends



AB-0307  
Gusseted Tube



AB-0233  
Vinyl Insert

AB-2007

Length

Coating

23=23"

37=37"

46=46"

58=58"

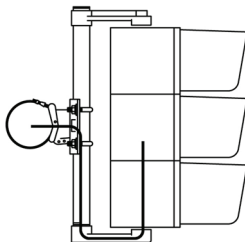
74=74"

PNC=Process No Color

P\_\_=Paint

### Concealed Wiring Installation

Pelco's aluminum gusseted tubes allow wire entry at any point. Vinyl insert conceals wiring from mast arm to signal head. Simply run wire throughout field-drilled hole in mast arm, through Astro-Brac, and into support tube. Hollow lower arm provides a channel for wire to be fed into signal head.



Note: 1. Lengths up to 120" maximum are available upon request. Specify by including Length in the part number, i.e., AB-2003-120-PNC.  
2. See Reference Section for available paint colors.



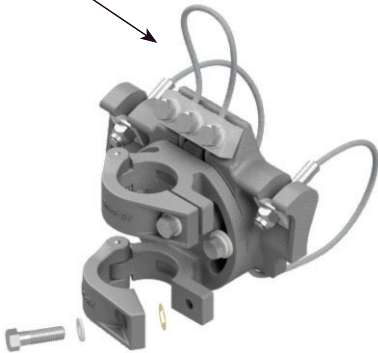
# Galaxy Series Clamp Kits

The Galaxy is designed using a single cable plate which allows easy installation, as well as the multi-directional adjustable tube saddle for strength. These high tensile aluminum alloy clamp kits provide strength with maximum adjustability and complete clamping versatility. Comes complete with all necessary attaching hardware.

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 54  
Qty. 10



AB-0512  
Cable Kit

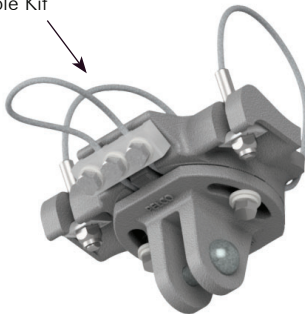


## Astro-Brac, Galaxy Hinged Clamp Kit, Cable Mount

AG-3055 -  -  -   
 Cable Length      Cable      Coating  
 See Note      Blank=Galv      PNC=Process No Color  
                  SS=Stainless      P\_\_=Paint

Note:  
Cable Length: 62", 84", 96", 110", 120", 132", 144", 220", or 280".

AB-0512  
Cable Kit



## Astro-Brac, Galaxy Series Clamp Kit, Cable Mount, 3/4" Clevis, Free-Swinging

AG-3014 -  -  -  -   
 Cable Length      Stainless Upgrade      Bushing      Coating  
 See Note      Blank=Galv      SB=Stainless      PNC=Process No Color  
                  SS=Stainless      Bushing      P\_\_=Paint

Note:  
Cable Length: 62", 84", 96", 110", 120", 132", 144", 220", or 280".  
Stainless upgrade to include stainless cable and pins.

- Note: 1. All assemblies are supplied standard with stainless steel fasteners.  
2. See Reference Section for clamp kit pole diameters.  
3. See Reference Section for available paint colors.



## LMR®-400 Flexible Low Loss Communications Coax

### Ideal for...

- Drop-in replacement for RG-8/9913 Air-Dielectric type Cable
- Jumper Assemblies in Wireless Communications Systems
- Short Antenna Feeder runs
- Any application (e.g. WLL, GPS, LMR, WLAN, WISP, WiMax, SCADA, Mobile Antennas) requiring an easily routed, low loss RF cable



• **LMR®** standard is a UV Resistant Polyethylene jacketed cable designed for 20-year service outdoor use. The bending and handling characteristics are significantly better than air-dielectric and corrugated hard-line cables.

• **LMR®-DB** is identical to standard LMR plus has the advantage of being watertight. The addition of waterproofing compound in and around the foil/braid insures continuous reliable service should the jacket be inadvertently damaged during installation or in the future.

• **LMR®-FR** is a non-halogen (non-toxic), low smoke, fire retardant cable designed for in-building runs that can be routed anywhere except air handling plenums. LMR-FR has a UL/NEC & CSA rating of 'CMR' and 'FT4' respectively. In addition, the LMR-FR series is MSHA-P rated for mining operations.

• **LMR®-FR-PVC** is a general-purpose indoor cable and has a UL/NEC & CSA rating of 'CMR' and 'FT4' respectively. It is less expensive than LMR-FR, however it emits toxic fumes (HCL) and greater smoke density when burned.

• **LMR®-PVC** is designed for low loss general-purpose indoor/outdoor applications and is somewhat more flexible than the standard polyethylene jacketed LMR.

• **LMR®-PVC-W** is a white-jacketed version of LMR-PVC for marine and other indoor/outdoor applications where color compatibility is desired.

• **Flexibility** and bendability are hallmarks of the LMR-400 cable design. The flexible outer conductor enables the tightest bend radius available for any cable of similar size and performance.

• **Low Loss** is another hallmark feature of LMR-400.

Size for size LMR has the lowest loss of any flexible cable and comparable loss to semirigid hard-line cables.

• **RF Shielding** is 50 dB greater than typical single shielded coax (40 dB). The multi-ply bonded foil outer conductor is rated conservatively at > 90 dB (i.e. >180 dB between two adjacent cables).

• **Weatherability:** LMR-400 cables designed for outdoor exposure incorporate the best materials for UV resistance and have life expectancy in excess of 20 years.

• **Connectors:** A wide variety of connectors are available for LMR-400 cable, including all common interface types, reverse polarity, and a choice of solder or non-solder center pins. Most LMR connectors employ crimp outer attachment using standard hex crimp sizes.

• **Cable Assemblies:** All LMR-400 cable types are available as pre-terminated cable assemblies. Refer to the section on FlexTech for further details.

Part Description					Stock
Part Number	Application	Jacket	Color		Code
LMR-400	Outdoor	PE	Black		54001
LMR-400-DB	Outdoor/Watertight	PE	Black		54091
LMR-400-FR	Indoor -Riser CMR	FRPE	Black		54030
LMR-400-FR-PVC	Indoor -Riser CMR	FRPVC	Black		54073
LMR-400-PVC	Indoor/Outdoor	PVC	Black		54218
LMR-400-PVC-W	Indoor/Outdoor	PVC	White		54204

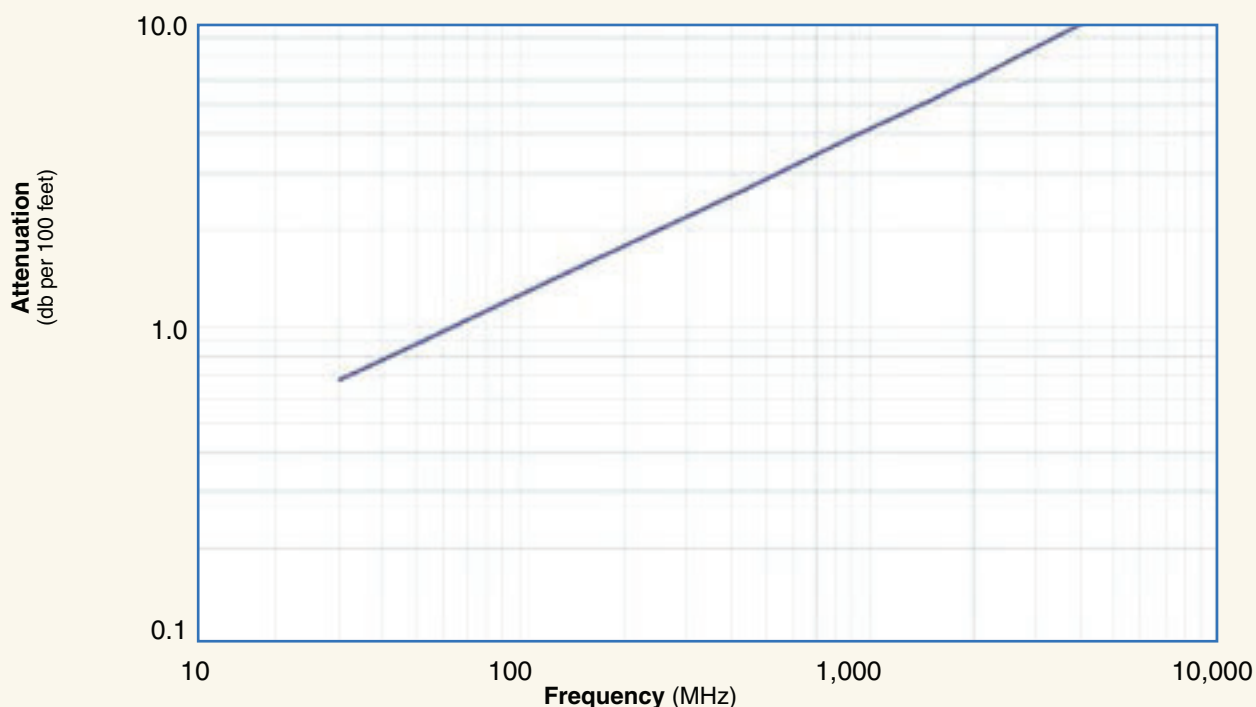
Construction Specifications			
Description	Material	In.	(mm)
Inner Conductor	Solid BCCA1	0.108	(2.74)
Dielectric	Foam PE	0.285	(7.24)
Outer Conductor	Aluminum Tape	0.291	(7.39)
Overall Braid	Tinned Copper	0.320	(8.13)
Jacket	(see table above)	0.405	(10.29)

Mechanical Specifications			
Performance Property	Units	US	(metric)
Bend Radius: installation	in. (mm)	1.00	(25.4)
Bend Radius: repeated	in. (mm)	4.0	(101.6)
Bending Moment	ft-lb (N-m)	0.5	(0.68)
Weight	lb/ft (kg/m)	0.068	(0.10)
Tensile Strength	lb (kg)	160	(72.6)
Flat Plate Crush	lb/in. (kg/mm)	40	(0.71)

Environmental Specifications		
Performance Property	°F	°C
Installation Temperature Range	-40/+185	-40/+85
Storage Temperature Range	-94/+185	-70/+85
Operating Temperature Range	-40/+185	-40/+85

Electrical Specifications			
Performance Property	Units	US	(metric)
Cutoff Frequency	GHz	16.2	
Velocity of Propagation	%	85	
Dielectric Constant	NA	1.38	
Time Delay	nS/ft (nS/m)	1.20	(3.92)
Impedance	ohms	50	
Capacitance	pF/ft (pF/m)	23.9	(78.4)
Inductance	uH/ft (uH/m)	0.060	(0.20)
Shielding Effectiveness	dB	>90	
DC Resistance			
Inner Conductor	ohms/1000ft (/km)	1.39	(4.6)
Outer Conductor	ohms/1000ft (/km)	1.65	(5.4)
Voltage Withstand	Volts DC	2500	
Jacket Spark	Volts RMS	8000	
Peak Power	kW	16	

**Attenuation vs. Frequency (typical)**



Frequency (MHz)	30	50	150	220	450	900	1500	1800	2000	2500	5800
<b>Attenuation dB/100 ft</b>	0.7	0.9	1.5	1.9	2.7	3.9	5.1	5.7	6.0	6.8	10.8
<b>Attenuation dB/100 m</b>	2.2	2.9	5.0	6.1	8.9	12.8	16.8	18.6	19.6	22.2	35.5
<b>Avg. Power kW</b>	3.33	2.57	1.47	1.20	0.83	0.58	0.44	0.40	0.37	0.33	0.21

**Calculate Attenuation =**

$(0.122290) \cdot \sqrt{\text{FMHz}} + (0.000260) \cdot \text{FMHz}$  (interactive calculator available at [http://www.timesmicrowave.com/cable\\_calculators](http://www.timesmicrowave.com/cable_calculators))

**Attenuation:**

VSWR=1.0 ; Ambient = +25°C (77°F)

**Power:**

VSWR=1.0; Ambient = +40°C; Inner Conductor = 100°C (212°F); Sea Level; dry air; atmospheric pressure; no solar loading

## LMR®-195

## Flexible Low Loss Communications Coax

### Ideal for...

- Jumper Assemblies in Wireless Communications Systems
- Short Antenna Feeder runs
- Any application (e.g. WLL, GPS, LMR, WLAN, WISP, WiMax, SCADA, Mobile Antennas) requiring an easily routed, low loss RF cable
- Drop-in replacement for RG-58 and RG-142



• **LMR®** standard is a UV Resistant Polyethylene jacketed cable designed for 20-year service outdoor use. The bending and handling characteristics are significantly better than air-dielectric and corrugated hard-line cables.

• **LMR®-DB** is identical to standard LMR plus has the advantage of being watertight. The addition of waterproofing compound in and around the foil/braid insures continuous reliable service should the jacket be inadvertently damaged during installation or in the future.

• **LMR®-FR** is a non-halogen (non-toxic), low smoke, fire retardant cable designed for in-building runs that can be routed anywhere except air handling plenums. LMR-FR is UL/NEC & CSA rated 'CMR' and 'FT4' respectively, meets FAA FAR25 requirements and is MSHA-P for mining operations.

• **LMR®-FR-PVC** is a general-purpose indoor cable and has a UL/NEC & CSA rating of 'CMR' and 'FT4' respectively. It is less expensive than LMR-FR, however it emits toxic fumes (HCL) and greater smoke density when burned.

• **LMR®-PVC** is designed for low loss general-purpose applications and is somewhat more flexible than the standard polyethylene jacketed LMR.

• **LMR®-PVC-W** is a white-jacketed version of LMR-PVC for marine and other applications where color compatibility is desired.

• **LMR®-MA** is a flexible cable designed specifically for mobile antenna applications. It has a PVC jacket and un-bonded aluminum tape to facilitate end stripping with automated equipment.

• **Flexibility** and bendability are hallmarks of the LMR-195 cable design. The flexible outer conductor enables the tightest bend radius available for any cable of similar size and performance.

• **Low Loss** is another hallmark feature of LMR-195. Size for size LMR has the lowest loss of any flexible cable and comparable loss to semirigid hard-line cables.

• **RF Shielding** is 50 dB greater than typical single shielded coax (40 dB). The multi-ply bonded foil outer conductor is rated conservatively at > 90 dB (i.e. >180 dB between two adjacent cables).

• **Weatherability:** LMR-195 cables designed for outdoor exposure incorporate the best materials for UV resistance and have life expectancy in excess of 20 years.

• **Connectors:** A wide variety of connectors are available for LMR-195 cable, including all common interface types, reverse polarity, and a choice of solder or non-solder center pins. Most LMR connectors employ crimp outer attachment using standard hex crimp sizes.

• **Cable Assemblies:** All LMR-195 cable types are available as pre-terminated cable assemblies. Refer to the section on FlexTech for further details.

Part Description				Stock
Part Number	Application	Jacket	Color	Code
LMR-195	Outdoor	PE	Black	54110
LMR-195-DB	Outdoor/Watertight	PE	Black	54113
LMR-195-FR	Indoor-Riser CMR	FRPE	Black	54111
LMR-195-FR-W	Indoor-Riser CMR	FRPE	White	54158
LMR-195-FR-PVC	Indoor-Riser CMR	FRPVC	Black	54105
LMR-195-MA	Mobile Antennas	PVC	Black	54210
LMR-195-PVC	General Purpose	PVC	Black	54215
LMR-195-PVC-W	General Purpose	PVC	White	54199

Construction Specifications			
Description	Material	In.	(mm)
Inner Conductor	Solid BC	0.037	(0.94)
Dielectric	Foam PE	0.110	(2.79)
Outer Conductor	Aluminum Tape	0.116	(2.95)
Overall Braid	Tinned Copper	0.139	(3.53)
Jacket	(see table above)	0.195	(4.95)



### Mechanical Specifications

Performance Property	Units	US	(metric)
Bend Radius: installation	in. (mm)	0.5	(12.7)
Bend Radius: repeated	in. (mm)	2.0	(50.8)
Bending Moment	ft-lb (N-m)	0.2	(0.27)
Weight	lb/ft (kg/m)	0.021	(0.03)
Tensile Strength	lb (kg)	40	(18.2)
Flat Plate Crush	lb/in. (kg/mm)	15	(0.27)

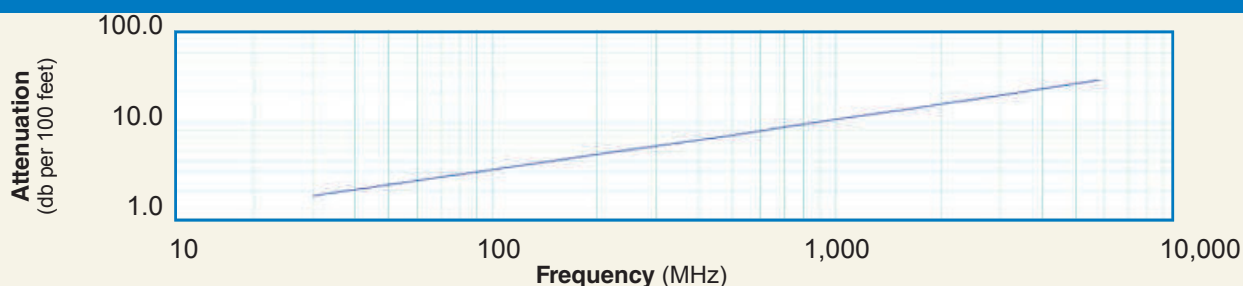
### Environmental Specifications

Performance Property	°F	°C
Installation Temperature Range	-40/+185	-40/+85
Storage Temperature Range	-94/+185	-70/+85
Operating Temperature Range	-40/+185	-40/+85

### Electrical Specifications

Performance Property	Units	US	(metric)
Velocity of Propagation	%	76	
Dielectric Constant	NA	1.56	
Time Delay	nS/ft (nS/m)	1.27	(4.17)
Impedance	ohms	50	
Capacitance	pF/ft (pF/m)	25.4	(83.3)
Inductance	uH/ft (uH/m)	0.064	(0.21)
Shielding Effectiveness	dB	>90	
DC Resistance			
Inner Conductor	ohms/1000ft (/km)	7.6	(24.9)
Outer Conductor	ohms/1000ft (/km)	4.9	(16.1)
Voltage Withstand	Volts DC	1000	
Jacket Spark	Volts RMS	3000	
Peak Power	kW	2.5	

### Attenuation vs. Frequency (typical)



Frequency (MHz)	30	50	150	220	450	900	1500	1800	2000	2500	5800
Attenuation dB/100 ft	2.0	2.5	4.4	5.4	7.8	11.1	14.5	16.0	16.9	19.0	29.9
Attenuation dB/100 m	6.5	8.4	14.6	17.7	25.5	36.5	47.7	52.5	55.4	62.4	98.1
Avg. Power kW	0.89	0.68	0.39	0.32	0.22	0.16	0.12	0.11	0.10	0.09	0.06

Calculate Attenuation =  $(0.356859) \cdot \sqrt{\text{FMHz}} + (0.000470) \cdot \text{FMHz}$  (interactive calculator available at [http://www.timesmicrowave.com/cable\\_calculators](http://www.timesmicrowave.com/cable_calculators))  
 Attenuation: VSWR=1.0; Ambient = +25°C (77°F) Power: VSWR=1.0; Ambient = +40°C; Inner Conductor = 100°C (212°F);  
 Sea Level; dry air; atmospheric pressure; no solar loading



TC-195-NM



TC-195-SM



TC-195-NM-RA-D



TC-195-TM

## Connectors

Interface	Description	Part Number	Stock Code	VSWR** Freq. (GHz)	Coupling Nut	Inner Contact Attach	Outer Contact Attach	Finish* Body /Pin	Length in (mm)	Width in (mm)	Weight lb (g)
N male	Straight Plug	TC-195-NM	3190-1555	<1.25:1 (2.5)	Knurl	Solder	Crimp	S/G	1.5 (38.1)	0.75 (19.1)	0.073 (33.1)
N male	Right Angle	TC-195-NMH-RA-D	3190-2425	<1.35:1 (6)	Hex/Knurl	Solder	Crimp	A/G	1.3 (32.1)	1.19 (30.1)	0.083 (37.5)
SMA male	Straight Plug	TC-195-SM	3190-1553	<1.25:1 (2.5)	Hex	Solder	Crimp	SS/G	1.0 (25.4)	0.32 (8.1)	0.015 (6.8)
TNC male	Straight Plug	TC-195-TM	3190-1554	<1.25:1 (2.5)	Knurl	Solder	Crimp	S/G	1.4 (35.6)	0.59 (15.0)	0.045 (20.4)

\* Finish metals: N=Nickel, S=Silver, G=Gold, SS=Stainless Steel, A=Alloy \*\*VSWR spec based on 3 foot cable with a connector pair

## Install Tools

Type	Part Number	Stock Code	Description
Crimp Tool	CT-240/200/195/100	3190-667	Crimp tool for LMR-100, 195, 200 and 240 connectors
Cutting Tool	CCT-01	3190-1544	Cable end flush cut tool
Deburr Tool	DBT-U	3192-001	Removes center conductor rough edges
Replacement Blade	RB-01	3190-1609	Replacement blade for cutting tool



CT-240/200/195/100



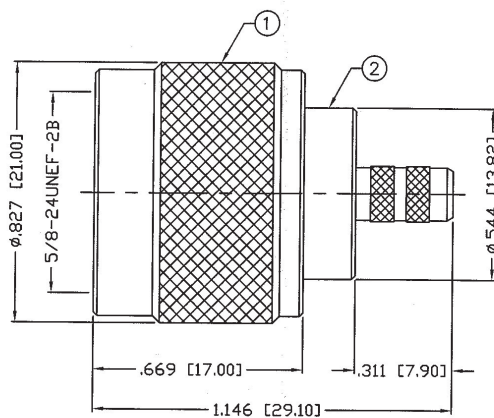
DBT-U



CCT-01

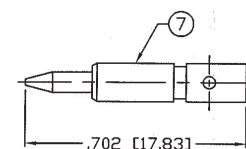
THIS DRAWING CONTAINS INFORMATION PROPRIETARY TO RF INDUSTRIES,  
ANY UNAUTHORIZED USE OF THIS DRAWING IS EXPRESSLY PROHIBITED  
WITHOUT WRITTEN PERMISSION FROM RF INDUSTRIES.  
ANY VIOLATION IS PUNISHABLE UNDER U.S. COPYRIGHT LAWS.

ALL DIMENSIONS ARE REFERENCE ONLY

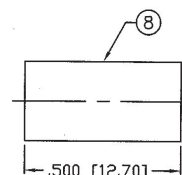


### SPECIFICATIONS:

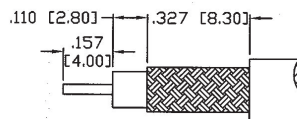
IMPEDANCE: 50 Ohms  
FREQUENCY RANGE: 0-11 GHz  
VSWR: 1.3 Max. @ 9 GHz  
INSERTION LOSS: .06 dB Max. x  $\sqrt{f(\text{GHz})}$   
WORKING VOLTAGE: 1k V rms @ sea level  
TEMPERATURE RANGE: -65°C TO 165°C  
INSULATION RESISTANCE: 5k M Ohms min.  
(C) FOR RG-58, 58A, 58C, 141, 141A, BELDEN 8240,  
8259, 8262, 9201, 9203, 9310, 9311 & COMM/SCOPE 0268



RECOMMENDED CRIMP DIE: .100



RECOMMENDED CRIMP DIE: .213



RECOMMENDED STRIPPING DIM'S

1 SHELL	1 BRASS	SILVER, 80μ"	008974
2 BODY	1 BRASS	SILVER, 80μ"	
3 INSULATOR	1 PTFE	---	
4 GROUND RING	1 BRASS	SILVER, 80μ"	
5 GASKET	1 SILICONE	---	
6 RETAINING RING	1 SUS 304	---	
7 PIN	1 BRASS	GOLD, 3μ"	
8 FERRULE	1 BRASS	SILVER, 80μ"	
9			
10			
11			
12			
13			
14			
# DESCRIPTION	QTY	MATERIAL	FINISH
			APPROVALS
			DATE

### UNLESS OTHERWISE SPECIFIED:

1. REMOVE ALL BURRS
2. BREAK ALL CORNERS & EDGES .005 R. MAX.
3. CHAMFER 1ST & LAST THREADS 45°
4. SURFACE ROUGHNESS 63 FINISH MIL-STD-10
5. DIAMETERS ON COMMON CENTERS TO BE CONCENTRIC WITHIN .002 T.I.R.
6. ALL DIMENSIONS ARE AFTER PLATING.

DIMENSIONS ARE IN INCHES  
AND [MILLIMETERS]  
UNLESS OTHERWISE NOTED  
TOLERANCES ARE:

DECIMALS	DIAMETER
.XXX±.003 [.08]	.XXX±.001 [.03]
.XX±.005 [.13]	.XX±.003 [.08]

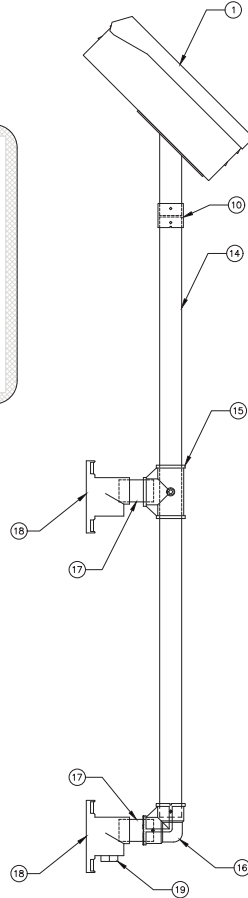
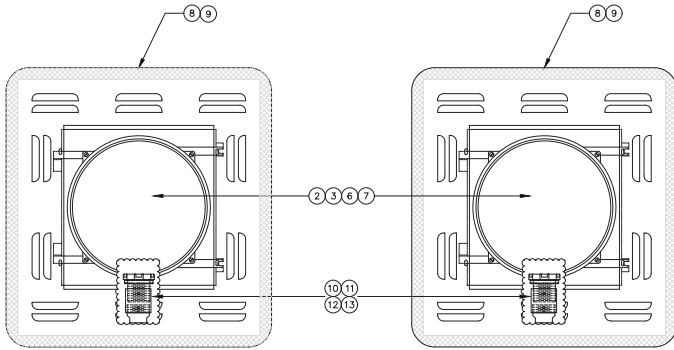
**RF connectors**  
DIVISION OF RF INDUSTRIES, LTD.

7610 MIRAMAR RD  
SAN DIEGO, CA 92126  
(858) 549-6340  
(858) 549-6345 FAX

## N PLUG, CRIMP

SIZE	CABLE GROUP	DWG NO.	REV
A	C	RFN-1005-3C	B
SCALE:	NTS	CAD FILE	OUTLINE
			SHEET 1 OF 1

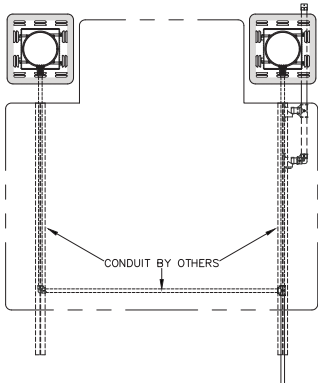




BILL OF MATERIAL			
ITEM	QTY.	DESCRIPTION	PART NUMBERS
1	1	SOLAR ENGINE, 24 HOUR BEACON, R247-E	CM-84292
2	2	SEALING CAP KIT	VSE-3054B
3	2	LED LENS, 12" YELLOW BALL	CM-84296
4	1	P.B. HARNESS/ LED MODULE HARNESS, 16'	CM-84390
5	1	P.B. HARNESS/ LED MODULE HARNESS, 36'	CM-84391
6	2	SIGNAL, 1-12" CAST FOR LED USE	J.TA11VJF20000
7	2	VISOR TUNNEL, 12" ALUMINUM BLACK	JE8265P1-14
8	2	BACKPLATE, 1-12", ALUM LOUVERED, 5" BORDER BLACK	JE1692P41-14
9	10	REFLECTIVE SHEETING, TYPE J FL.YELLOW, 1" x 1' LONG	QBP3981Y-01
10	3	COUPLING, 1-1/2" NOTCHED	VSE-0346
11	2	SERRATED LOCKING RING	VSE-0360
12	2	CAST COLLARD NIPPLE, ALUMINUM	VSE-0443
13	2	REDUCER BUSHING, 1-1/2" TO 1-1/4"	ORRE54
14	1	PIPE NIPPLE, 1.5" x 52"	VSE-0436-52
15	1	HORIZONTAL SLIP TEE, 1-1/2"	VSE-0474
16	1	SERRATED ELBOW, 1-1/2" NATURAL	VSE-0457
17	2	NIPPLE, ALL THREAD, 1.5"x3"	VSE-0309-03
18	2	EXTENDED HUB PLATE W/1-1/4"	VSE-0466
19	1	SQUARE HEAD PLUG 1-1/4"	VSE-0479
20	2	STANDARD BATTERY, 7 AHR, E SERIES ONLY	CM-67620

NS = NOT SHOWN

NTS  
NOT TO SCALE



NOTE:  
SHOWN ONLY AS A REPRESENTATION OF FINAL ASSEMBLY  
FINAL ASSEMBLY DETERMINED BY CONTRACTOR

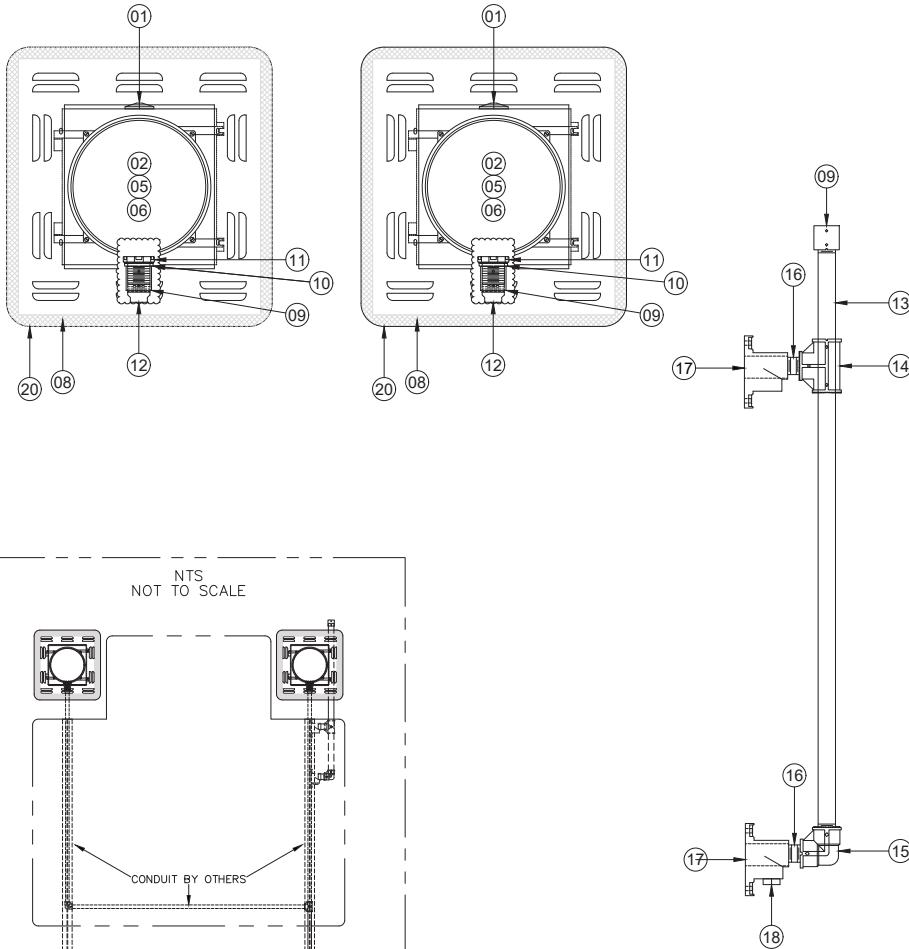
Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 55  
Qty. 1



#### CONFIDENTIALITY AGREEMENT

All users of this document agree to respect and keep confidential all proprietary information pertaining to Path Master, Inc. and its customers. Any duplication or transmission of this entire document or any part thereof, without written consent of Path Master, Inc. is strictly prohibited.

TITLE SOLAR SIGN FLASHER ASSEMBLY FOR I-BEAM, W/DOT, BLACK WITH ECONOLITE BEACONS			
DRAWN BY SJM	APPROVED BY	CAD ZS0N-WV01-BH R247E	SCALE 1"=6'
DATE 7-12-23	DATE		
REFERENCE			DRAWING NO. DC-4613



NOTE:  
SHOWN ONLY AS A REPRESENTATION OF FINAL ASSEMBLY  
FINAL ASSEMBLY DETERMINED BY CONTRACTOR

# BILL OF MATERIAL

ITEM	QTY.	DESCRIPTION	PART NUMBER
1	2	SEALING CAP KIT	VSE-3054*
2	2	LED LENS, 12" YELLOW BALL	CM-84296
3	1	P.B. HARNESS/ LED MODULE HARNESS, 16'	CM-84390
4	1	P.B. HARNESS/ LED MODULE HARNESS, 36'	CM-84391
5	2	SIGNAL, 1-12" CAST FOR LED USE	J.TA11VJF20000
6	2	VISOR TUNNEL, 12" ALUMINUM	J.E8265P1-14
7	2	BACKPLATE, 1-12", 5" BORDER	J.BPTA105BPAL
8	10	REFLECTIVE SHEETING, TYPE J FL-YELLOW, 1" x 1' LONG	QBP3981Y-01
9	3	COUPLING, 1-1/2" NOTCHED	VSE-0346
10	2	SERRATED LOCKING RING	VSE-0360
11	2	CAST COLLARD NIPPLE, ALUMINUM	VSE-0443
12	2	REDUCER BUSHING, 1-1/2" TO 1-1/4"	GRRE54
13	1	PIPE NIPPLE, 1.5" x 52"	VSE-0436-52
14	1	HORIZONTAL SLIP TEE, 1-1/2"	VSE-0474
15	1	SERRATED ELBOW, 1-1/2" NATURAL	VSE-0457
16	2	NIPPLE, ALL THREAD, 1.5"x3"	VSE-0309-03
17	2	EXTENDED HUB PLATE W/1-1/4"	VSE-0466
18	1	SQUARE HEAD PLUG 1-1/4"	VSE-0479
19	2	STANDARD BATTERY, 17.2 AHR, F SERIES ONLY	CM-37912
20	2	BACKPLATE, 1-12" ALUM LOUVERED, 5" BORDER BLACK	J.E1692P41-14

NS = NOT SHOWN

COLOR DETAIL	
REPLACE "*" IN PART NUMBER WITH	COLOR LISTED BELOW
COLOR CODE	COLOR
BLANK NO "*"	NATURAL
Y	YELLOW
B	BLACK
GRN	GREEN
BZ	BRONZE
E	EASTON BLUE
EB	EASTON BLUE
DC	DARK GREEN
H1	NEW ALBANY GREEN
H1	GAHANNA GREEN
H2	IND. GREEN
H3	URBANA GREEN

Traffic Signal Parts & Equipment  
CRFQ 0803 DOT2300000151  
B/R# 56  
Qty. 1



## CONFIDENTIALITY AGREEMENT

All users of this document agree to respect and keep confidential all proprietary information pertaining to Path Master, Inc. and its customers. Any duplication or transmission of this entire document or any part thereof, without written consent of Path Master, Inc. is strictly prohibited.

TITLE		SOLAR SIGN FLASHER ASSEMBLY FOR I-BEAM, WVDOT WITH ECONOLITE BEACONS	
DRAWN BY	SJM	APPROVED BY	CAD SIGN-WV01-JB
DATE	7-12-23	DATE	SCALE 1"=6'
REFERENCE	DRAWING NO. DC-4612		

# EVO RADAR

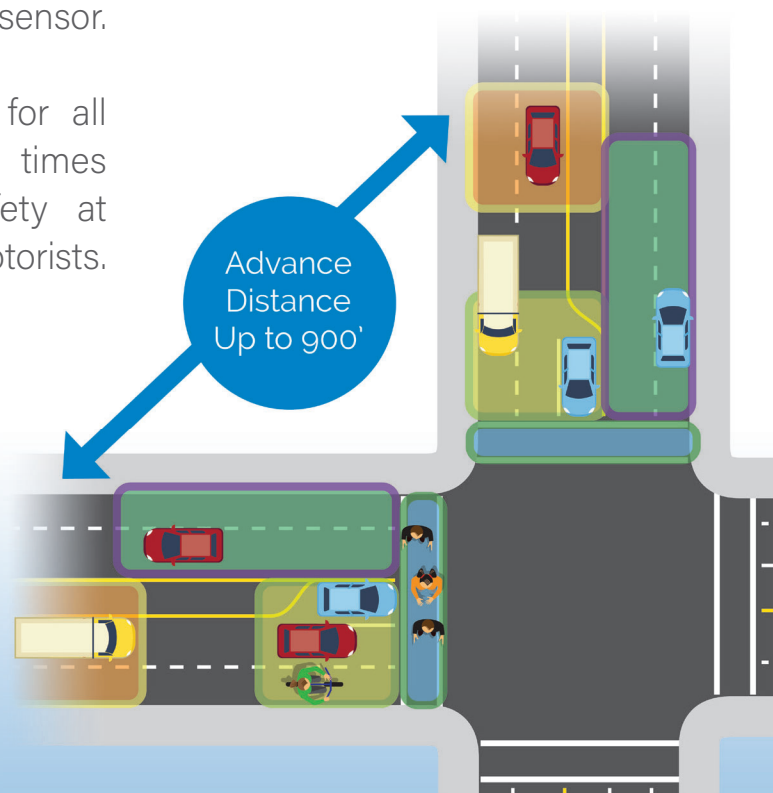
The Econolite EVO RADAR sensor is a one-stop-shop detection product that is the latest, most capable radar on the market. EVO RADAR uses forward-fire FMCW MIMO radar design and technology to achieve superior traffic detection accuracy and reliability across a variety of detection objectives, including stop bar, advance, departure, bicycle, and pedestrian detection.

The EVO RADAR sensor solution is ideally suited for a variety of intersections, using a 110-degree field-of-view designed to cover two approaches with a single sensor.

Econolite's EVO RADAR sensor is designed for all approaches, which helps to reduce travel times and traffic congestion, while increasing safety at intersections for pedestrians, cyclists, and motorists.

## Key Features

- Only 2 Sensors Needed Per Intersection, Great Value
- Simple to Set Up & Use
- 900' of Detection Approach Area
- Departure Detection
- Pedestrian Detection
- Bike Detection





## Why EVO RADAR?

Functions & Features	EVO RADAR
900' Advance Detection	✓
Pedestrian and Bicycle Detection	✓
Multiple Approaches with a Single Sensor	✓
2 Sensors Needed Per Intersection	✓
Departure Detection	✓
Advance Detection	✓
Tracks or Detects 512 Objects	✓
120 Programmable Outputs	✓
Data	
Traffic Data: Speed & Object Classification	✓
Traffic Data: Vehicle Counts	✓
ETA Function	✓
Installation	
14-2 Grounded Cable	✓

## General Data

Specification	EVO RADAR
Range	900 ft.
Horizontal Field of View Angle	110°
Max Angle to Traffic Flow	60°
Ambient Temperature	-40° to +165°F (-40° to +74°C)
Environmental Protection	IP67
Weight (approximate)	5.5 lbs
Dimensions (L x H x W)	12.1 x 5.4 x 2.81 in (308 x 136 x 71mm)
Power Supply	20-28 VDC 36 W @ 20°C
Frequency Band	24.5-24.25 GHz (K band)
Output Power	20 dBm PK / <108dBμV/m AVG*
Interface	100BaseT Ethernet
Compliance	ETSI EN 300-440, FCC part 15, RSS-310, RSS-210, SRRC, KCC, NCC
Warranty	3 Years

\*Using 20dBm power output enclosure detection range. Used in specific installation ranges.



# EVO RADAR

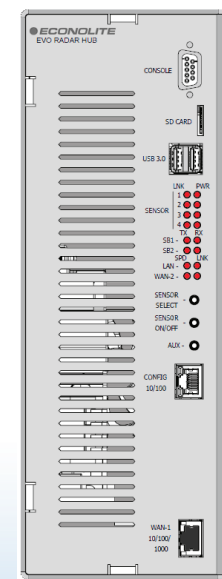
The Econolite EVO RADAR system is the next generation, high-performance, vehicle, pedestrian, and object detection system. The system uses wide angle, long range, radar sensors, which allow full intersection coverage from stop bar to advanced detection, using just two sensors for most intersection configurations.

EVO RADAR system consists of three major sub-systems: EVO RADAR Sensors, J-Boxes, and HUB, and also includes a Traffic Manager program.

The EVO RADAR HUB has significant processing power with its quad-core, i7 processor, and provides easy system integration with built-in interfaces for NEMA TS2 SDLC, ATC / ITS SDLC, TS1 & 33x PIO, Ethernet, and built-in power supplies.



**Traffic Manager Program**



**EVO RADAR HUB**



The system uses Power Line Communications (PLC) to enable 10/100 Ethernet communications to EVO RADAR Sensors, up to 1000 feet from the HUB, using a shielded, AWG 14/2 cable. The maximum data rate is 88 Mbps.

EVO RADAR Sensors send vehicle and pedestrian detection information to the EVO RADAR HUB via the PLC. The HUB converts this information into NEMA TS2 and ATC controller SDLC messages, and PIO outputs for legacy systems. The HUB also provides high-resolution logging of detection information, and an interface for EVO RADAR configuration software.

### EVO RADAR HUB Includes:

Functions & Features
• Eight PLC channel connectors (2 connectors per PLC channel)
• One Intel, quad-core, 1 GHz, i7 processor module, and a separate 300MHz I/O processor
• One 25-pin, ATC compatible, C12S connector to provide NEMA Port 1 and ATC SDLC interfaces
• One 44-Pin, PIO connector providing 24 detector output and 16 "color" inputs
• Two 10/100 Ethernet ports
• Two USB ports
• One SD Card slot
• Device status LEDs
• Three configuration push buttons
• One EIA-232 terminal port
• Built-in 48VDC @ 600 W, and 12VDC @ 150 W power supplies

### General Data

Specification	EVO RADAR HUB
<b>Dimensions (H x W x D)</b>	11.24 x 4.01 W x 10.57 in (286 x 102 x 269mm)
<b>Weight</b>	6.42 lbs (2.91 kg)
<b>Operating Temperature</b>	-34.6°F to +165.2°F (-37°C to +74°C)
<b>Operating Voltage</b>	85 VAC to 265 VAC
<b>NEMA TS2 Compliance</b>	Compliant for temperature range, voltage, transients, vibration and shock.
<b>FCC Part 15 Compliance</b>	FCC Part 15 Subpart B, Class A

### Mounting Information

Wall mount, shelf mount, and rack mount options are available to support different cabinet types.





## **GENERAL TERMS AND CONDITIONS:**

**1. CONTRACTUAL AGREEMENT:** Issuance of an Award Document signed by the Purchasing Division Director, or his designee, and approved as to form by the Attorney General's office constitutes acceptance by the State of this Contract made by and between the State of West Virginia and the Vendor. Vendor's signature on its bid, or on the Contract if the Contract is not the result of a bid solicitation, signifies Vendor's agreement to be bound by and accept the terms and conditions contained in this Contract.

**2. DEFINITIONS:** As used in this Solicitation/Contract, the following terms shall have the meanings attributed to them below. Additional definitions may be found in the specifications included with this Solicitation/Contract.

**2.1. "Agency" or "Agencies"** means the agency, board, commission, or other entity of the State of West Virginia that is identified on the first page of the Solicitation or any other public entity seeking to procure goods or services under this Contract.

**2.2. "Bid" or "Proposal"** means the vendors submitted response to this solicitation.

**2.3. "Contract"** means the binding agreement that is entered into between the State and the Vendor to provide the goods or services requested in the Solicitation.

**2.4. "Director"** means the Director of the West Virginia Department of Administration, Purchasing Division.

**2.5. "Purchasing Division"** means the West Virginia Department of Administration, Purchasing Division.

**2.6. "Award Document"** means the document signed by the Agency and the Purchasing Division, and approved as to form by the Attorney General, that identifies the Vendor as the contract holder.

**2.7. "Solicitation"** means the official notice of an opportunity to supply the State with goods or services that is published by the Purchasing Division.

**2.8. "State"** means the State of West Virginia and/or any of its agencies, commissions, boards, etc. as context requires.

**2.9. "Vendor" or "Vendors"** means any entity submitting a bid in response to the Solicitation, the entity that has been selected as the lowest responsible bidder, or the entity that has been awarded the Contract as context requires.

**3. CONTRACT TERM; RENEWAL; EXTENSION:** The term of this Contract shall be determined in accordance with the category that has been identified as applicable to this Contract below:

☒ **Term Contract**

**Initial Contract Term:** The Initial Contract Term will be for a period of One year. The Initial Contract Term becomes effective on the effective start date listed on the first page of this Contract, identified as the State of West Virginia contract cover page containing the signatures of the Purchasing Division, Attorney General, and Encumbrance clerk (or another page identified as \_\_\_\_\_), and the Initial Contract Term ends on the effective end date also shown on the first page of this Contract.

**Renewal Term:** This Contract may be renewed upon the mutual written consent of the Agency, and the Vendor, with approval of the Purchasing Division and the Attorney General's office (Attorney General approval is as to form only). Any request for renewal should be delivered to the Agency and then submitted to the Purchasing Division thirty (30) days prior to the expiration date of the initial contract term or appropriate renewal term. A Contract renewal shall be in accordance with the terms and conditions of the original contract. Unless otherwise specified below, renewal of this Contract is limited to <sup>3</sup> successive one (1) year periods or multiple renewal periods of less than one year, provided that the multiple renewal periods do not exceed the total number of months available in all renewal years combined. Automatic renewal of this Contract is prohibited. Renewals must be approved by the Vendor, Agency, Purchasing Division and Attorney General's office (Attorney General approval is as to form only)

☐ **Alternate Renewal Term** – This contract may be renewed for \_\_\_\_\_ successive \_\_\_\_\_ year periods or shorter periods provided that they do not exceed the total number of months contained in all available renewals. Automatic renewal of this Contract is prohibited. Renewals must be approved by the Vendor, Agency, Purchasing Division and Attorney General's office (Attorney General approval is as to form only)

**Delivery Order Limitations:** In the event that this contract permits delivery orders, a delivery order may only be issued during the time this Contract is in effect. Any delivery order issued within one year of the expiration of this Contract shall be effective for one year from the date the delivery order is issued. No delivery order may be extended beyond one year after this Contract has expired.

☐ **Fixed Period Contract:** This Contract becomes effective upon Vendor's receipt of the notice to proceed and must be completed within \_\_\_\_\_ days.

☐ **Fixed Period Contract with Renewals:** This Contract becomes effective upon Vendor's receipt of the notice to proceed and part of the Contract more fully described in the attached specifications must be completed within \_\_\_\_\_ days. Upon completion of the work covered by the preceding sentence, the vendor agrees that:

☐ the contract will continue for \_\_\_\_\_ years;

☐ the contract may be renewed for \_\_\_\_\_ successive \_\_\_\_\_ year periods or shorter periods provided that they do not exceed the total number of months contained in all available renewals. Automatic renewal of this Contract is prohibited. Renewals must be approved by the Vendor, Agency, Purchasing Division and Attorney General's Office (Attorney General approval is as to form only).

☐ **One-Time Purchase:** The term of this Contract shall run from the issuance of the Award Document until all of the goods contracted for have been delivered, but in no event will this Contract extend for more than one fiscal year.

☐ **Construction/Project Oversight:** This Contract becomes effective on the effective start date listed on the first page of this Contract, identified as the State of West Virginia contract cover page containing the signatures of the Purchasing Division, Attorney General, and Encumbrance clerk (or another page identified as \_\_\_\_\_), and continues until the project for which the vendor is providing oversight is complete.

☐ **Other:** Contract Term specified in \_\_\_\_\_

**4. AUTHORITY TO PROCEED:** Vendor is authorized to begin performance of this contract on the date of encumbrance listed on the front page of the Award Document unless either the box for "Fixed Period Contract" or "Fixed Period Contract with Renewals" has been checked in Section 3 above. If either "Fixed Period Contract" or "Fixed Period Contract with Renewals" has been checked, Vendor must not begin work until it receives a separate notice to proceed from the State. The notice to proceed will then be incorporated into the Contract via change order to memorialize the official date that work commenced.

**5. QUANTITIES:** The quantities required under this Contract shall be determined in accordance with the category that has been identified as applicable to this Contract below.

☒ **Open End Contract:** Quantities listed in this Solicitation/Award Document are approximations only, based on estimates supplied by the Agency. It is understood and agreed that the Contract shall cover the quantities actually ordered for delivery during the term of the Contract, whether more or less than the quantities shown.

☐ **Service:** The scope of the service to be provided will be more clearly defined in the specifications included herewith.

☐ **Combined Service and Goods:** The scope of the service and deliverable goods to be provided will be more clearly defined in the specifications included herewith.

☐ **One-Time Purchase:** This Contract is for the purchase of a set quantity of goods that are identified in the specifications included herewith. Once those items have been delivered, no additional goods may be procured under this Contract without an appropriate change order approved by the Vendor, Agency, Purchasing Division, and Attorney General's office.

☐ **Construction:** This Contract is for construction activity more fully defined in the specifications.

**6. EMERGENCY PURCHASES:** The Purchasing Division Director may authorize the Agency to purchase goods or services in the open market that Vendor would otherwise provide under this Contract if those goods or services are for immediate or expedited delivery in an emergency. Emergencies shall include, but are not limited to, delays in transportation or an unanticipated increase in the volume of work. An emergency purchase in the open market, approved by the Purchasing Division Director, shall not constitute a breach of this Contract and shall not entitle the Vendor to any form of compensation or damages. This provision does not excuse the State from fulfilling its obligations under a One-Time Purchase contract.

**7. REQUIRED DOCUMENTS:** All of the items checked in this section must be provided to the Purchasing Division by the Vendor as specified:

☐ **LICENSE(S) / CERTIFICATIONS / PERMITS:** In addition to anything required under the Section of the General Terms and Conditions entitled Licensing, the apparent successful Vendor shall furnish proof of the following licenses, certifications, and/or permits upon request and in a form acceptable to the State. The request may be prior to or after contract award at the State's sole discretion.

☐☐☐☐

The apparent successful Vendor shall also furnish proof of any additional licenses or certifications contained in the specifications regardless of whether or not that requirement is listed above.

**8. INSURANCE:** The apparent successful Vendor shall furnish proof of the insurance identified by a checkmark below prior to Contract award. The insurance coverages identified below must be maintained throughout the life of this contract. Thirty (30) days prior to the expiration of the insurance policies, Vendor shall provide the Agency with proof that the insurance mandated herein has been continued. Vendor must also provide Agency with immediate notice of any changes in its insurance policies, including but not limited to, policy cancelation, policy reduction, or change in insurers. The apparent successful Vendor shall also furnish proof of any additional insurance requirements contained in the specifications prior to Contract award regardless of whether that insurance requirement is listed in this section.

Vendor must maintain:

☒ **Commercial General Liability Insurance** in at least an amount of: 1,000,000.00 per occurrence.

☒ **Automobile Liability Insurance** in at least an amount of: 1,000,000.00 per occurrence.

☐ **Professional/Malpractice/Errors and Omission Insurance** in at least an amount of: \_\_\_\_\_ per occurrence. Notwithstanding the forgoing, Vendor's are not required to list the State as an additional insured for this type of policy.

☐ **Commercial Crime and Third Party Fidelity Insurance** in an amount of: \_\_\_\_\_ per occurrence.

☐ **Cyber Liability Insurance** in an amount of: \_\_\_\_\_ per occurrence.

☐ **Builders Risk Insurance** in an amount equal to 100% of the amount of the Contract.

☐ **Pollution Insurance** in an amount of: \_\_\_\_\_ per occurrence.

☐ **Aircraft Liability** in an amount of: \_\_\_\_\_ per occurrence.

☐☐☐☐

**9. WORKERS' COMPENSATION INSURANCE:** Vendor shall comply with laws relating to workers compensation, shall maintain workers' compensation insurance when required, and shall furnish proof of workers' compensation insurance upon request.

**10. VENUE:** All legal actions for damages brought by Vendor against the State shall be brought in the West Virginia Claims Commission. Other causes of action must be brought in the West Virginia court authorized by statute to exercise jurisdiction over it.

**11. LIQUIDATED DAMAGES:** This clause shall in no way be considered exclusive and shall not limit the State or Agency's right to pursue any other available remedy. Vendor shall pay liquidated damages in the amount specified below or as described in the specifications:

☐ \_\_\_\_\_ for \_\_\_\_\_.

☒ Liquidated Damages Contained in the Specifications.

☐ Liquidated Damages Are Not Included in this Contract.

**12. ACCEPTANCE:** Vendor's signature on its bid, or on the certification and signature page, constitutes an offer to the State that cannot be unilaterally withdrawn, signifies that the product or service proposed by vendor meets the mandatory requirements contained in the Solicitation for that product or service, unless otherwise indicated, and signifies acceptance of the terms and conditions contained in the Solicitation unless otherwise indicated.

**13. PRICING:** The pricing set forth herein is firm for the life of the Contract, unless specified elsewhere within this Solicitation/Contract by the State. A Vendor's inclusion of price adjustment provisions in its bid, without an express authorization from the State in the Solicitation to do so, may result in bid disqualification. Notwithstanding the foregoing, Vendor must extend any publicly advertised sale price to the State and invoice at the lower of the contract price or the publicly advertised sale price.

**14. PAYMENT IN ARREARS:** Payments for goods/services will be made in arrears only upon receipt of a proper invoice, detailing the goods/services provided or receipt of the goods/services, whichever is later. Notwithstanding the foregoing, payments for software maintenance, licenses, or subscriptions may be paid annually in advance.

**15. PAYMENT METHODS:** Vendor must accept payment by electronic funds transfer and P-Card. (The State of West Virginia's Purchasing Card program, administered under contract by a banking institution, processes payment for goods and services through state designated credit cards.)

**16. TAXES:** The Vendor shall pay any applicable sales, use, personal property or any other taxes arising out of this Contract and the transactions contemplated thereby. The State of West Virginia is exempt from federal and state taxes and will not pay or reimburse such taxes.



**17. ADDITIONAL FEES:** Vendor is not permitted to charge additional fees or assess additional charges that were not either expressly provided for in the solicitation published by the State of West Virginia, included in the Contract, or included in the unit price or lump sum bid amount that Vendor is required by the solicitation to provide. Including such fees or charges as notes to the solicitation may result in rejection of vendor's bid. Requesting such fees or charges be paid after the contract has been awarded may result in cancellation of the contract.

**18. FUNDING:** This Contract shall continue for the term stated herein, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise made available, this Contract becomes void and of no effect beginning on July 1 of the fiscal year for which funding has not been appropriated or otherwise made available. If that occurs, the State may notify the Vendor that an alternative source of funding has been obtained and thereby avoid the automatic termination. Non-appropriation or non-funding shall not be considered an event of default.

**19. CANCELLATION:** The Purchasing Division Director reserves the right to cancel this Contract immediately upon written notice to the vendor if the materials or workmanship supplied do not conform to the specifications contained in the Contract. The Purchasing Division Director may also cancel any purchase or Contract upon 30 days written notice to the Vendor in accordance with West Virginia Code of State Rules § 148-1-5.2.b.

**20. TIME:** Time is of the essence regarding all matters of time and performance in this Contract.

**21. APPLICABLE LAW:** This Contract is governed by and interpreted under West Virginia law without giving effect to its choice of law principles. Any information provided in specification manuals, or any other source, verbal or written, which contradicts or violates the West Virginia Constitution, West Virginia Code, or West Virginia Code of State Rules is void and of no effect.

**22. COMPLIANCE WITH LAWS:** Vendor shall comply with all applicable federal, state, and local laws, regulations and ordinances. By submitting a bid, Vendor acknowledges that it has reviewed, understands, and will comply with all applicable laws, regulations, and ordinances.

**SUBCONTRACTOR COMPLIANCE:** Vendor shall notify all subcontractors providing commodities or services related to this Contract that as subcontractors, they too are required to comply with all applicable laws, regulations, and ordinances. Notification under this provision must occur prior to the performance of any work under the contract by the subcontractor.

**23. ARBITRATION:** Any references made to arbitration contained in this Contract, Vendor's bid, or in any American Institute of Architects documents pertaining to this Contract are hereby deleted, void, and of no effect.

**24. MODIFICATIONS:** This writing is the parties' final expression of intent. Notwithstanding anything contained in this Contract to the contrary no modification of this Contract shall be binding without mutual written consent of the Agency, and the Vendor, with approval of the Purchasing Division and the Attorney General's office (Attorney General approval is as to form only). Any change to existing contracts that adds work or changes contract cost, and were not included in the original contract, must be approved by the Purchasing Division and the Attorney General's Office (as to form) prior to the implementation of the change or commencement of work affected by the change.

**25. WAIVER:** The failure of either party to insist upon a strict performance of any of the terms or provision of this Contract, or to exercise any option, right, or remedy herein contained, shall not be construed as a waiver or a relinquishment for the future of such term, provision, option, right, or remedy, but the same shall continue in full force and effect. Any waiver must be expressly stated in writing and signed by the waiving party.

**26. SUBSEQUENT FORMS:** The terms and conditions contained in this Contract shall supersede any and all subsequent terms and conditions which may appear on any form documents submitted by Vendor to the Agency or Purchasing Division such as price lists, order forms, invoices, sales agreements, or maintenance agreements, and includes internet websites or other electronic documents. Acceptance or use of Vendor's forms does not constitute acceptance of the terms and conditions contained thereon.

**27. ASSIGNMENT:** Neither this Contract nor any monies due, or to become due hereunder, may be assigned by the Vendor without the express written consent of the Agency, the Purchasing Division, the Attorney General's office (as to form only), and any other government agency or office that may be required to approve such assignments.

**28. WARRANTY:** The Vendor expressly warrants that the goods and/or services covered by this Contract will: (a) conform to the specifications, drawings, samples, or other description furnished or specified by the Agency; (b) be merchantable and fit for the purpose intended; and (c) be free from defect in material and workmanship.

**29. STATE EMPLOYEES:** State employees are not permitted to utilize this Contract for personal use and the Vendor is prohibited from permitting or facilitating the same.

**30. PRIVACY, SECURITY, AND CONFIDENTIALITY:** The Vendor agrees that it will not disclose to anyone, directly or indirectly, any such personally identifiable information or other confidential information gained from the Agency, unless the individual who is the subject of the information consents to the disclosure in writing or the disclosure is made pursuant to the Agency's policies, procedures, and rules. Vendor further agrees to comply with the Confidentiality Policies and Information Security Accountability Requirements, set forth in <http://www.state.wv.us/admin/purchase/privacy/default.html>.

**31. YOUR SUBMISSION IS A PUBLIC DOCUMENT:** Vendor's entire response to the Solicitation and the resulting Contract are public documents. As public documents, they will be disclosed to the public following the bid/proposal opening or award of the contract, as required by the competitive bidding laws of West Virginia Code §§ 5A-3-1 et seq., 5-22-1 et seq., and 5G-1-1 et seq. and the Freedom of Information Act West Virginia Code §§ 29B-1-1 et seq.

**DO NOT SUBMIT MATERIAL YOU CONSIDER TO BE CONFIDENTIAL, A TRADE SECRET, OR OTHERWISE NOT SUBJECT TO PUBLIC DISCLOSURE.**

Submission of any bid, proposal, or other document to the Purchasing Division constitutes your explicit consent to the subsequent public disclosure of the bid, proposal, or document. The Purchasing Division will disclose any document labeled "confidential," "proprietary," "trade secret," "private," or labeled with any other claim against public disclosure of the documents, to include any "trade secrets" as defined by West Virginia Code § 47-22-1 et seq. All submissions are subject to public disclosure without notice.

**32. LICENSING:** In accordance with West Virginia Code of State Rules § 148-1-6.1.e, Vendor must be licensed and in good standing in accordance with any and all state and local laws and requirements by any state or local agency of West Virginia, including, but not limited to, the West Virginia Secretary of State's Office, the West Virginia Tax Department, West Virginia Insurance Commission, or any other state agency or political subdivision. Obligations related to political subdivisions may include, but are not limited to, business licensing, business and occupation taxes, inspection compliance, permitting, etc. Upon request, the Vendor must provide all necessary releases to obtain information to enable the Purchasing Division Director or the Agency to verify that the Vendor is licensed and in good standing with the above entities.

**SUBCONTRACTOR COMPLIANCE:** Vendor shall notify all subcontractors providing commodities or services related to this Contract that as subcontractors, they too are required to be licensed, in good standing, and up-to-date on all state and local obligations as described in this section. Obligations related to political subdivisions may include, but are not limited to, business licensing, business and occupation taxes, inspection compliance, permitting, etc. Notification under this provision must occur prior to the performance of any work under the contract by the subcontractor.

**33. ANTITRUST:** In submitting a bid to, signing a contract with, or accepting a Award Document from any agency of the State of West Virginia, the Vendor agrees to convey, sell, assign, or transfer to the State of West Virginia all rights, title, and interest in and to all causes of action it may now or hereafter acquire under the antitrust laws of the United States and the State of West Virginia for price fixing and/or unreasonable restraints of trade relating to the particular commodities or services purchased or acquired by the State of West Virginia. Such assignment shall be made and become effective at the time the purchasing agency tenders the initial payment to Vendor.

**34. VENDOR NON-CONFLICT:** Neither Vendor nor its representatives are permitted to have any interest, nor shall they acquire any interest, direct or indirect, which would compromise the performance of its services hereunder. Any such interests shall be promptly presented in detail to the Agency.

Revised 11/1/2022

**35. VENDOR RELATIONSHIP:** The relationship of the Vendor to the State shall be that of an independent contractor and no principal-agent relationship or employer-employee relationship is contemplated or created by this Contract. The Vendor as an independent contractor is solely liable for the acts and omissions of its employees and agents. Vendor shall be responsible for selecting, supervising, and compensating any and all individuals employed pursuant to the terms of this Solicitation and resulting contract. Neither the Vendor, nor any employees or subcontractors of the Vendor, shall be deemed to be employees of the State for any purpose whatsoever. Vendor shall be exclusively responsible for payment of employees and contractors for all wages and salaries, taxes, withholding payments, penalties, fees, fringe benefits, professional liability insurance premiums, contributions to insurance and pension, or other deferred compensation plans, including but not limited to, Workers' Compensation and Social Security obligations, licensing fees, etc. and the filing of all necessary documents, forms, and returns pertinent to all of the foregoing.

Vendor shall hold harmless the State, and shall provide the State and Agency with a defense against any and all claims including, but not limited to, the foregoing payments, withholdings, contributions, taxes, Social Security taxes, and employer income tax returns.

**36. INDEMNIFICATION:** The Vendor agrees to indemnify, defend, and hold harmless the State and the Agency, their officers, and employees from and against: (1) Any claims or losses for services rendered by any subcontractor, person, or firm performing or supplying services, materials, or supplies in connection with the performance of the Contract; (2) Any claims or losses resulting to any person or entity injured or damaged by the Vendor, its officers, employees, or subcontractors by the publication, translation, reproduction, delivery, performance, use, or disposition of any data used under the Contract in a manner not authorized by the Contract, or by Federal or State statutes or regulations; and (3) Any failure of the Vendor, its officers, employees, or subcontractors to observe State and Federal laws including, but not limited to, labor and wage and hour laws.

**37. NO DEBT CERTIFICATION:** In accordance with West Virginia Code §§ 5A-3-10a and 5-22-1(i), the State is prohibited from awarding a contract to any bidder that owes a debt to the State or a political subdivision of the State. By submitting a bid, or entering into a contract with the State, Vendor is affirming that (1) for construction contracts, the Vendor is not in default on any monetary obligation owed to the state or a political subdivision of the state, and (2) for all other contracts, neither the Vendor nor any related party owe a debt as defined above, and neither the Vendor nor any related party are in employer default as defined in the statute cited above unless the debt or employer default is permitted under the statute.

**38. CONFLICT OF INTEREST:** Vendor, its officers or members or employees, shall not presently have or acquire an interest, direct or indirect, which would conflict with or compromise the performance of its obligations hereunder. Vendor shall periodically inquire of its officers, members and employees to ensure that a conflict of interest does not arise. Any conflict of interest discovered shall be promptly presented in detail to the Agency.

**39. REPORTS:** Vendor shall provide the Agency and/or the Purchasing Division with the following reports identified by a checked box below:

☐ Such reports as the Agency and/or the Purchasing Division may request. Requested reports may include, but are not limited to, quantities purchased, agencies utilizing the contract, total contract expenditures by agency, etc.

☒ Quarterly reports detailing the total quantity of purchases in units and dollars, along with a listing of purchases by agency. Quarterly reports should be delivered to the Purchasing Division via email at [purchasing.division@wv.gov](mailto:purchasing.division@wv.gov).

**40. BACKGROUND CHECK:** In accordance with W. Va. Code § 15-2D-3, the State reserves the right to prohibit a service provider's employees from accessing sensitive or critical information or to be present at the Capitol complex based upon results addressed from a criminal background check. Service providers should contact the West Virginia Division of Protective Services by phone at (304) 558-9911 for more information.

**41. PREFERENCE FOR USE OF DOMESTIC STEEL PRODUCTS:** Except when authorized by the Director of the Purchasing Division pursuant to W. Va. Code § 5A-3-56, no contractor may use or supply steel products for a State Contract Project other than those steel products made in the United States. A contractor who uses steel products in violation of this section may be subject to civil penalties pursuant to W. Va. Code § 5A-3-56. As used in this section:

- a. "State Contract Project" means any erection or construction of, or any addition to, alteration of or other improvement to any building or structure, including, but not limited to, roads or highways, or the installation of any heating or cooling or ventilating plants or other equipment, or the supply of and materials for such projects, pursuant to a contract with the State of West Virginia for which bids were solicited on or after June 6, 2001.
- b. "Steel Products" means products rolled, formed, shaped, drawn, extruded, forged, cast, fabricated or otherwise similarly processed, or processed by a combination of two or more or such operations, from steel made by the open hearth, basic oxygen, electric furnace, Bessemer or other steel making process.
- c. The Purchasing Division Director may, in writing, authorize the use of foreign steel products if:
  1. The cost for each contract item used does not exceed one tenth of one percent (.1%) of the total contract cost or two thousand five hundred dollars (\$2,500.00), whichever is greater. For the purposes of this section, the cost is the value of the steel product as delivered to the project; or
  2. The Director of the Purchasing Division determines that specified steel materials are not produced in the United States in sufficient quantity or otherwise are not reasonably available to meet contract requirements.

**42. PREFERENCE FOR USE OF DOMESTIC ALUMINUM, GLASS, AND STEEL:** In Accordance with W. Va. Code § 5-19-1 et seq., and W. Va. CSR § 148-10-1 et seq., for every contract or subcontract, subject to the limitations contained herein, for the construction, reconstruction, alteration, repair, improvement or maintenance of public works or for the purchase of any item of machinery or equipment to be used at sites of public works, only domestic aluminum, glass or steel products shall be supplied unless the spending officer determines, in writing, after the receipt of offers or bids, (1) that the cost of domestic aluminum, glass or steel products is unreasonable or inconsistent with the public interest of the State of West Virginia, (2) that domestic aluminum, glass or steel products are not produced in sufficient quantities to meet the contract requirements, or (3) the available domestic aluminum, glass, or steel do not meet the contract specifications. This provision only applies to public works contracts awarded in an amount more than fifty thousand dollars (\$50,000) or public works contracts that require more than ten thousand pounds of steel products.

The cost of domestic aluminum, glass, or steel products may be unreasonable if the cost is more than twenty percent (20%) of the bid or offered price for foreign made aluminum, glass, or steel products. If the domestic aluminum, glass or steel products to be supplied or produced in a “substantial labor surplus area”, as defined by the United States Department of Labor, the cost of domestic aluminum, glass, or steel products may be unreasonable if the cost is more than thirty percent (30%) of the bid or offered price for foreign made aluminum, glass, or steel products. This preference shall be applied to an item of machinery or equipment, as indicated above, when the item is a single unit of equipment or machinery manufactured primarily of aluminum, glass or steel, is part of a public works contract and has the sole purpose or of being a permanent part of a single public works project. This provision does not apply to equipment or machinery purchased by a spending unit for use by that spending unit and not as part of a single public works project.

All bids and offers including domestic aluminum, glass or steel products that exceed bid or offer prices including foreign aluminum, glass or steel products after application of the preferences provided in this provision may be reduced to a price equal to or lower than the lowest bid or offer price for foreign aluminum, glass or steel products plus the applicable preference. If the reduced bid or offer prices are made in writing and supersede the prior bid or offer prices, all bids or offers, including the reduced bid or offer prices, will be reevaluated in accordance with this rule.

**43. INTERESTED PARTY SUPPLEMENTAL DISCLOSURE:** W. Va. Code § 6D-1-2 requires that for contracts with an actual or estimated value of at least \$1 million, the Vendor must submit to the Agency a disclosure of interested parties prior to beginning work under this Contract. Additionally, the Vendor must submit a supplemental disclosure of interested parties reflecting any new or differing interested parties to the contract, which were not included in the original pre-work interested party disclosure, within 30 days following the completion or termination of the contract. A copy of that form is included with this solicitation or can be obtained from the WV Ethics Commission. This requirement does not apply to publicly traded companies listed on a national or international stock exchange. A more detailed definition of interested parties can be obtained from the form referenced above.



**44. PROHIBITION AGAINST USED OR REFURBISHED:** Unless expressly permitted in the solicitation published by the State, Vendor must provide new, unused commodities, and is prohibited from supplying used or refurbished commodities, in fulfilling its responsibilities under this Contract.

**45. VOID CONTRACT CLAUSES:** This Contract is subject to the provisions of West Virginia Code § 5A-3-62, which automatically voids certain contract clauses that violate State law.

**46. ISRAEL BOYCOTT:** Bidder understands and agrees that, pursuant to W. Va. Code § 5A-3-63, it is prohibited from engaging in a boycott of Israel during the term of this contract.

**DESIGNATED CONTACT:** Vendor appoints the individual identified in this Section as the Contract Administrator and the initial point of contact for matters relating to this Contract.

(Printed Name and Title) Halle Van Scoy, Vice President

(Address) 1960 Midway Drive Twinsburg OH 44087

(Phone Number) / (Fax Number) 330-425-4994 / 330-425-9338

(Email address) halle.vanscoy@pathmasterinc.com

**CERTIFICATION AND SIGNATURE:** By signing below, or submitting documentation through WV OASIS, I certify that: I have reviewed this Solicitation/Contract in its entirety; that I understand the requirements, terms and conditions, and other information contained herein; that this bid, offer or proposal constitutes an offer to the State that cannot be unilaterally withdrawn; that the product or service proposed meets the mandatory requirements contained in the Solicitation/Contract for that product or service, unless otherwise stated herein; that the Vendor accepts the terms and conditions contained in the Solicitation, unless otherwise stated herein; that I am submitting this bid, offer or proposal for review and consideration; that this bid or offer was made without prior understanding, agreement, or connection with any entity submitting a bid or offer for the same material, supplies, equipment or services; that this bid or offer is in all respects fair and without collusion or fraud; that this Contract is accepted or entered into without any prior understanding, agreement, or connection to any other entity that could be considered a violation of law; that I am authorized by the Vendor to execute and submit this bid, offer, or proposal, or any documents related thereto on Vendor's behalf; that I am authorized to bind the vendor in a contractual relationship; and that to the best of my knowledge, the vendor has properly registered with any State agency that may require registration.

By signing below, I further certify that I understand this Contract is subject to the provisions of West Virginia Code § 5A-3-62, which automatically voids certain contract clauses that violate State law; and that pursuant to W. Va. Code 5A-3-63, the entity entering into this contract is prohibited from engaging in a boycott against Israel.

Path Master, Inc.

(Company)

Halle R. Van Scoy

(Signature of Authorized Representative)

Halle Van Scoy, Vice President July 13, 2023

(Printed Name and Title of Authorized Representative) (Date)

330-425-4994 / 330-425-9338

(Phone Number) (Fax Number)

halle.vanscoy@pathmasterinc.com

(Email Address)



Department of Administration  
Purchasing Division  
2019 Washington Street East  
Post Office Box 50130  
Charleston, WV 25305-0130

State of West Virginia  
Centralized Request for Quote  
Highways

Proc Folder: 1218721

Doc Description: TRAFFIC SIGNAL PARTS AND EQUIPMENT

Reason for Modification:

Proc Type: Central Master Agreement

Date Issued	Solicitation Closes	Solicitation No	Version
2023-06-27	2023-07-13 13:30	CRFQ 0803 DOT2300000151	1

**BID RECEIVING LOCATION**

BID CLERK  
DEPARTMENT OF ADMINISTRATION  
PURCHASING DIVISION  
2019 WASHINGTON ST E  
CHARLESTON WV 25305  
US

**VENDOR**

Vendor Customer Code: 000 000 176550

Vendor Name : Path Master, Inc.

Address : 1960

Street : Midway Drive

City : Twinsburg

State : OH

Country : USA

Zip : 44087

Principal Contact : Halle Van Scoy

Vendor Contact Phone: 330-425-4994

Extension: 114

**FOR INFORMATION CONTACT THE BUYER**

John W Estep  
304-558-2566  
john.w.estep@wv.gov

Vendor

Signature X *Halle R. Van Scoy*

FEIN# 34-1233777

DATE July 13, 2023

All offers subject to all terms and conditions contained in this solicitation

<b>ADDITIONAL INFORMATION</b>
REQUEST FOR QUOTATION:
The West Virginia Purchasing Division is soliciting bids on behalf of the West Virginia Division of Highways (WVDOH) to establish an open-end contract for Parts and Equipment for existing Traffic Signal Systems (TSS) and Intelligent Transportation Systems (ITS) infrastructure. Per the Bid Requirements, Specifications, Terms and Conditions attached to this solicitation.

<b>INVOICE TO</b>		<b>SHIP TO</b>	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
1	SIEMENS EAGLE YUNEX EPACM60 TRAFFIC CONTROLLERS	20.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**  
SIEMENS EAGLE YUNEX EPACM60 TRAFFIC CONTROLLERS

<b>INVOICE TO</b>		<b>SHIP TO</b>	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
2	SIEMENS EAGLE YUNEX EPACM60 MASTER TRAFFIC CONTROLLERS	10.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**  
SIEMENS EAGLE YUNEX EPACM60 MASTER TRAFFIC CONTROLLERS

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR  CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
3	REPAIR OF EAGLE SIEMENS EPAC TRAFFIC CONTROLLERS	30.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**

REPAIR OF EAGLE SIEMENS EPAC TRAFFIC CONTROLLERS

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR  CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
4	EAGLE TS2 MODEL P38 POLE MOUNTED TRAFFIC SIGNAL CABINET	1.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**

EAGLE TS2 MODEL P38 POLE MOUNTED TRAFFIC SIGNAL CABINET

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
5	EAGLE TS2 SIZE P GROUND MOUNTED TRAFFIC SIGNAL CABINET	1.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**

EAGLE TS2 SIZE P GROUND MOUNTED TRAFFIC SIGNAL CABINET WITH ANCHOR BOLTS

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
6	ECONOLITE COBALT ATC TRAFFIC SIGANL CONTROLLER	15.00000	EA	\$4,153.00	\$62,295.00

Comm Code	Manufacturer	Specification	Model #
46161504	Econolite	N/A	Cobalt Classic

**Extended Description:**

ECONOLITE COBALT ATC TRAFFIC SIGANL CONTROLLER



INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
7	REPAIR OF ECONOLITE COBALT ATC TRAFFIC SIGANL CONTROLLER	10.00000	EA	\$500.00	\$5,000.00

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**  
REPAIR OF ECONOLITE COBALT ATC TRAFFIC SIGANL CONTROLLER

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
8	ECONOLITE TS2 MODEL P438 GROUND MOUNTED SIGNAL CABINET	1.00000	EA	\$14,748.00	\$14,748.00

Comm Code	Manufacturer	Specification	Model #
46161504	Path Master, Inc.	N/A	XACEC-WV6116-002

**Extended Description:**  
ECONOLITE TS2 MODEL P438 GROUND MOUNTED SIGNAL CABINET

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
9	ECONOLITE TS2 MODEL P44 GROUND MOUNTED SIGNAL CABINET	1.00000	EA	\$14,710.00	\$14,710.00

Comm Code	Manufacturer	Specification	Model #
46161504	Path Master, Inc.	N/A	XACEC-WV6116-001

**Extended Description:**  
ECONOLITE TS2 MODEL P44 GROUND MOUNTED SIGNAL CABINET

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
10	ITERIS RZ4 VEHICLE DETECTION VIDEO CAMERA	10.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**  
ITERIS RZ4 VEHICLE DETECTION VIDEO CAMERA

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR  CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
11	REPAIR OF ITERIS RZ4 VEHICLE DETECTION VIDEO CAMERA	20.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**  
REPAIR OF ITERIS RZ4 VEHICLE DETECTION VIDEO CAMERA

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR  CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
12	ITERIS VEHICLE DETECTION CARD	10.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**  
ITERIS VEHICLE DETECTION CARD

INVOICE TO			SHIP TO		
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US			DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US		

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
13	REPAIR OF ITERIS VEHICLE DETECTION CARD	15.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**  
REPAIR OF ITERIS VEHICLE DETECTION CARD

INVOICE TO			SHIP TO		
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US			DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US		

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
14	AUTOSCOPE AIS-IV MODEL 703170 VEHICLE DETECTION CAMERA	10.00000	EA	\$1,992.00	\$19,920.00

Comm Code	Manufacturer	Specification	Model #
46161504	Econolite	N/A	AIS-IV

**Extended Description:**  
AUTOSCOPE AIS-IV MODEL 703170 VEHICLE DETECTION CAMERA

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
15	REPAIR OF AUTOSCOPE VEHICLE DETECTION CAMERA	10.00000	EA	\$500.00	\$5,000.00

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**  
REPAIR OF AUTOSCPE VEHICLE DETECTION CAMERA

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
16	AUTOSCOPE RACKVISION PRO 2- A-700-1030 VEHICLE DETECTION CARD	10.00000	EA	\$2,277.00	\$22,770.00

Comm Code	Manufacturer	Specification	Model #
46161504	Econolite	N/A	Rackvision Pro 2

**Extended Description:**  
AUTOSCOPE RACKVISION PRO 2-A-700-1030 VEHICLE DETECTION CARD

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
17	REPAIR OF AUTOSCOPE VEHICLE DETECTION CARD	10.00000	EA	\$250.00	\$2,500.00

Comm Code	Manufacturer	Specification	Model #
46161500	N/A	N/A	N/A

**Extended Description:**  
REPAIR OF AUTOSCOPE VEHICLE DETECTION CARD

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
18	WAVETRONIX SMART SENSOR MODEL SS225 RAPID PRESENCE DETECTION	1.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**  
WAVETRONIX SMART SENSOR MODEL SS225 RAPID PRESENCE DETECTION



INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
19	WAVETRONIX SMART SENSOR ADVANCE MODEL SS200E	1.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**  
WAVETRONIX SMART SENSOR ADVANCE MODEL SS200E

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
20	WAVETRONIX SMART 2-CHANNEL CLICK 112 DETECTION CARD	0.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**  
WAVETRONIX SMART 2-CHANNEL CLICK 112 DETECTION CARD

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
21	WAVETRONIX 4-CHANNEL CLICK 114 VEHICLE DETECTION CARD	5.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**  
WAVETRONIX 4-CHANNEL CLICK 114 VEHICLE DETECTION CARD

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
22	SMART MICRO STOP BAR ADVANCE MODEL TRUGRD UMRR-12 TYPE 48	1.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**  
SMART MICRO STOP BAR ADVANCE MODEL TRUGRD UMRR-12 TYPE 48 RADAR

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
23	SMART MICRO VEHICLE DETECTION RADAR CARD MODEL TMIB AB	1.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**

SMART MICRO VEHICLE DETECTION RADAR CONTROLLER CONTROL PLUS CARD MODEL TMIB AB

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
24	SMART MICRO VEHICLE DETECTION RADAR DAUGHETER INTEFACE CARD	10.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**

SMART MICRO VEHICLE DETECTION RADAR DAUGHETER INTEFACE CARD

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
25	TOMAR PREEMPTION CONTROL SYSTEMS DETECTORS	30.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**  
TOMAR PREEMPTION CONTROL SYSTEMS DETECTORS

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
26	TOMAR PREEMPTION CONTROL SYSTEMS DETECTION CARDS	20.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**  
TOMAR PREEMPTION CONTROL SYSTEMS DETECTION CARDS

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
27	REPAIR OF TOMAR PREEMPTION CONTROL SYSTEMS CARDS	15.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**  
REPAIR OF TOMAR PREEMPTION CONTROL SYSTEMS CARDS

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
28	TRAFFIC SIGNAL CONFLICT MONITOR	30.00000	EA	\$959.00	\$28,770.00

Comm Code	Manufacturer	Specification	Model #
46161504	Eberle Design Inc.	N/A	SSM 12LE

**Extended Description:**  
TRAFFIC SIGNAL CONFLICT MONITOR

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
29	TRAFFIC SIGNAL MALFUNCTION MANAGEMNT UNIT	15.00000	EA	\$924.00	\$13,860.00

Comm Code	Manufacturer	Specification	Model #
46161504	Eberle Design Inc.	N/A	MM02-16LE

**Extended Description:**  
TRAFFIC SIGNAL MALFUNCTION MANAGEMNT UNIT

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
30	TRAFFIC SIGNAL BUS INTERFACE UNIT	30.00000	EA	\$328.00	\$9,840.00

Comm Code	Manufacturer	Specification	Model #
46161504	Eberle Design Inc.	N/A	BIU 700

**Extended Description:**  
TRAFFIC SIGNAL BUS INTERFACE UNIT



INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
31	GREEN LED SIGNAL LAMP	200.00000	EA	\$37.00	\$7,400.00

Comm Code	Manufacturer	Specification	Model #
46161504	Dialight Corp.	N/A	433-2720-001XL

**Extended Description:**  
GREEN LED SIGNAL LAMP

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
32	YELLOW LED SIGNAL LAMP	200.00000	EA	\$43.00	\$8,600.00

Comm Code	Manufacturer	Specification	Model #
46161504	Dialight Corp.	N/A	433-3230-901XL

**Extended Description:**  
YELLOW LED SIGNAL LAMP

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
33	RED LED SIGNAL LAMP	200.00000	EA	\$38.00	\$7,600.00

Comm Code	Manufacturer	Specification	Model #
46161504	Dialight Corp.	N/A	433-1210-003XL

**Extended Description:**  
RED LED SIGNAL LAMP

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
34	GREEN ARROW LED SIGNAL LAMP	1.00000	EA	\$48.00	\$48.00

Comm Code	Manufacturer	Specification	Model #
46161504	Dialight Corp.	N/A	432-2374-001XOD

**Extended Description:**  
GREEN ARROW LED SIGNAL LAMP

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
35	YELLOW ARROW LED SIGNAL LAMP	1.00000	EA	\$45.00	\$45.00

Comm Code	Manufacturer	Specification	Model #
46161504	Dialight Corp.	N/A	431-3334-901XOD

**Extended Description:**  
YELLOW ARROW LED SIGNAL LAMP

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
36	RED ARROW LED SIGNAL LAMP	1.00000	EA	\$42.00	\$42.00

Comm Code	Manufacturer	Specification	Model #
46161504	Dialight Corp.	N/A	432-1314-001XOD

**Extended Description:**  
RED ARROW LED SIGNAL LAMP

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
37	3 HEAD SIGNAL HOUSING	1.00000	EA	\$568.00	\$568.00

Comm Code	Manufacturer	Specification	Model #
46161504	Econolite / Pelco Products Inc.	N/A	Various, See Cut Sheets

**Extended Description:**  
3 HEAD SIGNAL HOUSING WITH HARDWARE

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
38	5 HEAD SIGNAL HOUSING	1.00000	EA	\$921.00	\$921.00

Comm Code	Manufacturer	Specification	Model #
46161504	Econolite/ Pelco Products Inc.	N/A	Various, See Cut Sheets

**Extended Description:**  
5 HEAD SIGNAL HOUSING WITH HARDWARE

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
39	LED PEDESTRIAN SIGNAL HEAD WITH HOUSING & MOUNTING HARDWARE	30.00000	EA	\$338.00	\$10,140.00

Comm Code	Manufacturer	Specification	Model #
46161504	Econolite / Pelco Products Inc.	N/A	Various, See Cut Sheets

**Extended Description:**

LED PEDESTRIAN SIGNAL HEAD WITH HOUSING & MOUNTING HARDWARE

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
40	AUDIBLE PEDESTRIAN PUSH BUTTON	30.00000	EA	\$626.00	\$18,780.00

Comm Code	Manufacturer	Specification	Model #
46161504	Pelco Products Inc.	N/A	Intellicross

**Extended Description:**

AUDIBLE PEDESTRIAN PUSH BUTTON

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
41	TS1 CABINET POWER SUPPLY	50.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**  
TS1 CABINET POWER SUPPLY

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
42	TS2 CABINET POWER SUPPLY	15.00000	EA	\$583.00	\$8,745.00

Comm Code	Manufacturer	Specification	Model #
46161504	Eberle Design Inc.	N/A	PS250

**Extended Description:**  
TS2 CABINET POWER SUPPLY



INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
43	TIME CLOCKS	5.00000	EA	\$364.00	\$1,820.00

Comm Code	Manufacturer	Specification	Model #
46161504	RTC Manufacturing	N/A	AP21

**Extended Description:**  
TIME CLOCKS

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
44	FLASH TRANSFER RELAYS	20.00000	EA	\$36.00	\$720.00

Comm Code	Manufacturer	Specification	Model #
46161504	Reno A&E	N/A	TR200

**Extended Description:**  
FLASH TRANSFER RELAYS

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
45	SOLAR FLASHER CONTROLLER	5.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**  
SOLAR FLASHER CONTROLLER

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
46	SOLAR FLASHER MOTOR UNIT	5.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**  
SOLAR FLASHER MOTOR UNIT

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
47	MULTILINK UNINTERRUPTIBLE POWER SUPPLY	2.00000	EA	\$2,059.00	\$4,118.00

Comm Code	Manufacturer	Specification	Model #
46161504	Multilink	N/A	EDP1000

**Extended Description:**  
MULTILINK UNINTERRUPTIBLE POWER SUPPLY

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
48	MULTILINK SAFETY AUTOMATIC TRANSFER SWITCH	2.00000	EA	\$759.00	\$1,518.00

Comm Code	Manufacturer	Specification	Model #
46161504	Multilink	N/A	010-505-10

**Extended Description:**  
MULTILINK SAFETY AUTOMATIC TRANSFER SWITCH

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
49	MULTI LINK BATTERY BALANCER	2.00000	EA	\$136.00	\$272.00

Comm Code	Manufacturer	Specification	Model #
46161504	Multilink	N/A	018-008-20

**Extended Description:**  
MULTI LINK BATTERY BALANCER

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
50	BATTERIES FOR TRAFFIC SIGNAL SYSTEMS	2.00000	EA	\$212.00	\$424.00

Comm Code	Manufacturer	Specification	Model #
46161504	Interstate Battery	N/A	SLA1185

**Extended Description:**  
BATTERIES FOR TRAFFIC SIGNAL SYSTEMS

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
51	MULTILINK BATTERY BACKUP SYSTEM CABINET	2.00000	EA	\$1,828.00	\$3,656.00

Comm Code	Manufacturer	Specification	Model #
46161504	APX	N/A	TCLS532421A1253RA-WV

**Extended Description:**  
MULTILINK BATTERY BACKUP SYSTEM CABINET

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
52	HUBBELL TWISTLOCK POWER INLET	2.00000	EA	\$277.00	\$554.00

Comm Code	Manufacturer	Specification	Model #
46161504	Hubbel	N/A	HBL2615SW L530-P

**Extended Description:**  
HUBBELL TWISTLOCK POWER INLET

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
53	ENCOM PULSE S RADIO TRANSCEIVERS	20.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**  
ENCOM PULSE S RADIO TRANSCEIVERS

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
54	INTUICOM EB-X RADIO TRANSCEIVERS	10.00000	EA	\$1,936.00	\$19,360.00

Comm Code	Manufacturer	Specification	Model #
46161504	Intuicom	N/A	EB-X

**Extended Description:**  
INTUICOM EB-X RADIO TRANSCEIVERS

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
55	15 WATT CARMANAH SOLAR FLASHER ASSEMBLY	1.00000	EA	\$3,064.00	\$3,064.00

Comm Code	Manufacturer	Specification	Model #
46161504	Carmanah	N/A	R247E

**Extended Description:**  
15 WATT CARMANAH SOLAR FLASHER ASSEMBLY

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
56	30 WATT CARMANAH SOLAR FLASHER ASSEMBLY	1.00000	EA	\$3,834.00	\$3,834.00

Comm Code	Manufacturer	Specification	Model #
46161504	Carmanah	N/A	R247F

**Extended Description:**  
30 WATT CARMANAH SOLAR FLASHER ASSEMBLY



INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
57	ECONOLITE EVO RADAR VEHICLE DETECTION SENSOR KIT	1.00000	EA	\$8,139.00	\$8,139.00

Comm Code	Manufacturer	Specification	Model #
46161504	Econolite	N/A	EVOR

**Extended Description:**  
ECONOLITE EVO RADAR VEHICLE DETECTION SENSOR KIT

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
58	ECONOLITE EVO RADAR VEHICLE DETECTION HUB	1.00000	EA	\$5,834.00	\$5,834.00

Comm Code	Manufacturer	Specification	Model #
46161504	Econolite	N/A	EVOHUB-W

**Extended Description:**  
ECONOLITE EVO RADAR VEHICLE DETECTION HUB

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
59	ITERIS VANTAGE RADIUS RADAR SENSOR KIT	1.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**  
ITERIS VANTAGE RADIUS RADAR SENSOR KIT

INVOICE TO		SHIP TO	
DIVISION OF HIGHWAYS TRAFFIC ENGINEERING DIVISION 1900 KANAWHA BLVD E, BLDG 5 RM A550 CHARLESTON WV US		DIVISION OF HIGHWAYS TRAFFIC ENG. TSC - SIGNAL MAINTENANCE 180 DRY BRANCH DR CHARLESTON WV US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
60	ITERIS VANTAGE RADIUS VEHICLE DETECTION CCU KIT	0.00000	EA	No Bid	No Bid

Comm Code	Manufacturer	Specification	Model #
46161504	N/A	N/A	N/A

**Extended Description:**  
ITERIS VANTAGE RADIUS VEHICLE DETECTION CCU KIT

#### SCHEDULE OF EVENTS

<u>Line</u>	<u>Event</u>	<u>Event Date</u>
1	Tech Questions due by 10:00am	2023-07-06

	Document Phase	Document Description	Page 32
DOT2300000151	Final	TRAFFIC SIGNAL PARTS AND EQUIPMENT	

**ADDITIONAL TERMS AND CONDITIONS**

See attached document(s) for additional Terms and Conditions