

Scope of Work to Install “Collision Avoidance Systems” on 145 MTA buses

Description:

This document outlines the general requirements, process and procedures to be followed for the installation of a full ROSCO Shield+ System Collision Avoidance system (CAS). This IFB aims to obtain, install, and provide warranty services for ROSCO Shield+ System on 145 buses. This IFB will also include specifications of software tools to configure, manage and oversee the system. MTA will monitor the pilot for an evaluation period of up to 12 months to assess ROSCO Forward Collision Warning and Side Sensing system effectiveness.

Installation scope:

The list of routes, bus types, numbers of buses and depots are as follows. A minimum of 40 buses would have to be completed by Dec 31st 2016 with remaining buses complete by March 31st 2017:

ROUTE	DEPOT	VEHICLE TYPES	PEAK SERVICE
B46	Flatbush	09 Orion VII NG Hybrid 15 New Flyer XD40	78
B38	Fresh Ponds	09 Orion VII NG Hybrid 15 New Flyer XD40	22
M42	MJ Quill	09 Orion VII	45

Installation equipment:

The Collision Avoidance System (CAS) Shield+ system shall consist of the following on-board equipment to be installed on each bus:

One (1) ROSCO VQS4560 On-board Unit Kit which includes the following:

- Four (4) Mobileye 560 with dedicated enclosures (The external units have dedicated enclosures with built-in heater. The internal units located at the front and front-left do not have enclosures)
- One (1) box housing not to exceed 10”L x 8”W x 4”H
- Two (2) Pedestrian display modules with dedicated enclosures and embedded piezo devices
- One (1) Pedestrian and vehicle display module with dedicated enclosures and piezo device
- All harnesses, cables and connectors required to operate the system
- All required mounting hardware appropriate to each bus type as determined by the individual proposers during pre-bid surveys

The Contractor shall furnish and install the following software with capacity to support data log communication via CAN Bus network (on the aforementioned buses to be installed):

- ROSCO On-board Operational event logger
- ROSCO On-board Warning event logger
- ROSCO On-board System health check logger

- ROSCO Remote Shield+ monitoring tool with a 5 year license

Installation details:

Prototype Installation Document:

Please reference attached sample installation procedure document in Appendix 1.

Specific Installation Details:

Pre-Bid Surveys

All proposers shall attend a pre-bid survey hosted by NYCT, at a date and location to be determined, where NYCT will make all bus types included in this scope available for review. NYCT technical personnel will be in attendance to assist proposers and answer any questions. Upon request, NYCT will provide proposers access to all available necessary information regarding the structure, body and electrical system of the specified bus models.

Installation Procedures

Prior to installation, the Contractor shall provide an installation procedure document for each bus type for review and approval by NYCT.

The Contractor's procedures and practices shall comply with all Bus Manufacturer OEM specifications as outlined in the bus service manuals, and adhere to the latest industry standards (SAE), whenever applicable.

Prototype Installations

Upon approval of the installation procedure, the Contractor shall perform a prototype installation on one of each bus type.

The prototype installation shall be done in the presence of the NYCT Project Manager or their designee, on NYCT property, during regular business hours. After the first prototype installation, the Contractor shall provide an updated installation procedure (including lessons learned) for each bus type. If acceptable, the procedures will be approved by NYCT.

During the prototype installation for the first bus, the Contractor shall develop a procedure for an Installation Acceptance Test (IAT). The Contractor shall document and detail the exact steps to be taken on an IAT form. The Contractor will update this procedure to note bus-type specific variations, as the prototype installation is performed, if needed. NYCT will review and approve the test document / form and also any modifications, prior to its use on any production installations.

The Installation Acceptance Test (IAT) shall include:

- System power-up on bus ignition, verification of detection from A-pillar/Forward Collision/Right Side/Left Side Mobileye sensors via User Interface Module (UIM), verification of error messages via UIM, verification of operating heaters on the external detection sensors, ability to login through Setup Wizard to view human detection, ability to connect to configuration service, ability to view CAN Bus messages, system does not draw battery power, inspections on the



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interior and exterior of the bus for proper operation, damage, defects or missing parts and a water test.

- The Contractor shall record the following details of the installation: date, time, location, of installation, ID number of the installed bus, and serial numbers of the installed components and results of the above-mentioned test.
- The IAT shall be jointly conducted by the Contractor and NYCT inspectors on the interior and exterior of the bus for proper operation, damage, defects or missing parts. All panels and doors are to be securely closed and a functionality check must be performed to ensure the CAS is working properly. The results of this incoming/outgoing inspection are to be documented on the final IAT sheet. Once clear of all defects, the Final IAT sheet shall be signed by both parties. The Contractor shall close the SPEAR* work order after each bus completion. The Contractor will be trained to perform the necessary record keeping work on SPEAR before the start of the installations. * SPEAR is an enterprise asset management and maintenance work order tracking tool deployed within the Authority's depots. Selected Contractor shall be given appropriate training on the SPEAR system to perform the necessary functions outlined above.

Production Installations

1. The Contractor shall replace all components on the bus damaged during the retrofit.
2. The Contractor shall be responsible for the removal and reinstallation of all interior/exterior panels.
3. Cables must be protected to avoid chafing and damage. The Contractor shall be responsible for all tools, labor and parts for installing the CAS.
4. The Contractor shall use products identified by NYCT wherever specified.
5. The Contractor shall follow all applicable Federal, State and Local requirements and regulations pertinent to automotive safety and the use of personal protective equipment.
6. The Contractor shall have all appropriate and necessary insurance coverage to protect NYCT from any liabilities as a result of the conduct of this SOW.
7. Production installations shall occur at NYCT depots (8 p.m. and 4 a.m.); 7 days a week
8. The Contractor shall perform the aforementioned IAT for every bus installed with a CAS.
9. The NYCT Inspector will be the final arbiter as to the acceptability of the installation.
10. The Contractor will ensure that all buses worked on are available for revenue service by 5 a.m. the next morning.
11. The Contractor shall email IAT reports to the NYCT Project Manager within 24 hours of completion.



System Requirements:

1. The system must not require the bus operator to turn said system on or off, nor require any other interaction with the bus operator.
2. System activation will occur automatically while the vehicle speed is in motion at speeds greater than 0 mi/hr. and less than 50mi/hr.
3. The system will provide warnings when it detects a potential imminent collision with a pedestrian, cyclist or vehicle at the front or either side of the bus.
4. The CAS Shield-+ shall be capable of providing a configurable period of warning to assist the bus operator in avoiding or mitigating any potential collision. The initial time-to-impact setting must be 1.2 seconds (or less).
5. The system shall have no dependence on battery power. It shall use ignition power only. On-board equipment will accept DC input at 24 V (nominal).
6. The Contractor shall provide Mobileye Setup Wizard which will be configured for all of the aforementioned system requirements, including reporting and diagnostics.
7. The system shall include a 3Amp fuse and be tolerant to transient fluctuations of on-bus power supply of +/- 24 V DC.
8. All wired/cabled connections between the system and the bus shall be "quick-connects" using standard automotive-grade connectors. Such connectors will require no more than standard hand tools (e.g. screwdriver) to disconnect, and may not require splicing or soldering to connect.
9. The installer shall ensure components can be quickly and easily accessed, removed, and replaced during maintenance operations using standard hand tools.
10. Each component of the system which has a serial number from its respective manufacturer shall have a visible inventory-tracking label and/or barcode.
11. The total size shall be no more than 9.5"L x 6.25"W x 5"H and total weight no more than 2.7lbs. The enclosure shall be rugged/vandal proof.
12. The system shall have the following features
 - a. Unintentional Lane Departure Warnings (Both to the Left and Right -- activates at over 34mph)
 - b. Forward Headway Monitoring Warning (activates at over 19 mph)
 - c. Forward and Side Pedestrian and Cyclist Collision Warning (active under 31 mph)
 - d. Forward Collision Warning (active at all speeds)
 - e. The Bus Operators shall not be able to mute the volume (The volume shall be configurable in the software level)
 - f. The system shall provide the ability to log Shield-+ events and system checks. This information shall be available through J1939 (CAN-Bus) or similar open standard method (e.g. TCIP). CAN Bus mapping document shall be available to MTA NYCT.



Training and Transition

Contractor shall provide training to NYCT personnel regarding maintenance, trouble shooting, and programming the CAS hardware and associated software.

1. Trouble shooting guide, maintenance manual, programming procedure and wiring diagrams shall be provided to NYCT for review prior to training.
2. Contractor shall provide a total of 32 hours of training split into two 16-hour tours.
Tour#1; 5AM to 1PM; 8 hours in Class training, and 8 hours in the field training.
Tour#2; 7PM to 3AM; 8 hours in Class training, and 8 hours in the field training.

Warranty and Services

- The Contractor shall provide Shield+ monitoring based warranty support and services. The warranty shall begin from successful completion of the IAT on each bus. Buses installed in a given calendar year will be warrantied from the day of installation through the end of the year and then for five (5) subsequent years.
- The Contractor shall provide, manage, and service the warranty for all installed system components. The Contractor will provide both a General Warranty and Warranty Services.
- During the General Warranty period, the Contractor shall repair or replace any faulty components at no cost to the Authority.
- The Contractor shall manage warranty repair and replacement of all components of the entire system, including each on-bus installation, all of its components, installation workmanship, and configuration. This warranty includes software, configuration, and other data-driven maintenance.
- Warranty Services will be provided according to the following Service Level Agreement (SLA).
 - Response Time (Maximum time between Warranty Service Request and Warranty Service Response (i.e. the return call or email from the Contractor to the MTA) is 24 hours
 - Repair Time (Maximum time between Warranty Service Request and successful Warranty Service Resolution of the reported problem) is 48 hours.



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Appendix #1

ROSCO – Shield+

Bus Installation Proposal (2009 ORION VII HYBRID)

1. Shield+ Components
2. Sensor Locations and Dependencies
3. Wiring Location Guide
4. Installation Testing Procedures
5. MTA NYCT Bus Electrical Installation Standards

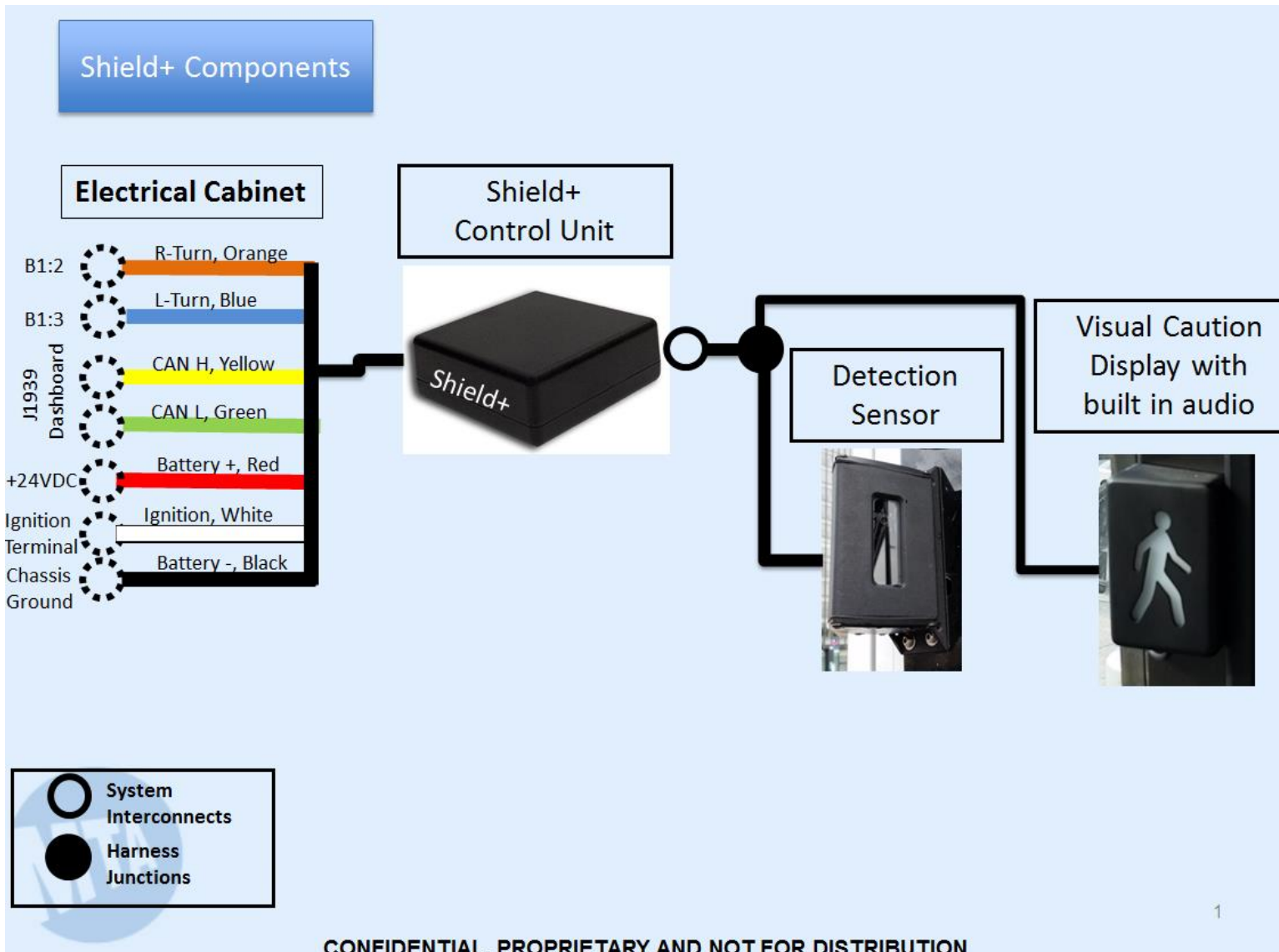


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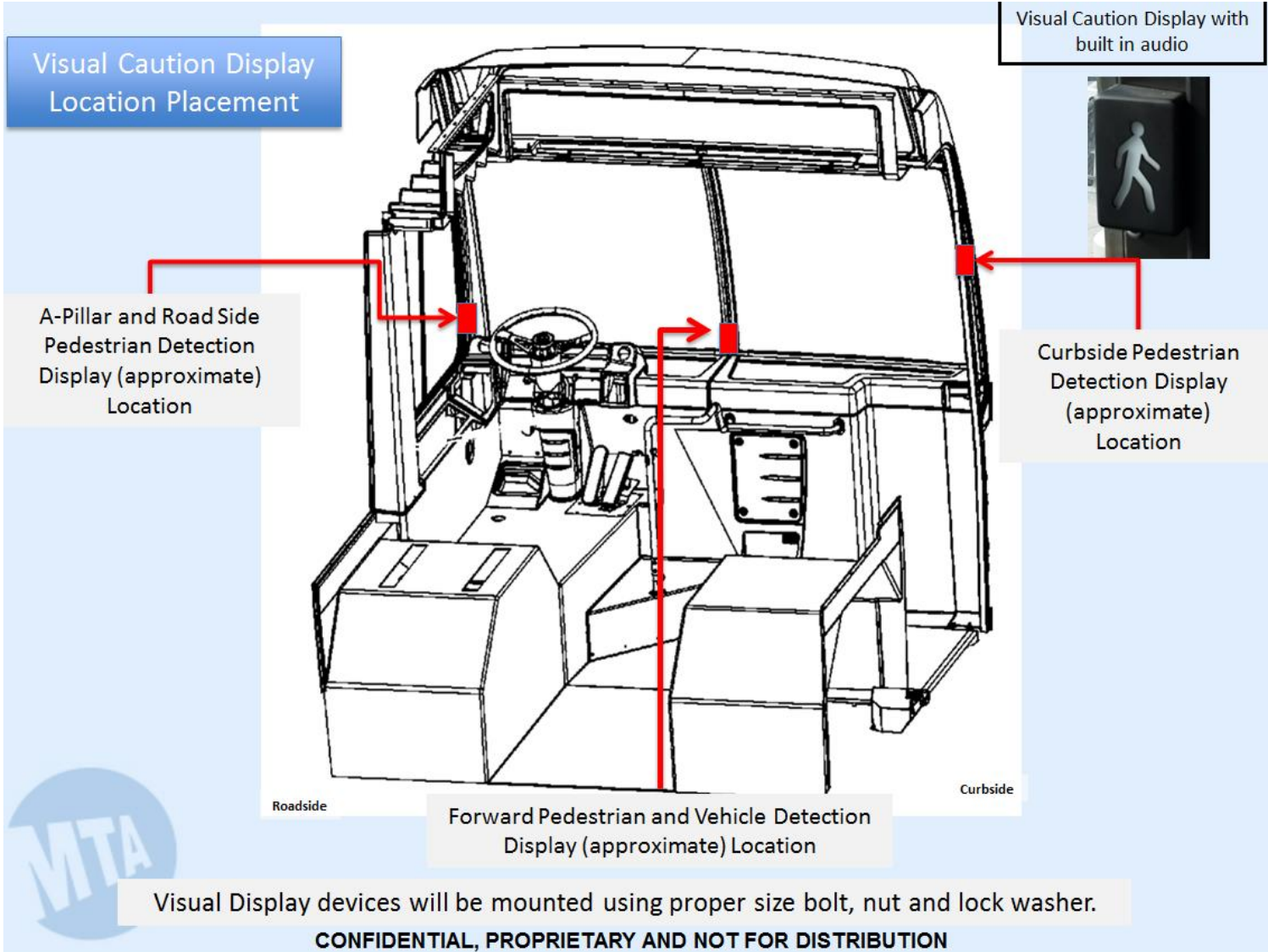
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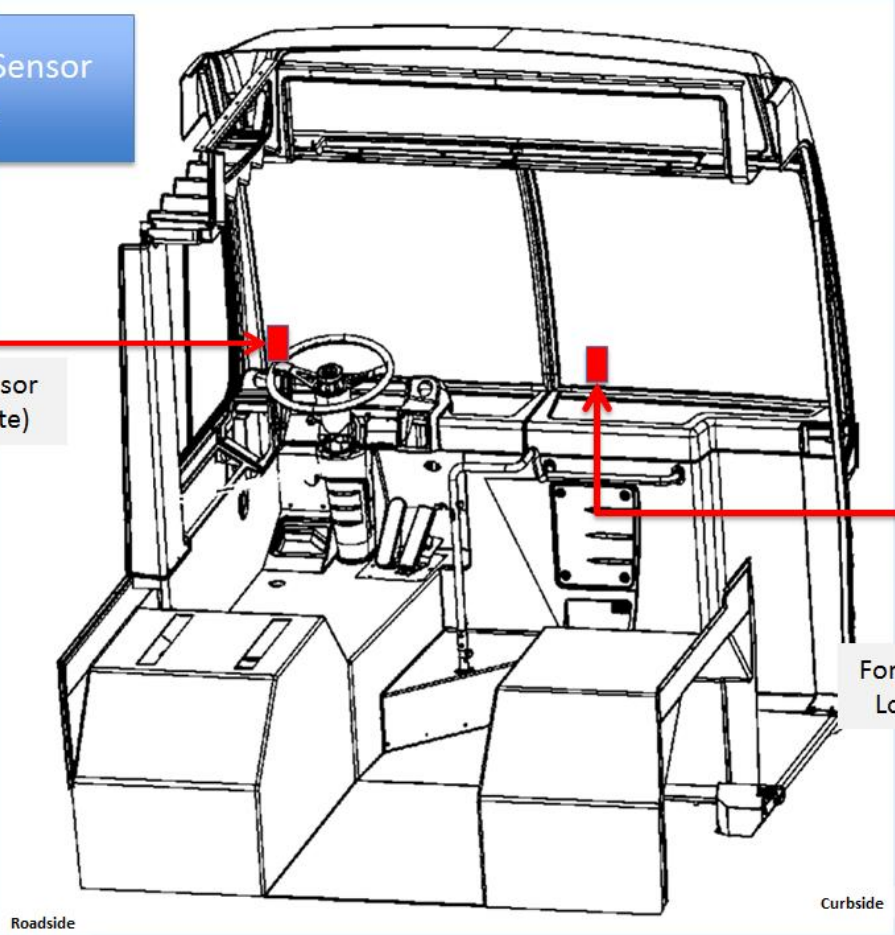
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Detection Sensor



Front Detection Sensor Placement

A-Pillar Detection Sensor Location (approximate)



Forward Detection Sensor Location (approximate)

Detection Sensors devices will be mounted using 3M double sided adhesive.

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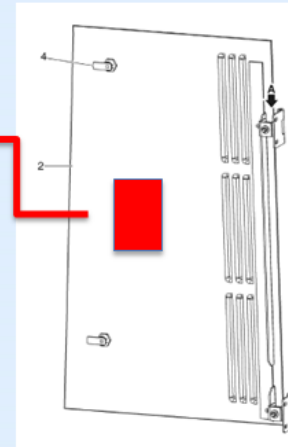
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Side Detection Sensor Locations Placement

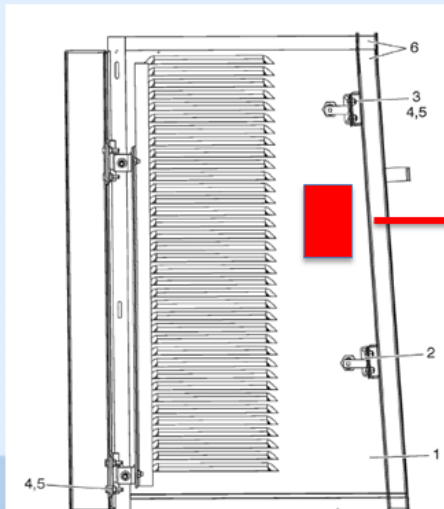


Roadside

Roadside Detection Sensor (approximate) Location



Detection Sensor



Curbside

Curbside Detection Sensor (approximate) Location

Detection Sensors devices will be mounted using proper size bolt, nut and lock washer.

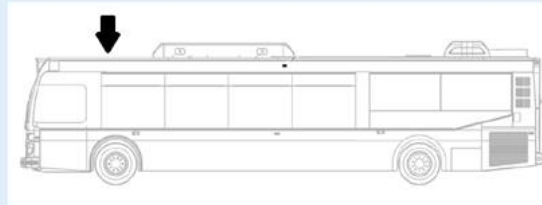
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Shield+ and Video Rbox Location Placement



Electrical Cabinet



Shield+ Box will be mounted on a extended IVN bracket. The bracket will be of a high quality metal, sturdy and durable.

Detection sensors, Speaker System, Visual Display Units and Controllers shall be diagnosable and replaceable on buses with industry typical tech skills and equipment.



Shield+ Box Placement

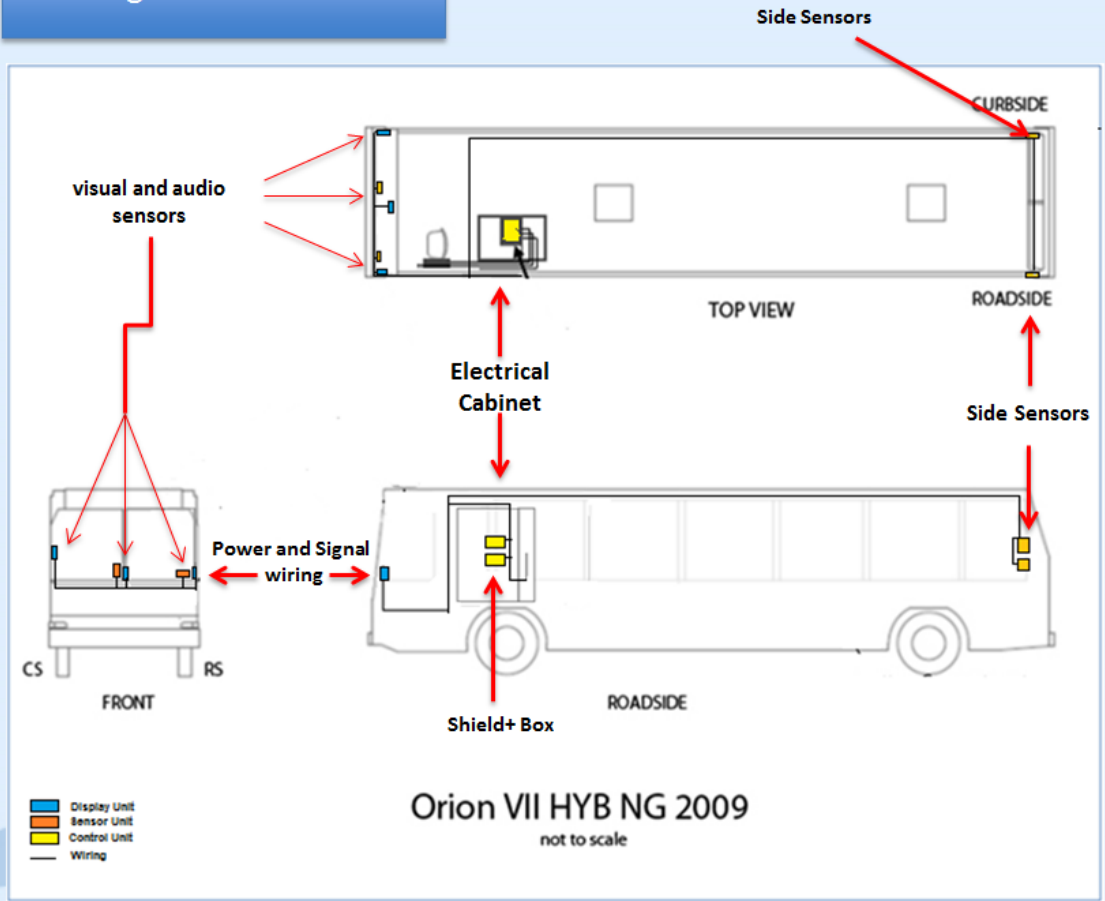
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Wiring Guide Overview



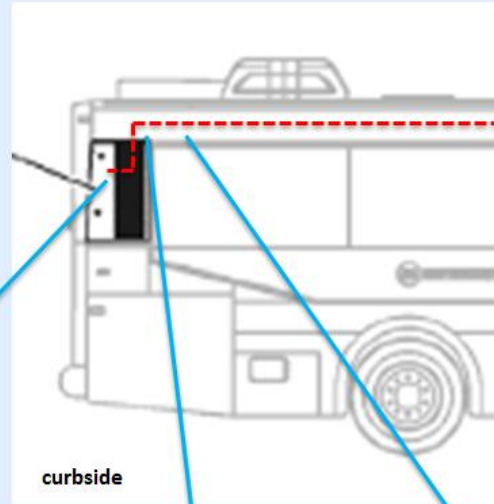
All wiring must be loomed inside or outside the compartment.



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Curbside rear quarter panel wiring guide



curbside

External Wiring



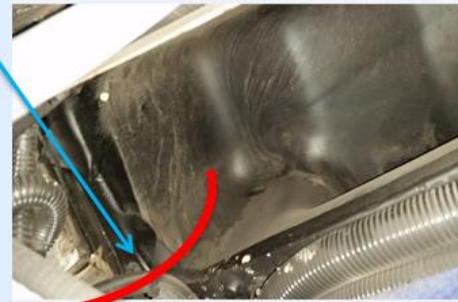
External View

Wiring Connector (HVAC Panel)



Use bulkhead metal 90 degree conduit connector to run wires between HVAC and quarter panel compartments

Internal Wiring



Internal View

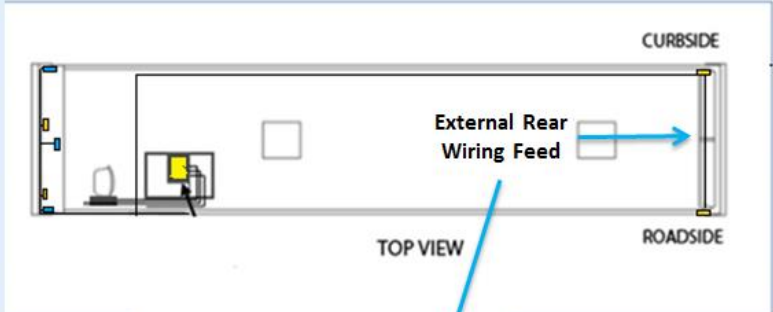
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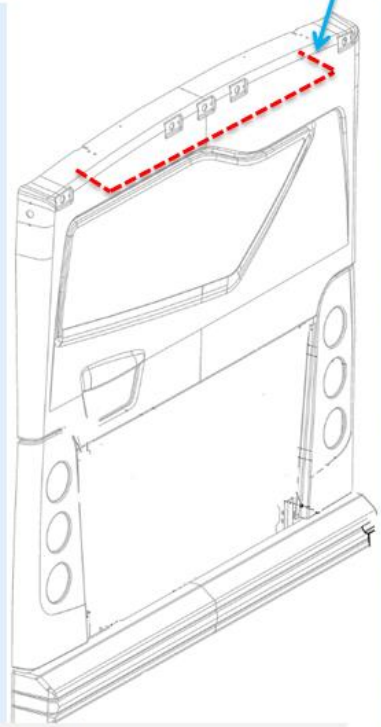
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Rear panel wiring guide



External Road Side Wiring Feed

External Curb Side Wiring Feed



leave enough cable slack to open panels freely

The loomed wired need to be labeled in each compartment

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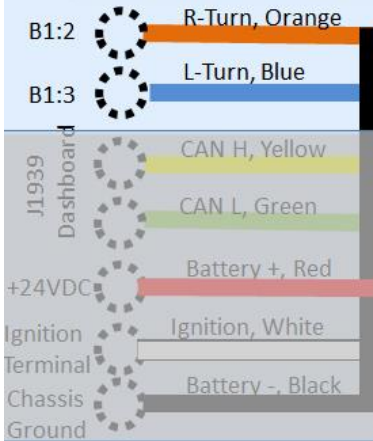
Roadside



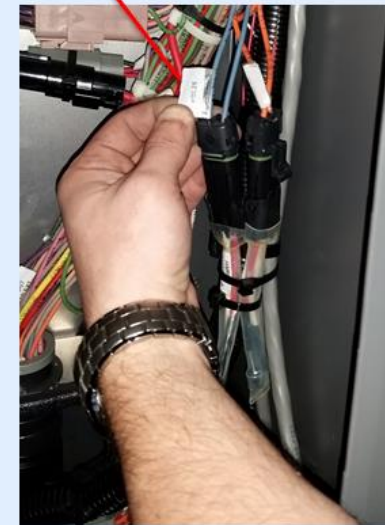
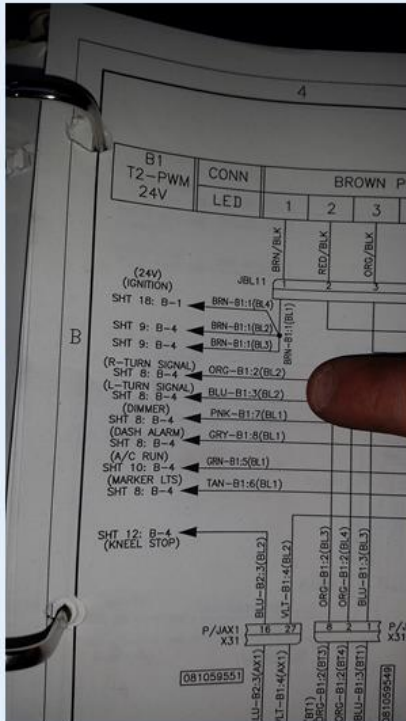
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Power and Signal Sources



Connections must be crimped, soldered and heat shrunk.



Electrical Cabinet

Right and Left Signal Sources



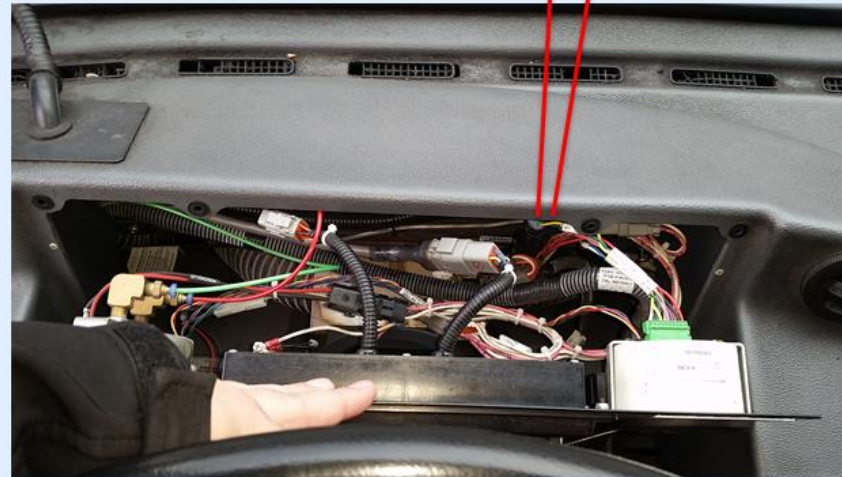
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Power and Signal Sources

B1:2	R-Turn, Orange
B1:3	L-Turn, Blue
J1939 Dashboard	CAN H, Yellow
	CAN L, Green
+24VDC	Battery +, Red
Ignition Terminal	Ignition, White
Chassis Ground	Battery -, Black

Connections must be crimped, soldered and heat shrunk.



Use tree mounts for pilot buses to secure harness on driver's dash board instead of screws to prevent any accidental damage to existing bus wiring under the dash.

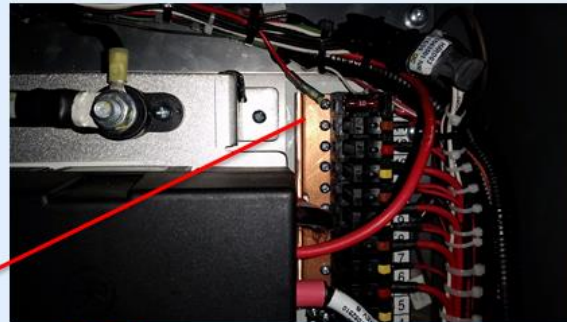
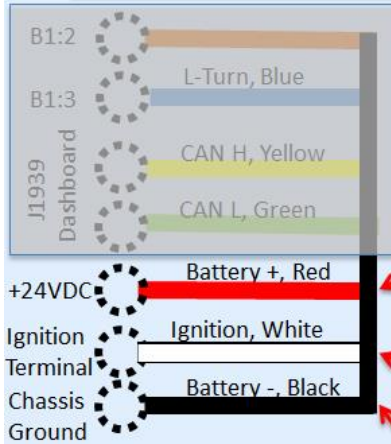
Dashboard J1939 Sources



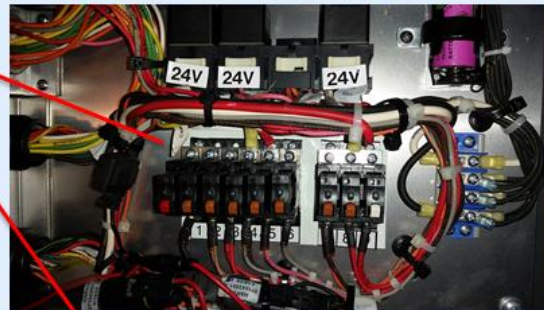
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Power and Signal Sources



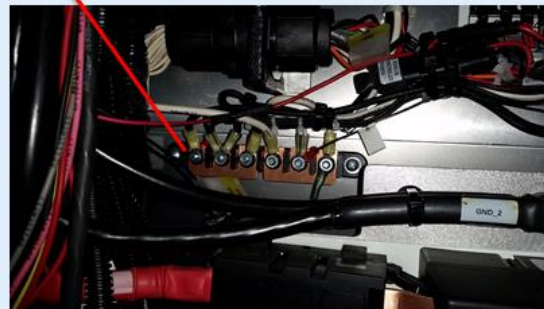
All connections will be crimped, soldered and heat shrunk.



Terminal studs and Circuit breaker terminals need to be torqued (0-50 inch lbs)



Electrical Cabinet



The loomed wired need to be labeled in each compartment



Shield+ Installation Test

- Verify Diagnostic Check upon Vehicle Start-Up (Each Pedestrian Display will Flash: Left, Center and Right)
- Validation of pedestrian detection to be conducted in a controlled intersection with a Rosco qualified pedestrian wearing Class 2 Green safety vest and Rosco qualified driver
- Three turning events for pedestrian detection:
 - Right hand turn with pedestrian stepping off of curb as bus is making turn
 - Left hand turn with oncoming pedestrian in crosswalk walking into the path of the bus
 - Left hand turn with pedestrian alongside in crosswalk walking into the path of the bus
- Observe Eyewatch for LDW(Lane Departure Warning), FCW(Forward Collision Warning), HMW(Headway Monitoring Warning) and speeding notification.





MTA NYCT Bus Electrical Installation Standards

1. All wiring must be loomed inside the compartment or outside.
2. All connections must be crimp, solder and heat shrunk.
3. Some terminals such as ground studs and Circuit breaker terminals needs to be torqued. Ground stud need to be torqued to 20 inch-lbs.
4. Proper ring terminal must be used for the screw size. Ring terminal must be crimp, solder and heat shrink.
5. Inline fuses will be used on 24 volts and ignition signals.
6. Use tree mounts for pilot buses to secure "exposed" harness on top of dash board instead of screws to prevent any accidental damage to existing bus wiring under the dash. (Figure 1.)
7. Any splice, butt type barrel connector used to crimp, solder and heat shrink to follow. See picture below. Part # NOBT-2200CK butt connector 16-14 gage wire or similar part # (Figure 2.)
8. Any drill area where the harness is passing through, needs grommet of proper size besides the loom installed on the wires .
9. Spare wires provision. All looms more than 4 feet long will carry two spare wire labeled "FCW spare"
10. All wiring inside every compartment must be secured using plastic ties at least 8 inches apart and secured to the existing bus harnesses.
11. All connections and wire loom must be identified by printed labels in each compartment the harness is passing through. Label should also be installed at the connection point. Hand written labels are not acceptable.
12. To avoid any drilling debris, metal chips, etc., work area must be covered by protective cover or painter's drop cloth. The work area must debris free after the installation is completed



Fig 1. Harness Tree Mount



Fig 2. Butt type barrel connector used to crimp, solder





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