

BRAKES

ALL MODELS

Air Brake Modifications

Certification Procedures For DOT FMVSS-121

The Federal Department of Transportation's Motor Vehicle Safety Standard 121 required that virtually all trucks equipped with air brakes and manufactured on or after March 1, 1975 must comply with a comprehensive set of design and performance parameters concerning the air brakes and related systems.

Of the many requirements of FMVSS 121, two are of primary concern between the truck manufacturer and the body and allied equipment manufacturer. The first concern is the center of gravity location on a truck used for compliance testing and the second involves the tubing and air flow design of the brake system.

Cautions - FMVSS-121 Air Brake System Modifications

CAUTION: If wheelbase alterations are made to International vehicles with FMVSS-121 brakes:

- **DO NOT** make alterations to air lines with hose, piping or fittings of sizes other than those currently in use on the truck.
- **DO NOT** allow sharp bends or other constrictions in hosing.
- **DO NOT** exceed the minimum or maximum wheelbase available from the factory for that model after lengthening or shortening the wheelbase. For wheelbases longer or shorter than those available from the factory, International will provide verbal opinion (through contacting your local International dealer). International will be available to provide certification testing and documentation of compliance or non-compliance with FMVSS-121 for the specific situation at an additional cost.

CAUTION: Air reservoirs may be relocated providing these guidelines are followed:

- **DO NOT** make alterations to air lines with hose, piping or fittings of sizes other than those currently in use on the truck.
- **DO NOT** allow sharp bends or other constrictions in hosing.
- **DO NOT** alter brake line to port location.

CAUTION: Air-operated auxiliary attachments may be added to International FMVSS-121 vehicles if you:

- **DO NOT** use air tap locations other than those shown on these drawings for these models.
- **Pressure protection valves are required where shown and should be mounted with the vent port downward. All new parts are available from International truck dealers.** Since the FMVSS-121 has very specific criteria for the time allowed for air to reach and release the brakes, it is obvious that the tubing design is very critical and that the allowable sources for air tap must necessarily be restricted. Consult FMVSS-121 for criteria for time allowed for apply and release of brakes.

*ALL MODELS***Brake Restrictions***Safety Measures*

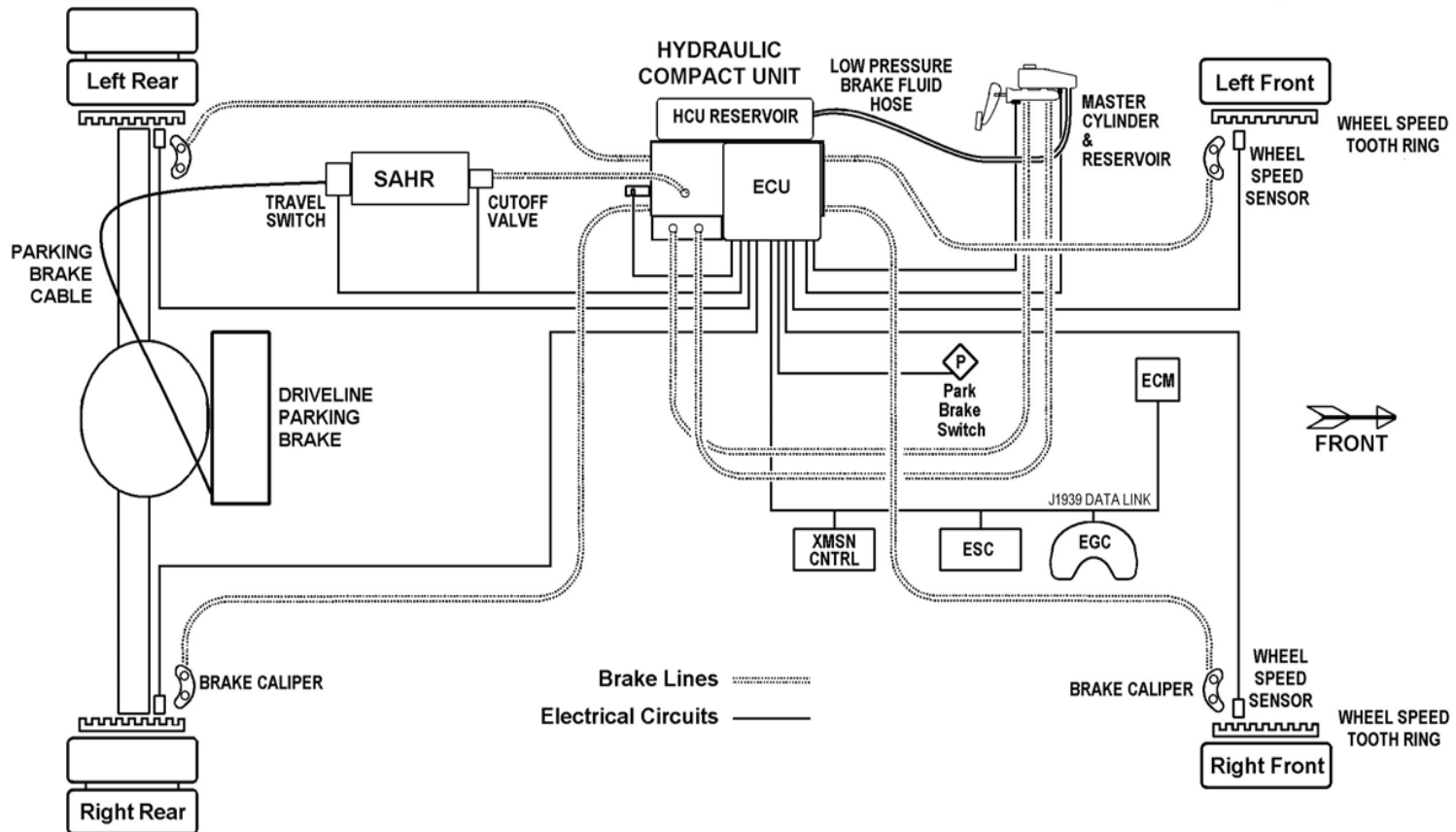
Should it be necessary to modify the braking system, for example in connection with a wheelbase alteration, the following must always be observed:

- Make sure that the brake circuits are not altered. Before any part of the braking system is dismantled, mark the brake pipes and connections concerned, or make a sketch showing the original routing.
- Avoid joints, preferably change the entire brake pipe.
- Preferably, use bent brake pipes instead of elbow unions so as not to affect the brake application/release times.
- Install the brake pipes in positions where they are protected against damage and heat.
- Install the air tanks so that the drain valves still function well and are easy to reach.

CAUTION: When a brake pipe is replaced or jointed, use only genuine International parts of the correct type.

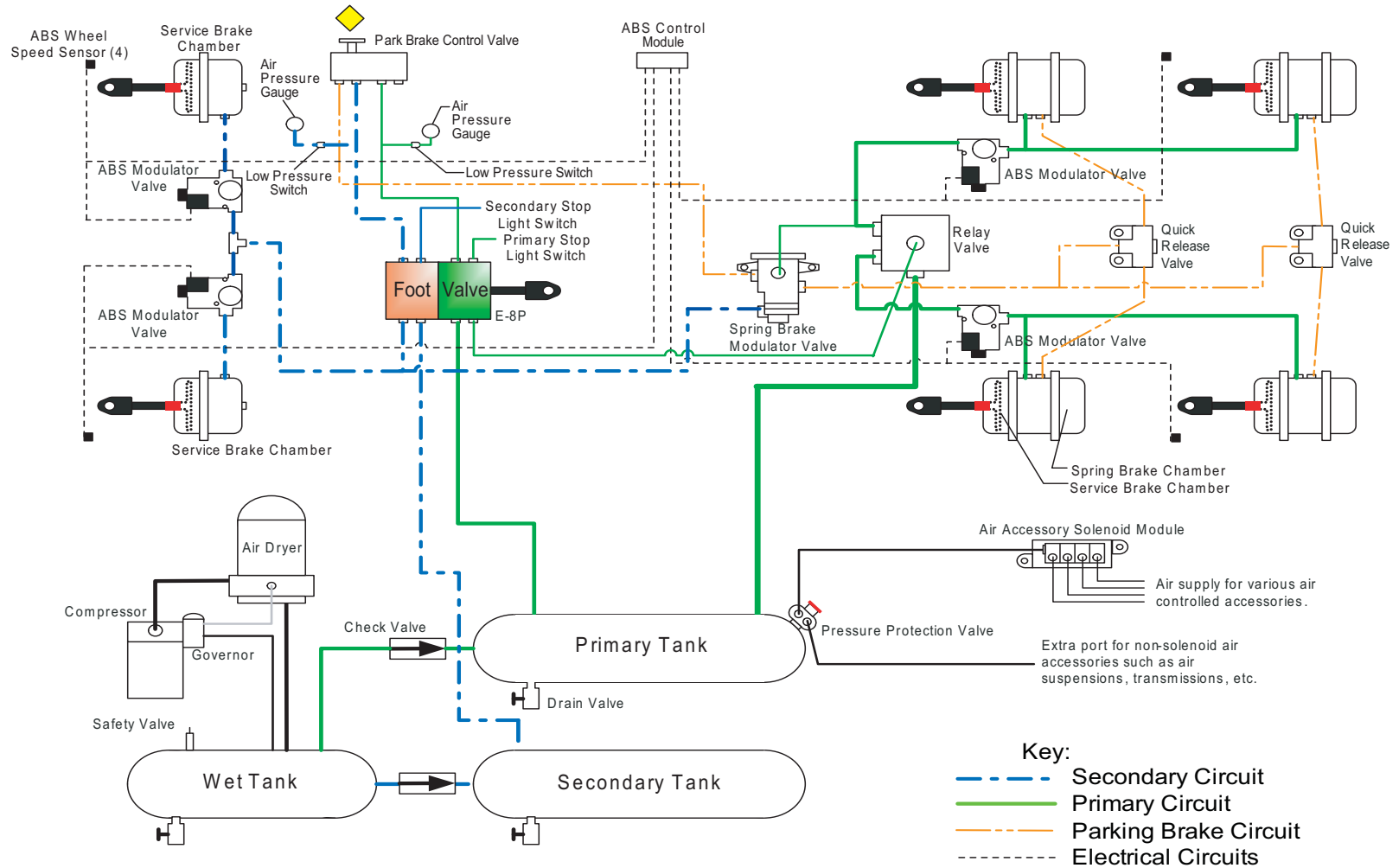
NOTE: On trucks with ABS brakes, the sensor cable must not be jointed. If necessary, it must be completely replaced.

Full Power Hydraulic Brake System Schematic (with Truck Brake System Code 04085)



04_0081

Antilock Air Brake System Schematic (with Truck Brake System Code 04091)



ALL MODELS

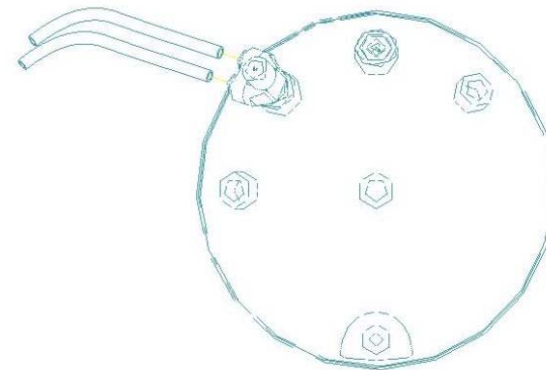
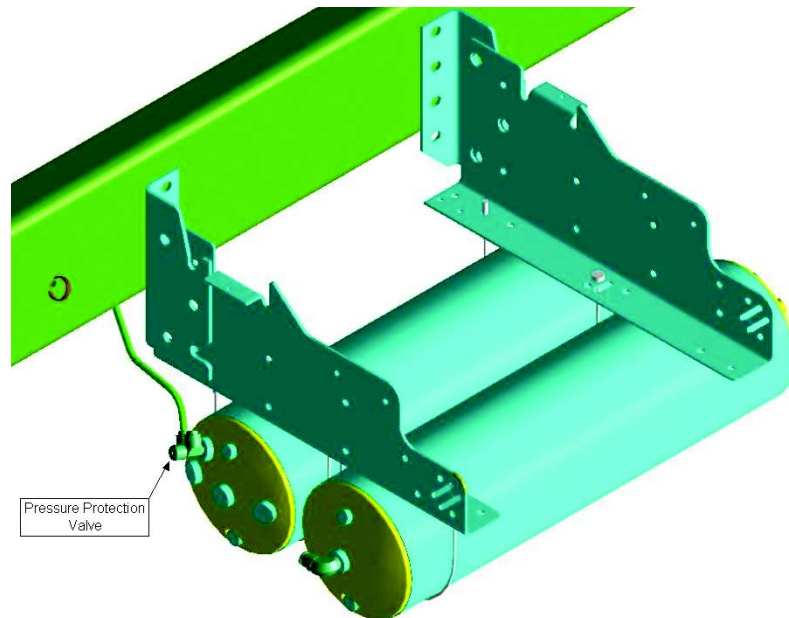
Routing Guidelines

If modifications are made to International vehicles with the addition or re-routing of tubing the following guidelines found in the Federal Motor Carrier Safety Regulations Pocketbook, section 393.45, should be followed:

- Be designed and constructed in a manner that insures proper, adequate, and continued functioning of the tubing or hose.
- Be installed in a manner that insures proper continued functioning of the tubing or hose.
- Be long and flexible enough to accommodate without damage all normal motions of the part to which it is attached.
- Be suitably secured against chafing, kinking, or other mechanical damage.
- Be installed in a manner that prevents it from contacting the vehicle's exhaust system or any other source of high temperatures.

*ALL MODELS***Air-Operated Auxiliary Attachments**

- The primary air reservoir has a dedicated port for a two-port pressure protection valve (PPV). If no air-operated features are ordered on the vehicle, then this port is plugged from the factory. A PPV can be ordered from an International dealer if a PPV is needed.
- The PPV will come installed from the factory if an air suspension or other air-operated device is ordered (i.e., fifth wheel slide, air suspension dump, etc.). Depending on vehicle ordered features; one port may be open. If this is the case, then unplug that port and use the port.
- If all of the ports on the PPV are utilized, then a Quality Connect tee should be installed into the one of the used ports. The recommended tee - 3/8-inch x 3/8-inch x 3/8-inch stem (International part number 2024458C1) – can be ordered from an International dealer.



View displaying Pressure protection valve in end of Primary air tank with two supply tubes.

04_0005

04_0006

ALL MODELS**Tube Fitting Installation Instructions**

The majority of tube fitting connections in the air braked chassis utilize a Quality Connect fitting (fitting integral to an air brake component or plastic fitting) or an PTC fitting (fitting threaded into an air brake component). Both of these fitting types are comprised of a collet which bites into the tube to hold it firmly in place and a fitting O-ring which seals the tube to the valve, manifold or tee body to prevent leakage. To aid in service, a kit is available with tools for each port and tube size used by International.

To assure standardization of tubing used on International vehicles, the following table illustrates tubing color, abbreviations and where that color is used.

Color	Abbreviation	Where Used
Black	BK	MV-3, PPDC Exhaust Air Seat Air Horn Air Dryer to Wet Tank Wet tank to Governor
Blue	BL	Trailer Service, 1st Pusher Delivery
Brown	BN	Air Suspension system, 2nd Pusher Delivery
Green	GN	Primary Brake system
Orange	OR	Secondary Brake system
Purple	PL	1st Tag Delivery
Red	RD	Trailer emergency
Silver	SIL	PDL control, 2nd Pusher Supply Governor to Dryer
Tan	TN	Locking differential, 1st Pusher Supply Traction differential Two-speed axle
White	WH	Solenoid Pack Supply Load Sensing Gauge, 1st Tag Supply
Yellow	YL	Spring Brake System, Cab Air Suspension

ALL MODELS

Removal and Insertion Procedures for Tubing in QC or PTC Fittings



WARNING: Do not attempt to disassemble tubing from fittings with air pressure in the system. Failure to drain system of air pressure before removing components may cause personal injury or death.

Removal of Tube from Fitting

- Use the tube release tool (see graphic 1 below) to remove the tube.
- Push down on the release tool, then pull on the tube. Pushing the tool depresses the fitting collet, allowing it to release the tube. Sometimes the brass tube support will be pulled out of the fitting when the tube is removed. Be sure to reinstall a tube support when installing the tube.

Preparation of Tube for Installation

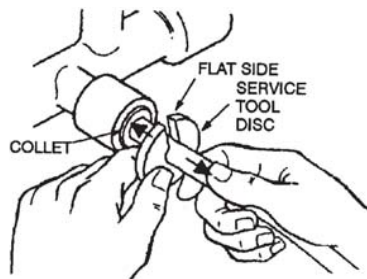
- Inspect the tube end for external scratches, burrs, or cracks. If it is damaged, trim the damaged portion off at an insertion depth mark (see graphic 2 below) or replace the tube. **DO NOT** reuse a damaged end.

IMPORTANT:

Use the tube cutter (supplied in the tool kit) to ensure that the cut is square within 15° to help prevent leakage. Do not use a dull or heavy cutting tool such as side cutters, pocket knife or hack saw which could collapse (flatten) the tube or create O-ring damaging burrs. Do not use the tube cutter to cut anything other than nylon air line tubing. Replace the blade or cutter if the cutting edge becomes dull.

Installing Tube Into The Fitting

- Lubricate the tube end and install it to the correct insertion depth (see graphic 3 below). Install the tube by pushing it straight into the fitting. The insertion depth mark should be flush with the face of the fitting (see graphic 3 below). Gently tug on the tube to make sure it is secured in the fitting.
- Test to make sure the assembly is free from leaks using a soap solution and clean, dry air at system pressure. When performing a bubble test, leakage should not exceed a soap bubble of 1/2-inch (12 mm) in 3 seconds with system air pressure of 100 to 130 psi. If a leak exceeding the above specification is still present, remove and replace the valve, manifold or tee.



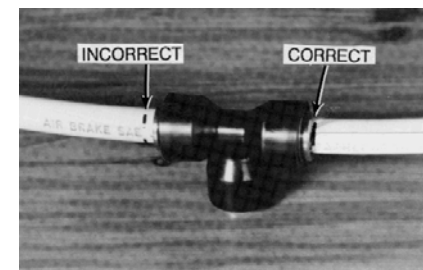
1 – Remove Tube

04_007



2 – Prepare for Installation

04_008

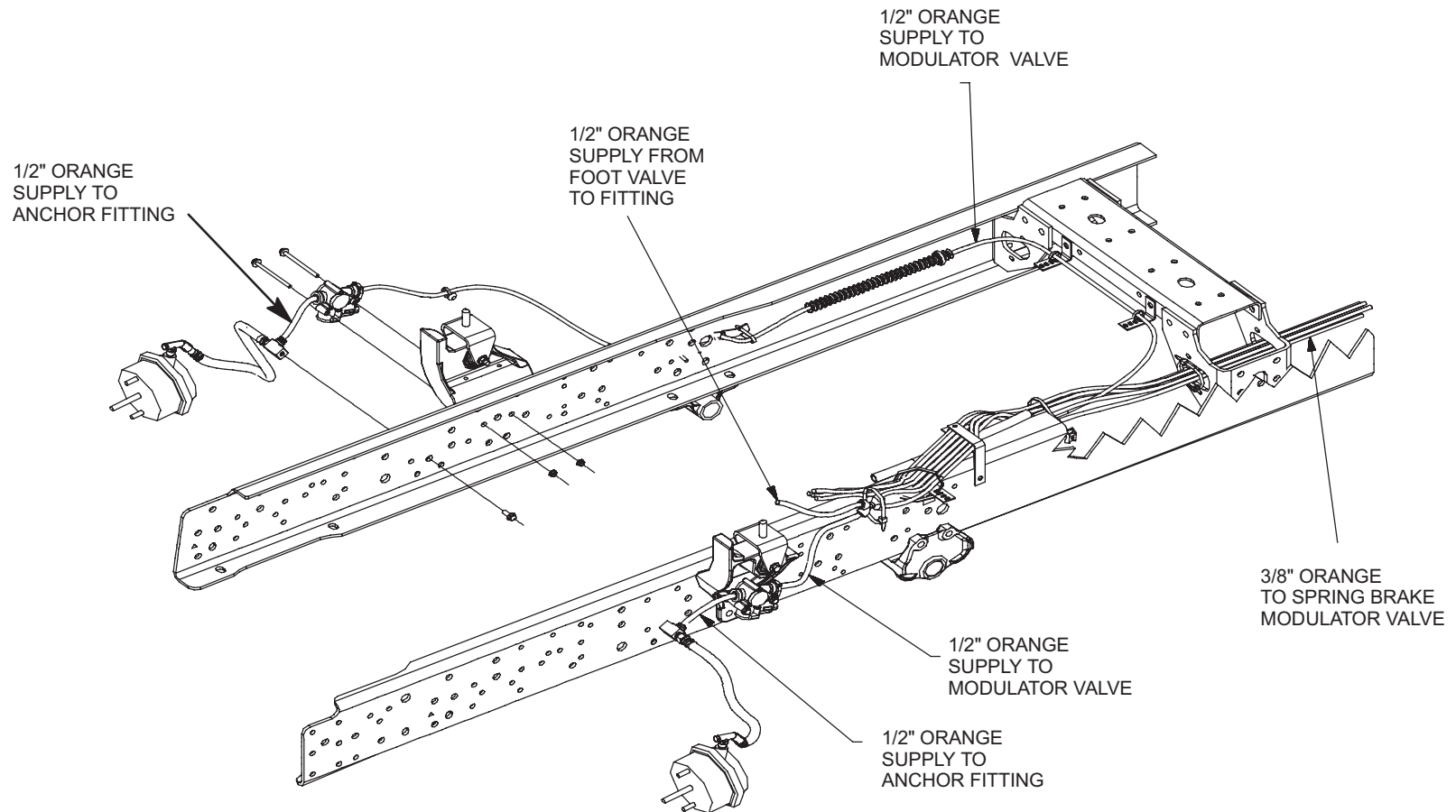


3 – Install Tube into the Fitting

04_009

ALL MODELS

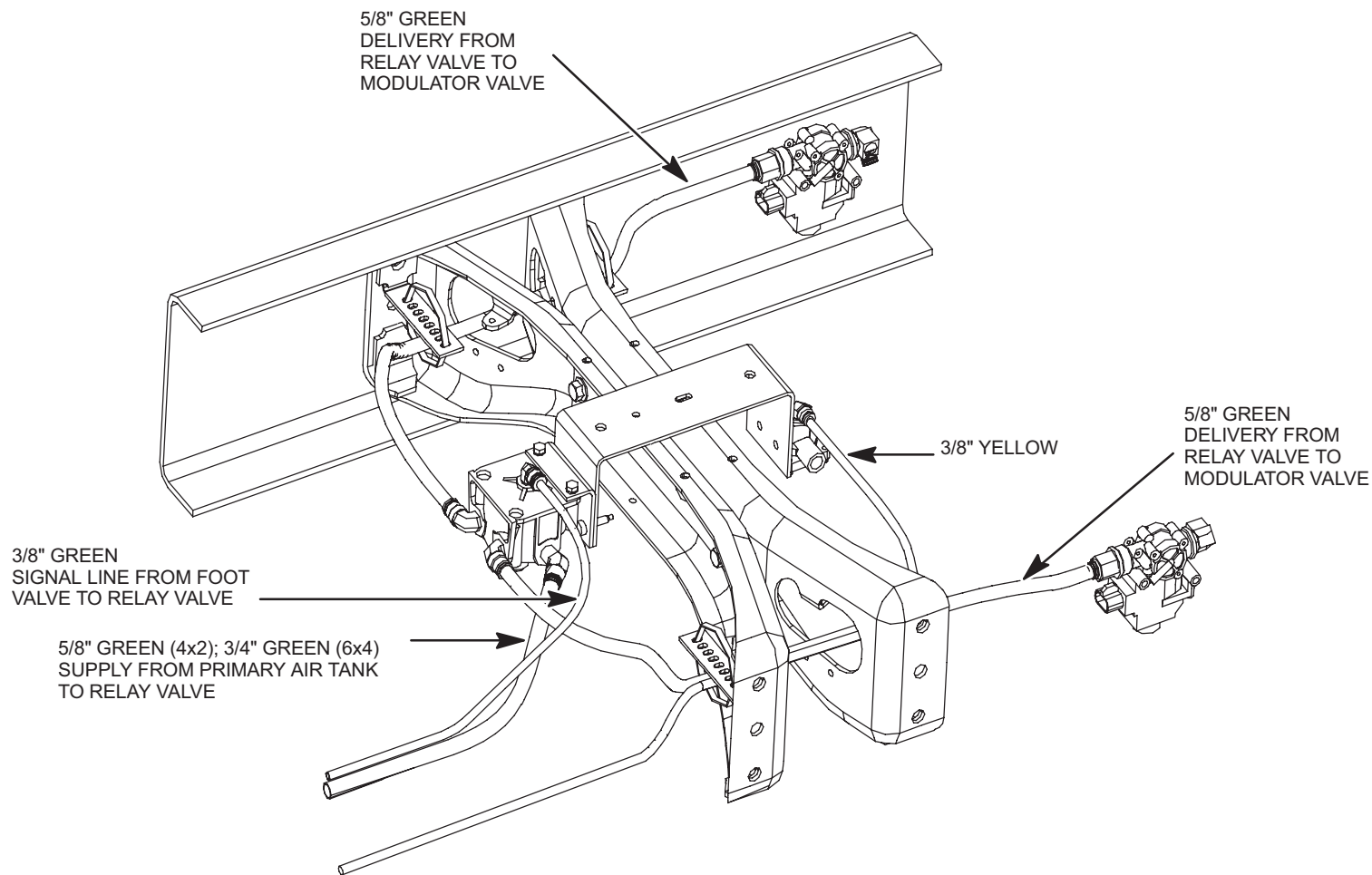
Air Brake Tubing – Front Section



04_0010

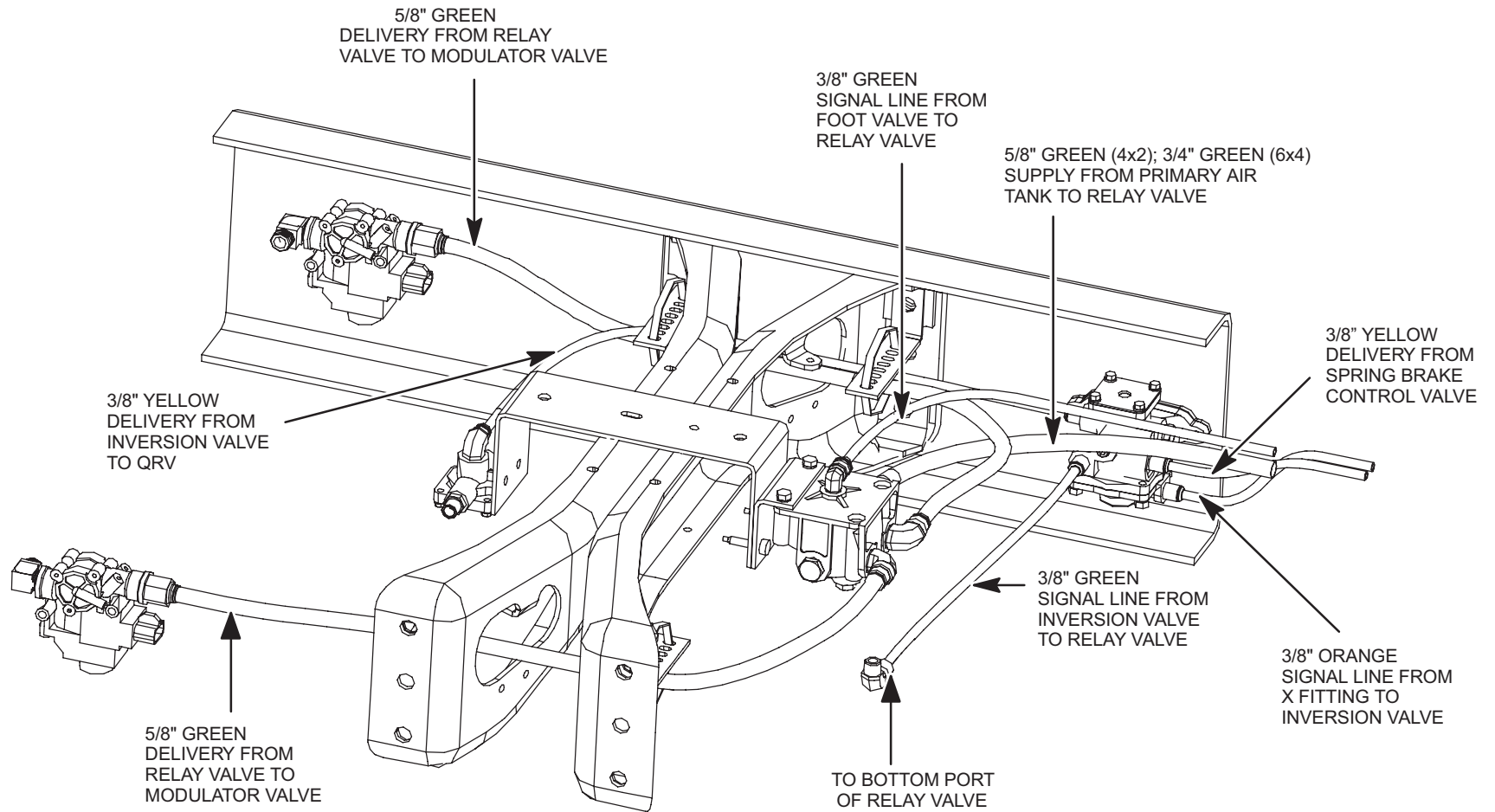
ALL MODELS

Air Brake Tubing – Rear Section – Tractor Brakes



ALL MODELS

Air Brake Tubing – Rear Section – Truck Brakes

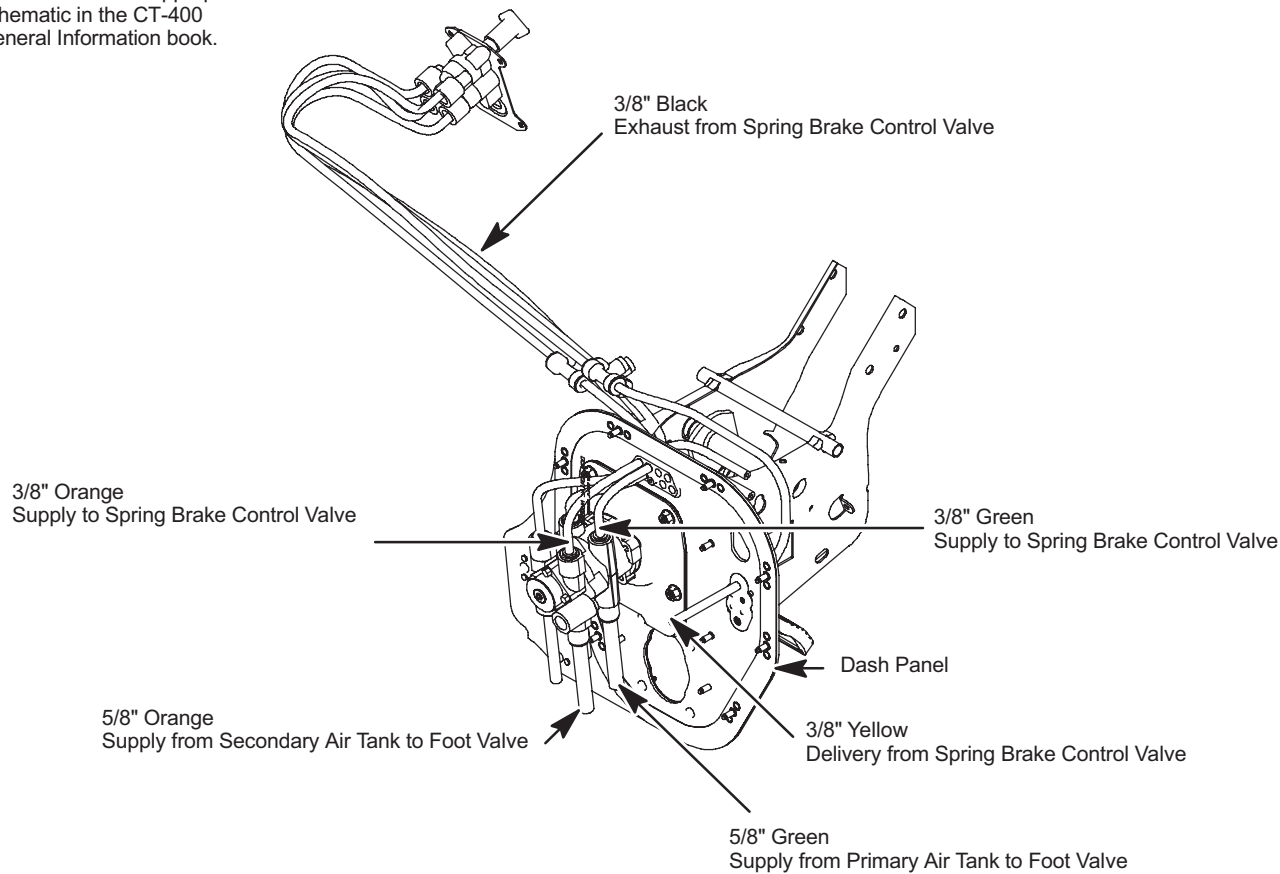


04_0012

ALL MODELS

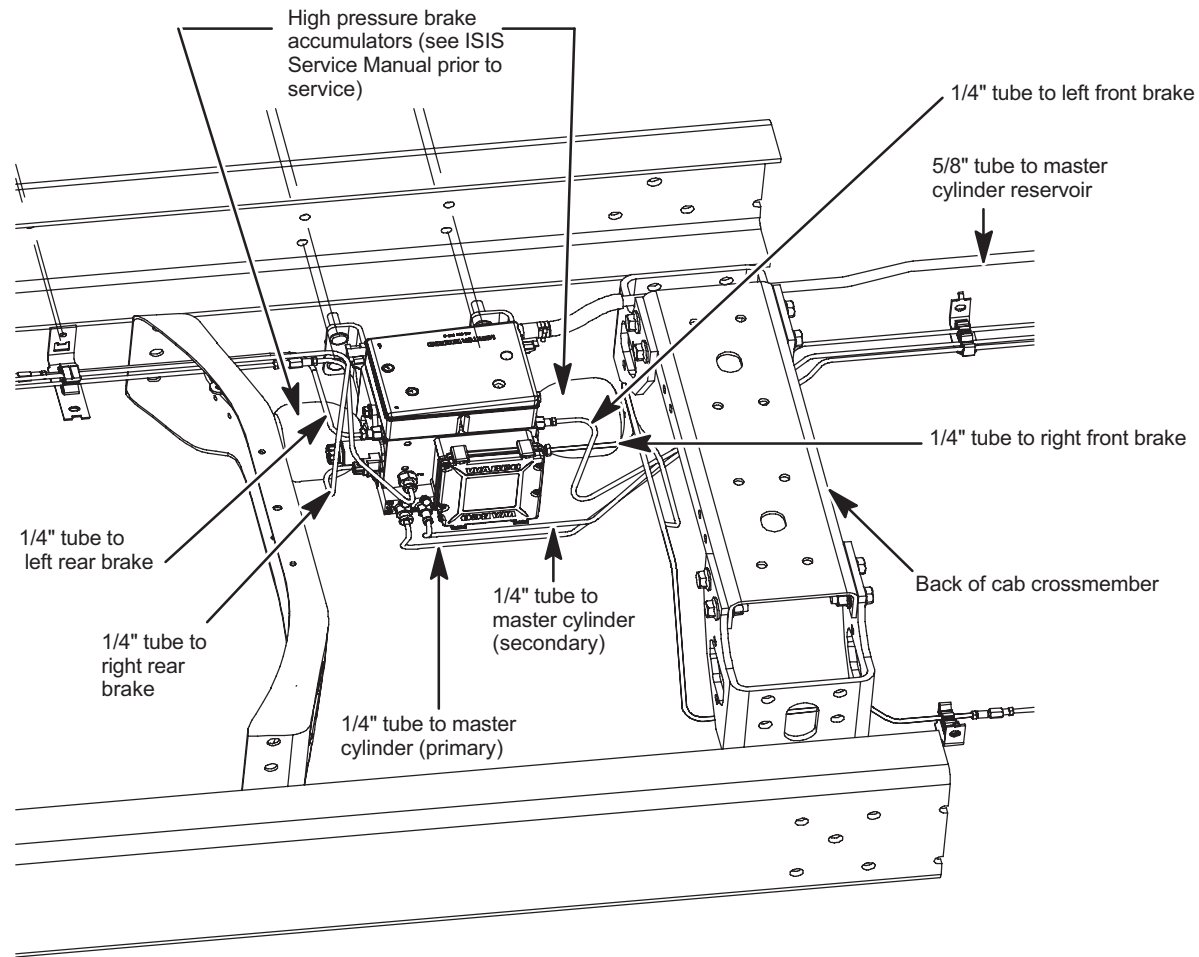
Inside Cab & Foot Valve Plumbing

For connections not shown,
please refer to the appropriate
schematic in the CT-400
General Information book.



ALL MODELS

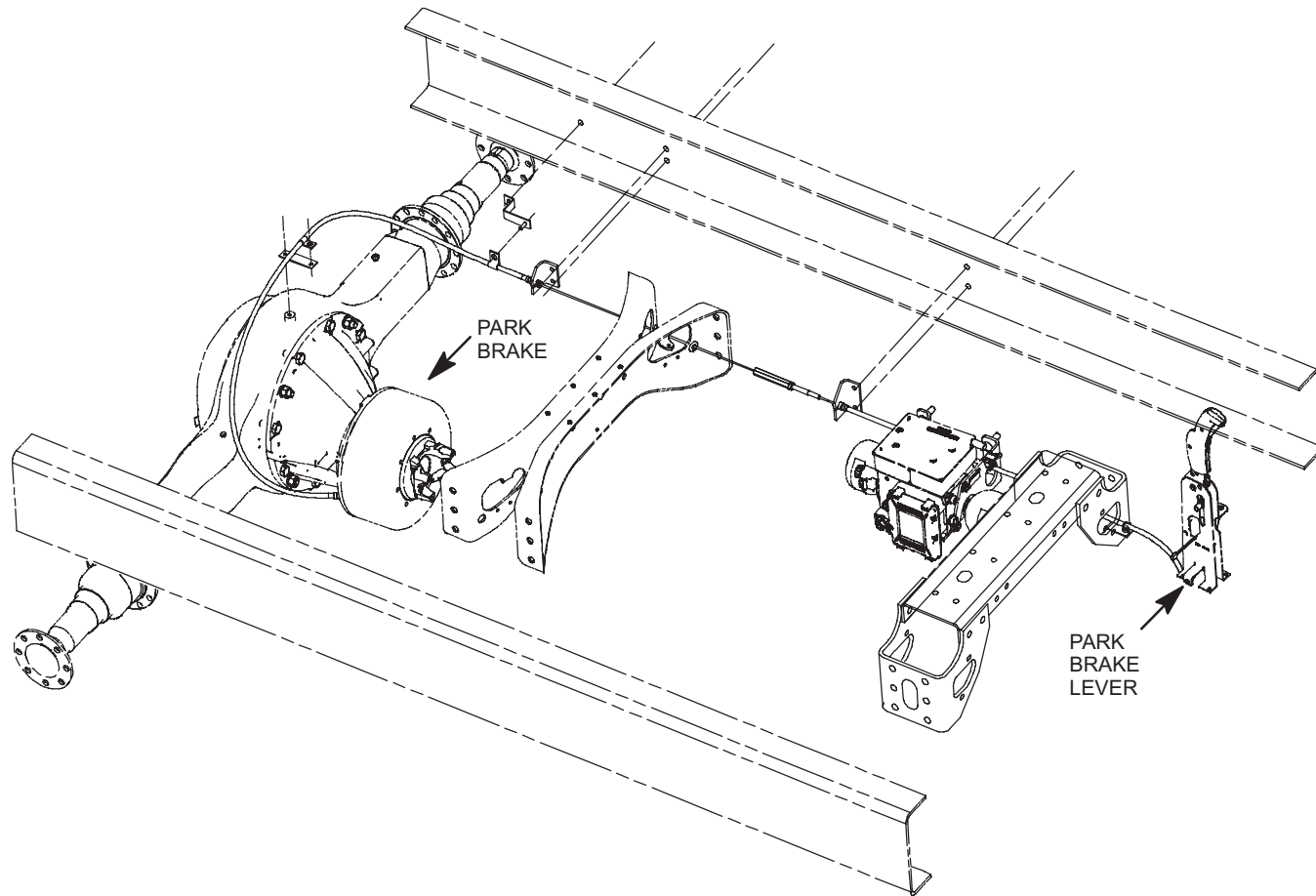
Hydraulic Control Unit Plumbing



04_0014

ALL MODELS

Parking Brake Assembly With Hydraulic Brakes

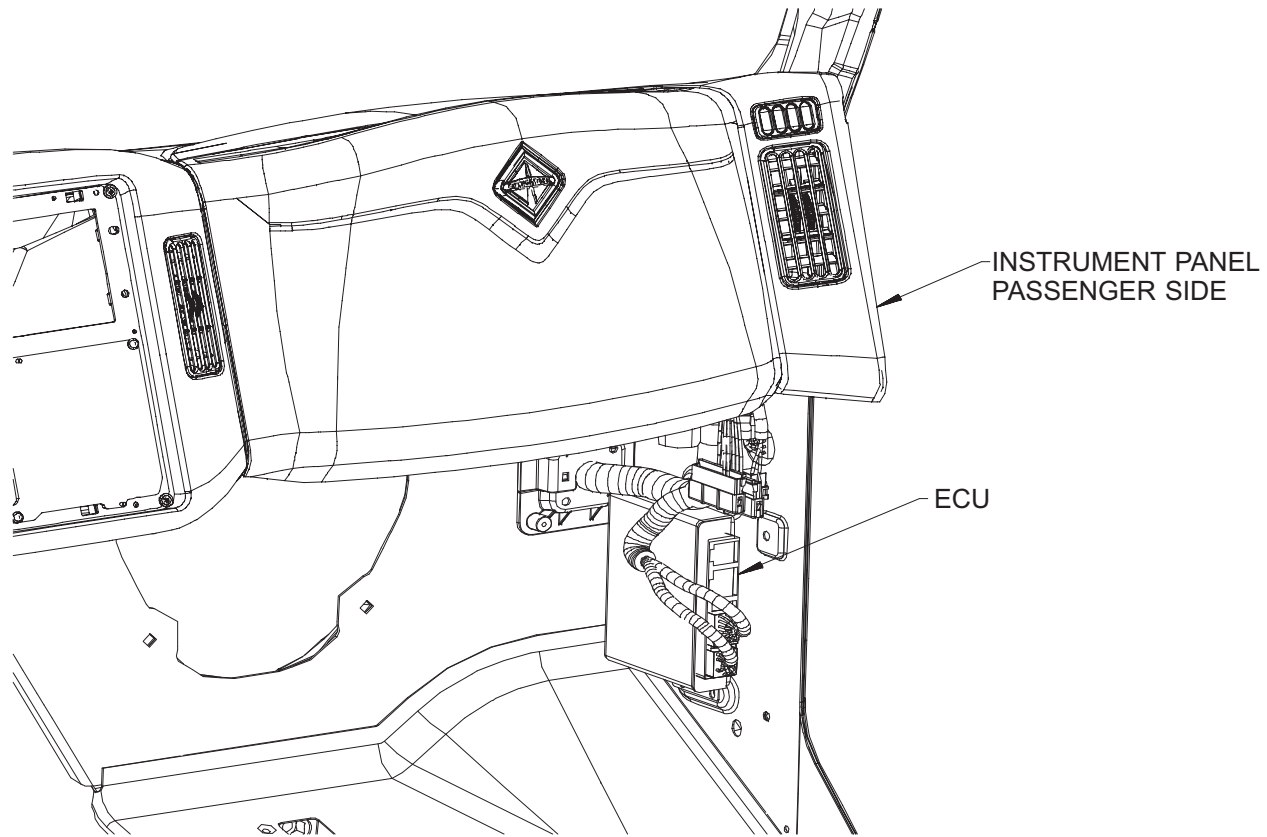


04_0015

With hydraulic brakes, the park brake assembly is attached to the rear axle. It is mechanically actuated through the use of a three-section cable. Due to the construction of the cables, it is not possible to alter the length.

ALL MODELS

Air ABS ECU (Electrical Control Unit)

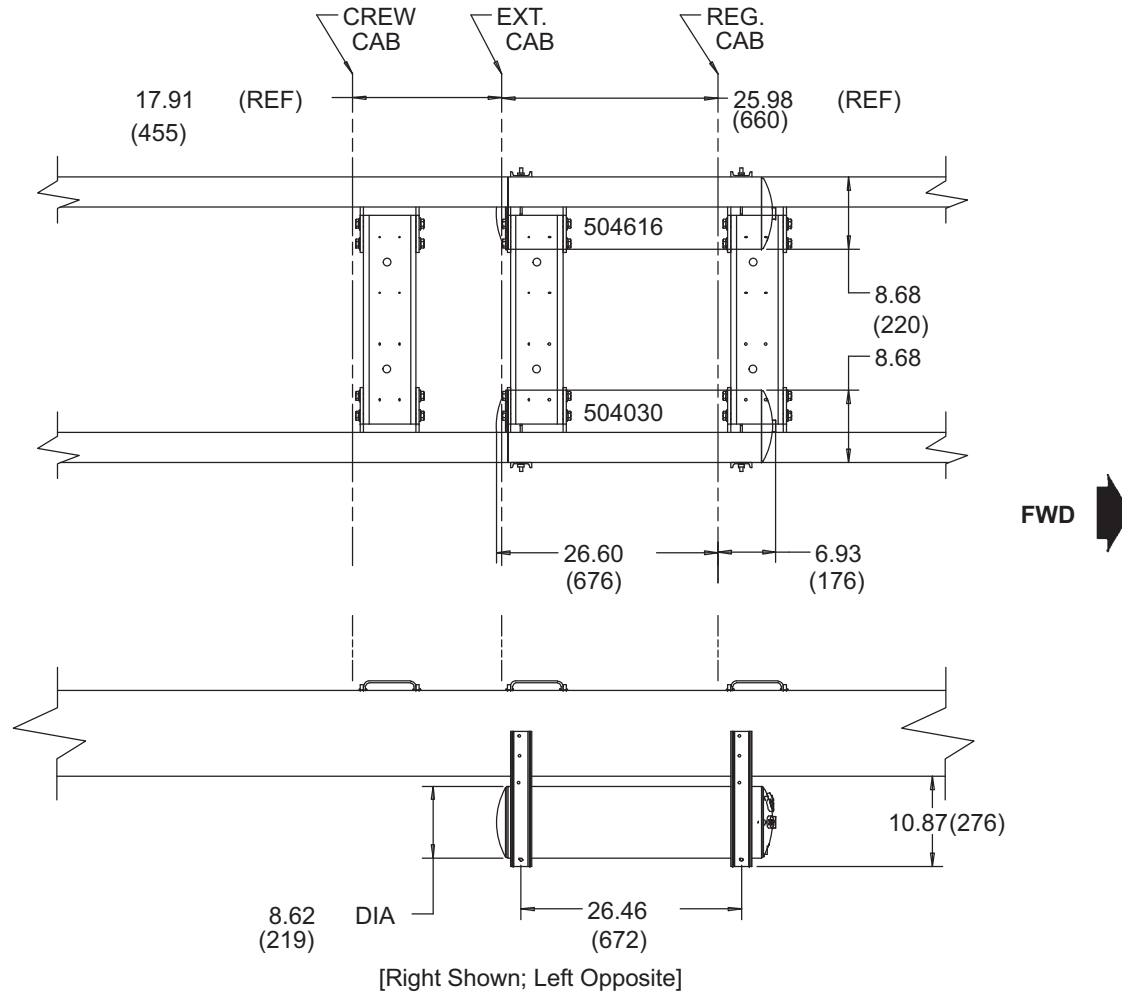


04_0016

ALL MODELS (Except 4x4)

Air Tank Location

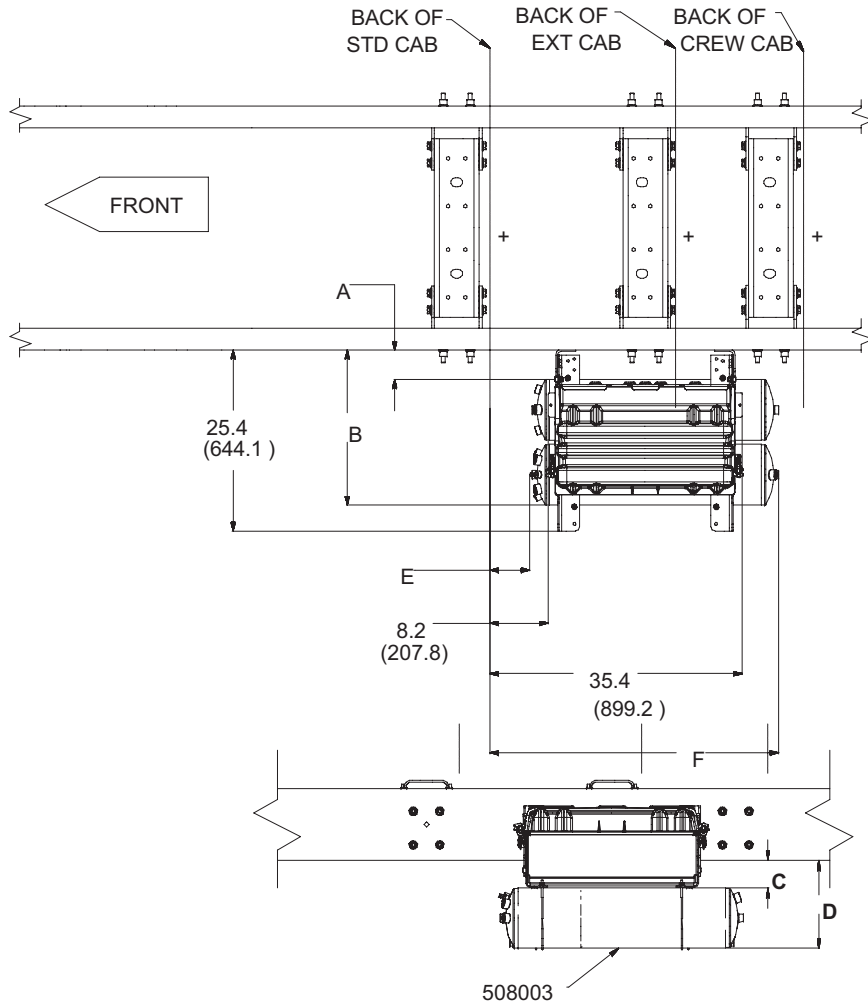
With Hydraulic Brakes and Air Effects Right (504030) and Left (504616) Side Mounted



ALL MODELS

Air Tank Location

With Air Brakes Left (508003) Side Mounted Under Battery Box, Back of Cab



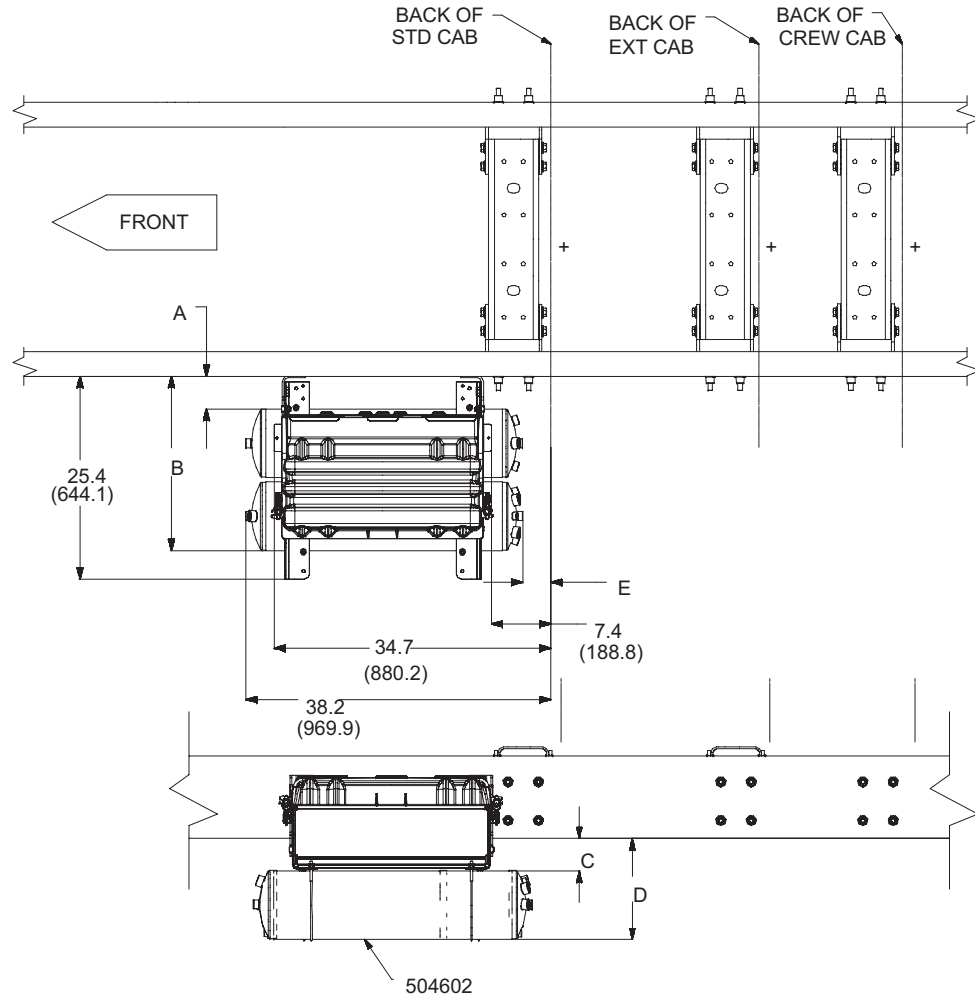
Key	8.5" Tank	11" Tank
	Inch (Millimeter)	
A	4.1 (103.8)	1.6 (41.7)
B	21.8 (553.7)	24.2 (614.7)
C	3.8 (96.7)	23.9 (606.6)
D	12.5 (318.3)	14.9 (379.2)
E	5.6 (142.3)	5.4 (137.4)
F	40.5 (1029.3)	41.3 (1048.3)

04_0018

ALL MODELS

Air Tank Location

With Air Brakes Left (504602) Side Mounted Under Battery Box, Under Cab

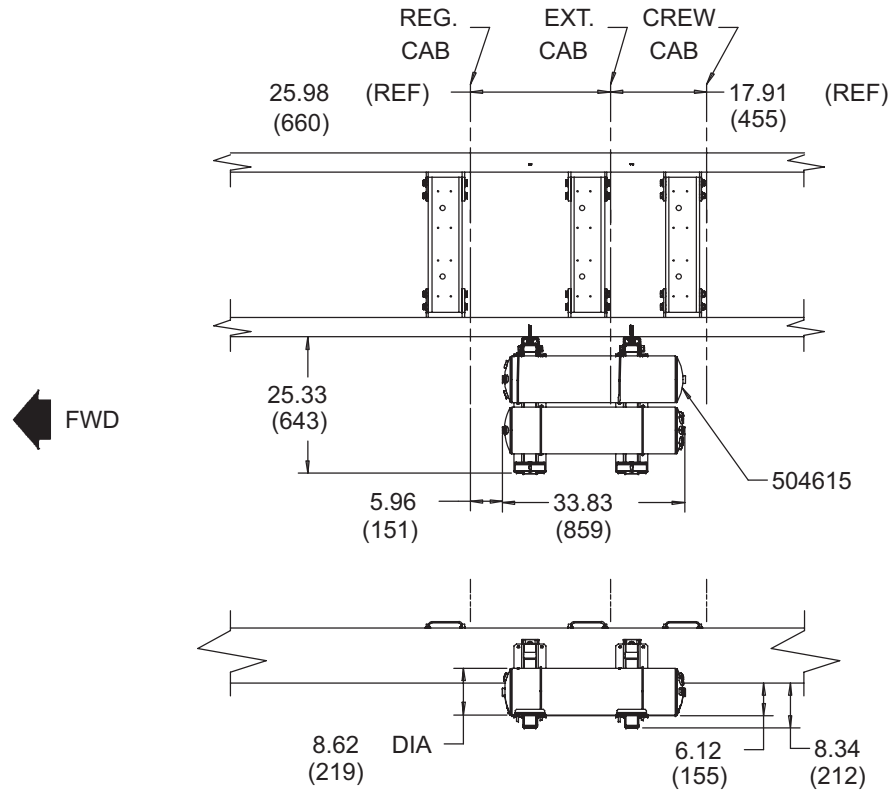


Key	8.5" Tank	11" Tank
	Inch (Millimeter)	
A	4.1 (103.8)	1.6 (41.7)
B	21.8 (553.7)	24.2 (614.7)
C	4.0 (102.4)	3.8 (96.7)
D	12.5 (318.3)	14.9 (379.2)
E	3.5 (89.9)	2.3 (59.0)

MODELS LP, 4x2

Air Tank Location

With Air Brakes Left (504615) Side Mounted, Back of Cab, With 19.5" Dia. Wheels

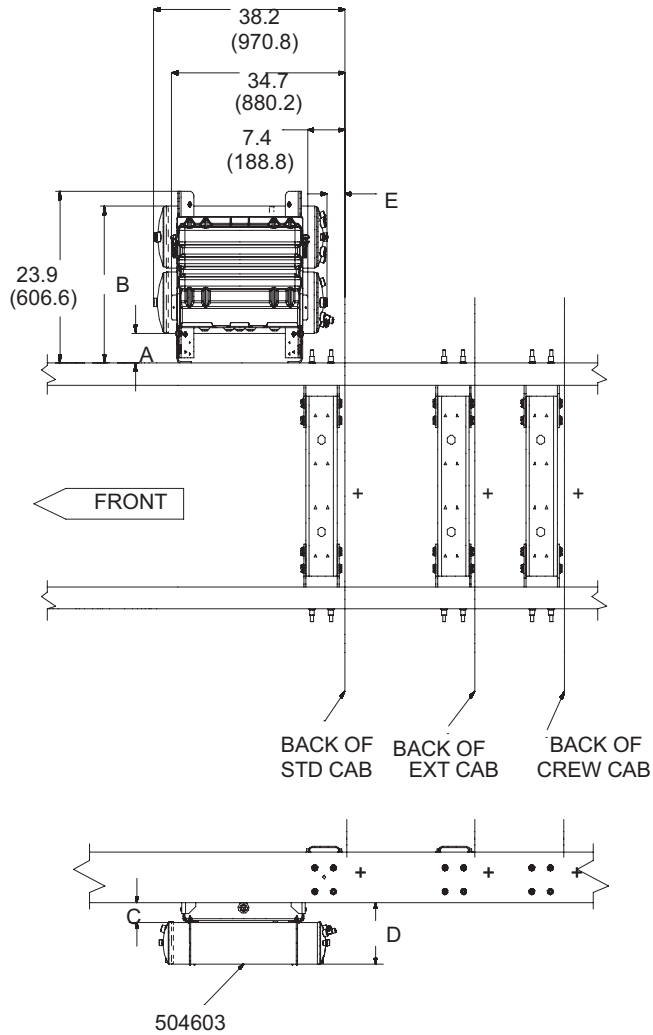


04_0020

ALL MODELS (except 4x4)

Air Tank Location

With Air Brakes Right (504603) Side Mounted Under Battery Box, Under Cab

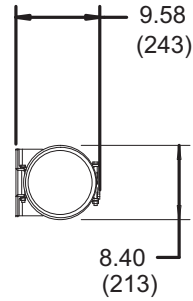


Key	8.5" Tank	11" Tank
	Inch (Millimeter)	
A	4.1 (103.8)	1.6 (41.7)
B	21.8 (553.7)	24.2 (616.7)
C	4.0 (102.4)	3.8 (96.7)
D	12.5 (318.3)	14.9 (379.2)
E	3.5 (89.9)	2.3 (59.0)

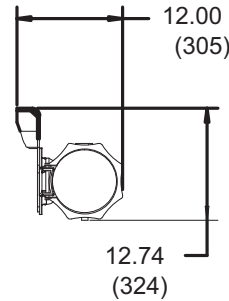
ALL MODELS

Air Dryer Location

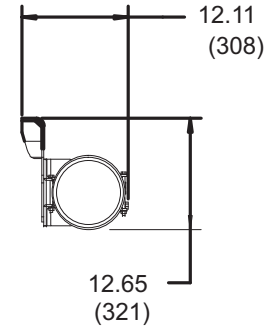
Codes 04EBD, 04EBS, and 04EBT



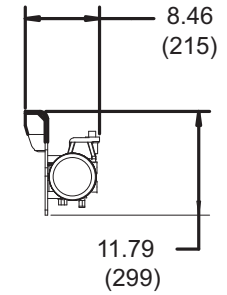
04EBT



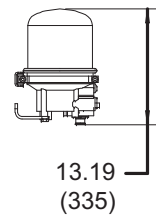
04EBS



04EBT

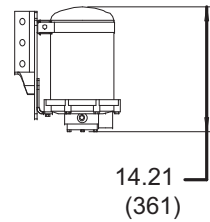


04EBD



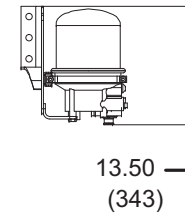
LOCATION CODES

504393
04VBC



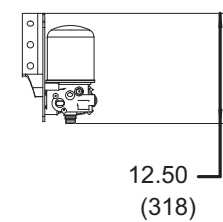
504395
504396

BATTERY BOX MOUNTED



504395
504396

FRAME MOUNTED



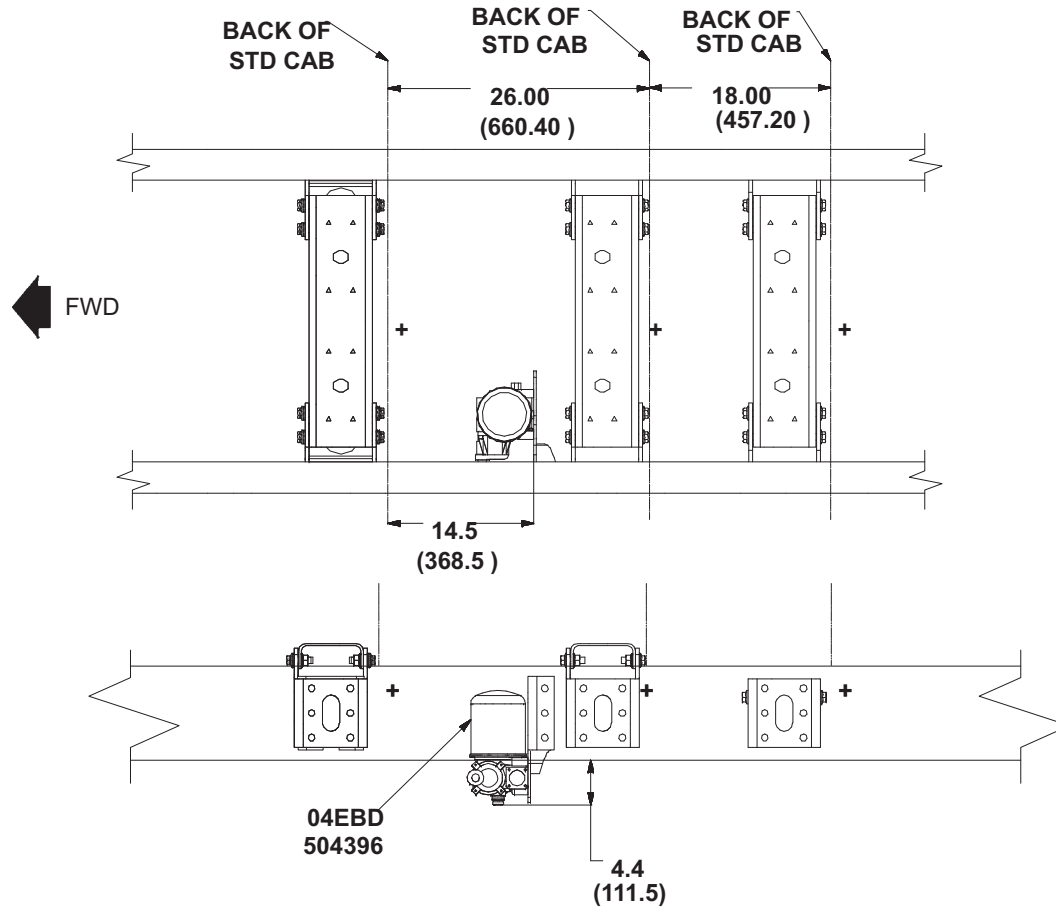
504395
504396

04_0022

ALL MODELS

Air Dryer Location

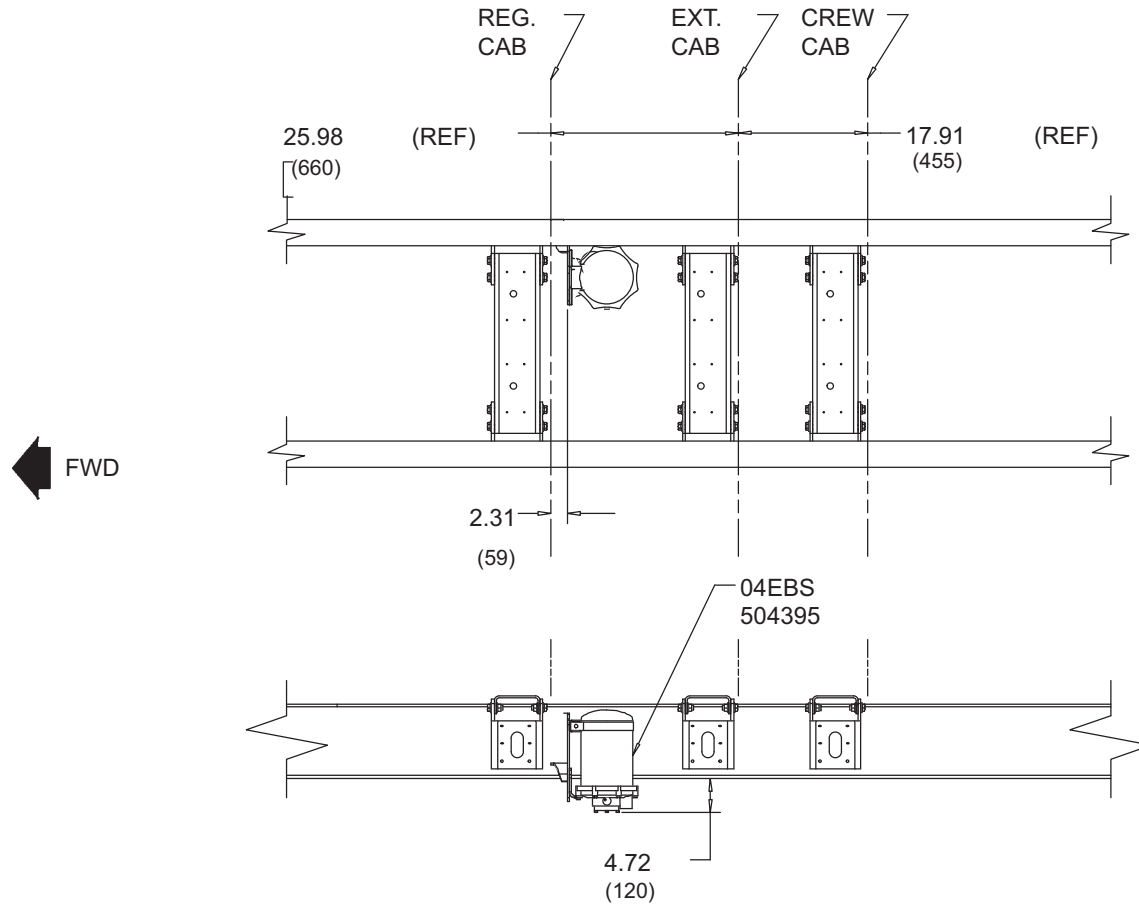
Air Dryer 04EBD with Location Code 504396 – Mounted Left Side Inside Rail, Back of Reg Cab



ALL MODELS

Air Dryer Location

Air Dryer 04EBS with Location Code 504395 – Mounted Right Side Inside Rail, Back of Standard Cab

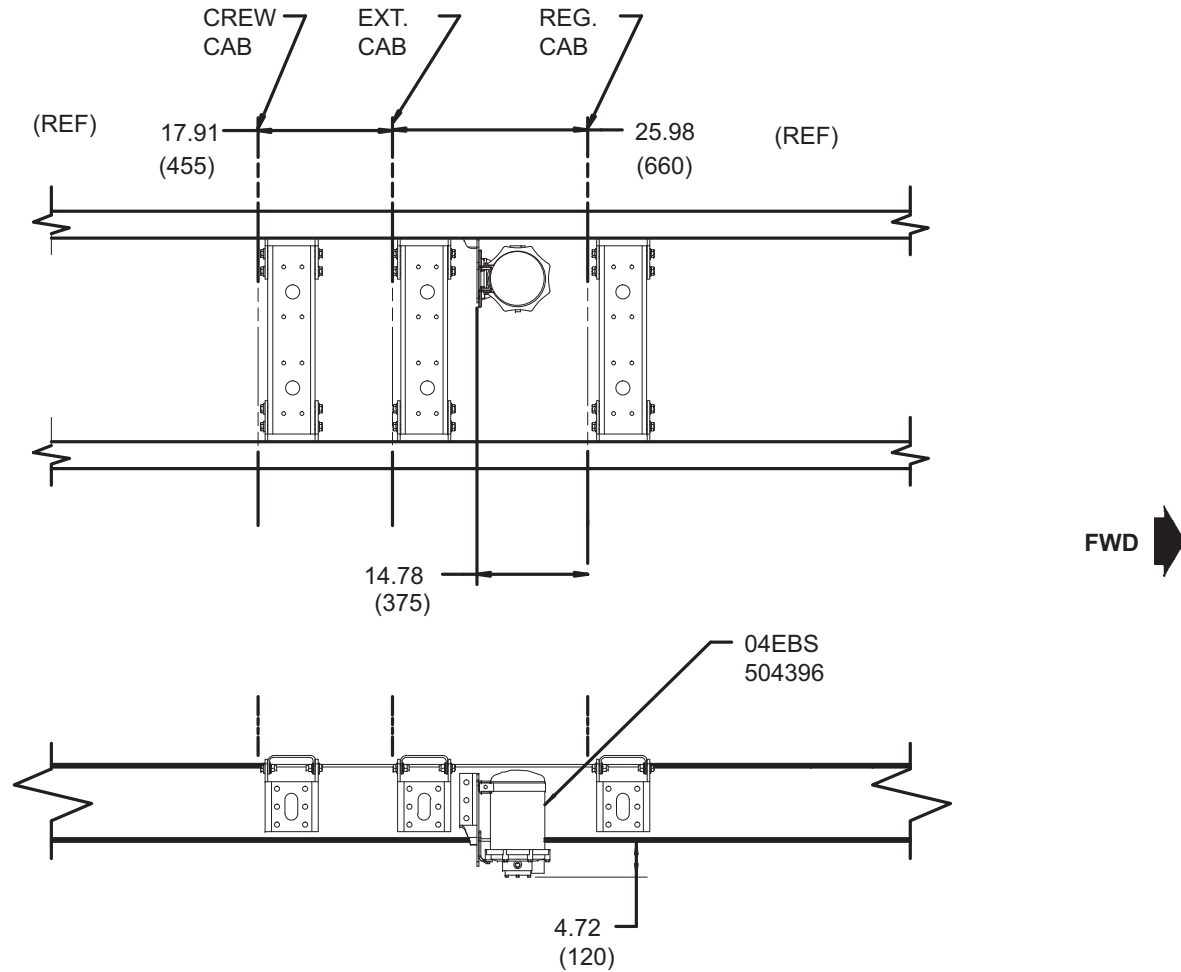


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ALL MODELS (except 4x4)

Air Dryer Location

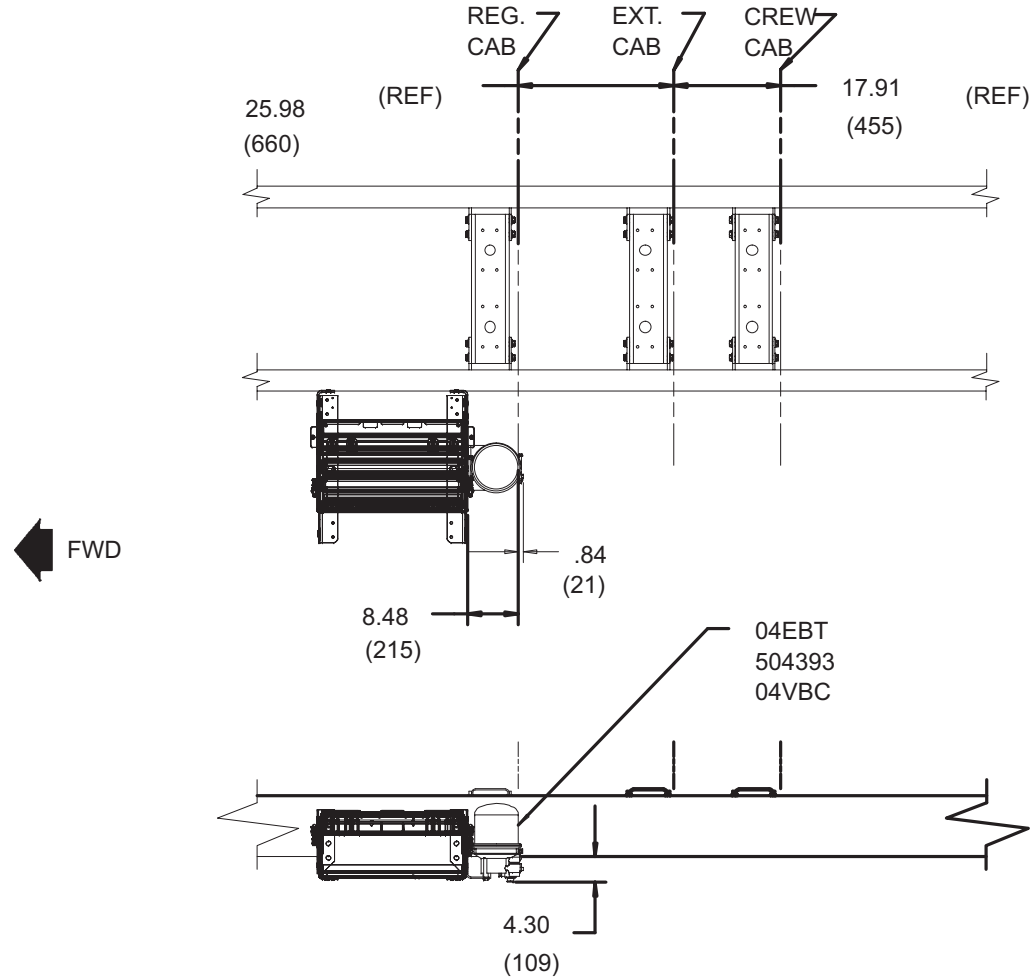
Air Dryer 04EBS with Location Code 504396 – Mounted Left Side Inside Rail, Back of Standard Cab



ALL MODELS

Air Dryer Location

Air Dryer 04EBT with Location Codes 04VBC or 504393 – Mounted Left Side, Back of Battery Box, Under Cab



04_0026