STALLION BUS INDUSTRIES

Model: SLC938

Sunliner Coach - *Corona, California U.S.A.*

Sunliner Coach (a Stallion Bus Industries Company) is pleased to provide you, our customer, with the highest quality product available on the market today. We strive to ensure that all our vehicles meet or exceed all applicable Federal, State, and Local laws and statutes for safety and operability for varied on-the-road usage requirements.

The vehicles manufactured by Sunliner Coach are constructed with ease of operation and economical durability in mind, for the life of the coach and its operating systems. We take great pride in producing a cost-effective product for your use and for the safety and comfort of your passengers.

Every component of this transportation system is vital to the safety and durability of this vehicle and at no time should any system or part be neglected, removed, or altered in any manner that will compromise safety or operability of the vehicle or the safety and well-being of passengers and the operator.

It is the responsibility of the owner of this coach to maintain all systems and components in serviceable and working condition. Always maintain and operate this coach with parts and information provided by Sunliner Coach for many years of trouble-free driving, and a safe and comfortable travel experience.

PLEASE READ BEFORE OPERATING THIS VEHICLE

THIS OPERATOR MANUAL MUST REMAIN WITH THE VEHICLE THROUGHOUT ITS SERVICE LIFE, AND MUST BE TRANSFERRED TO ANY FUTURE OWNERS OR OPERATORS AS AN IMPORTANT PART OF THIS TRANSPORTATION SYSTEM.

Stallion Bus Industries (“the manufacturer”) will, at its discretion, add to or edit this document as needed to provide the owner with any updates required by law or with information affecting the operation or safety of this coach. Stallion Bus Industries reserves all rights to this document in its entirety, and any copying, duplication, or changes to this manual are strictly prohibited, unless specific permission is granted by the manufacturer to the licensed operator or owner of this coach. Please submit any questions regarding this document to:

Stallion Bus Industries

1592 Jenks Dr. Corona, CA 92880

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http://www.stallionbus.com

THANK YOU FOR CHOOSING STALLION BUS PRODUCTS FOR YOUR TRANSPORTATION NEEDS.

GENERAL INFORMATION

EXTERIOR COMPONENTS

INTERIOR COMPONENTS

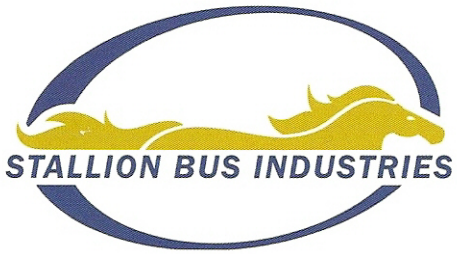
CONTROLS

MECHANICAL

TRANSMISSION

ELECTRICAL

ACCESSORIES / OPTIONS



1- GENERAL INFORMATION

Sunliner Coach *- Corona, California U.S.A.*

GENERAL INFORMATION

VEHICLE IDENTIFICATION NUMBER (VIN)

The Vehicle Identification Number is stamped on a plate located inside the vehicle on the upper step adjacent to the curbside wall.

The **D.O.T. Certification Plate** certifies that the vehicle complies with all Federal Motor Vehicle Safety Standards for operation of a vehicle on public roadways in effect at the time of manufacture. This plate is located on the first step on the aisle side of the driver's seat.

Information such as manufacturer's name and address, date of manufacture, gross vehicle weight, tire type and pressures, and are also on this plate. Refer to the VIN whenever requesting service parts, recall information.

GENERAL INFORMATION

The ultimate responsibility for the safe operation of a motor vehicle is the duty of the operator. In the case of motor coach transport, many individual lives may be endangered if certain common-sense items are ignored or dismissed. Due to the nature of tort law and damages compensation law, it is of the utmost importance that you, the operator, take it upon yourself to insure that your vehicle and all of its systems are in operable condition and have been maintained to all pertinent specifications of the manufacturer and state and federal regulations.

Before operating the vehicle, be sure to check the following:

- Tires – visually inspect for damage, low pressure, or uneven wear. If applicable per your operating agency, check the tire pressures and adjust as required.
- Inspect underside of coach for any fluid leaks or damage. Check undercarriage for obstructions and debris.
- Make sure that windshield, exterior mirrors, headlights, and windows are clean.
- Check all lights (interior, exterior, and instruments) for function
- Adjust exterior and interior mirrors for best view from the driver's position
- Walk down the aisle and check for loose items on the seats, stanchions, and overhead storage areas. Secure any loose items before travel.
- Check all emergency exits and windows
- Inspect for presence and contents of First Aid Kit.
- Visually check the fire extinguisher for service pressure and inspection date.
- Test the entertainment system and public address system for function.
- Check function of lavatory (if so equipped)

After starting the vehicle, check the following:

- Check for any service lamps or warning lights
- Listen for any unusual sounds or engine noise
- Adjust seat for best driving position and comfort
- Check function of brakes and brake system air pressure
- Test air conditioning and heating

PRE-TRIP INSPECTION CHECKLIST

DATE _____ **VEHICLE** _____

MILEAGE: START: _____ END: _____

DAILY TOTAL: _____

INSPECT AND CHECK BELOW:	**NOTE DEFECTS BELOW:**
MECHANICAL	
1. ENGINE OIL _____	_____
2. COOLANT LEVEL _____	_____
3. WASHER FLUID LEVEL _____	_____
4. HYDRAULIC OIL _____	_____
5. BELTS, HOSES _____	_____
6. ENGINE GENERAL _____	_____
7. BRAKES _____	_____
8. STEERING _____	_____
9. TRANSMISSION _____	_____
EXTERIOR	
1. TIRES _____	_____
2. MIRRORS _____	_____
3. HEADLIGHTS _____	_____
4. TAIL LIGHTS _____	_____
5. BODY DAMAGE _____	_____
6. WINDSHIELD WIPERS _____	_____
7. DOORS & WINDOWS _____	_____
SAFETY EQUIPMENT	
1. FIRE EXTINGUISHER _____	_____
2. FLARES _____	_____
3. FIRST AID KIT _____	_____
4. RADIO _____	_____
5. WHEELCHAIR LIFT _____	_____
6. EMERGENCY EXITS _____	_____

MAINTENANCE ITEMS: _____

FUEL ADDED: _____ GAL. OIL ADDED: _____ QT.

MILEAGE AT FUELING: _____ OTHER MAINT.: _____

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DRIVER SIGNATURE MECHANIC SIGNATURE

EMERGENCY PROCEDURES

In the event of accident, if the vehicle can be moved over to the shoulder of the road or at least out of traffic flow, DO SO IMMEDIATELY.

IF SAFE TO DO SO, request that all passengers exit the vehicle and stand away from the vehicle until it is secured.

- Make sure that all passengers exit the vehicle in an orderly and safe manner.
- Check for injuries among the passengers
- If there are any special needs passengers (non-ambulatory, wheelchair-bound), seek help from fellow passengers to remove them from the vehicle.
- Triage any injuries – anyone bleeding or unconscious must be attended to first.
- Radio or call for medical personnel immediately if there are any injured passengers.
- Administer first aid until professional medical help arrives.

In the event of fire, get the vehicle out of traffic IMMEDIATELY.

- Park in an open area away from underpasses or bridges if possible.
- Shut down the vehicle.
- Open the doors and make sure that all passengers exit the vehicle in an orderly and safe manner. Direct all passengers away from the vehicle and a safe distance from the roadway.
- Call for assistance from firefighters and emergency personnel.
- DO NOT ATTEMPT TO PUT OUT AN ENGINE FIRE WITH THE PORTABLE FIRE EXTINGUISHER. This unit is for small, localized fires only.
- If possible, turn off the electrical disconnect switch in the engine compartment. DO NOT ATTEMPT TO OPEN THE REAR ENGINE DOOR IF THE VEHICLE IS ENGULFED IN FLAMES.

If the vehicle has rolled over or has gone off the road, direct passengers to the doors, emergency exit windows, or roof hatches. Assist all passengers with egress, then call for help. As in the previous sections, triage any injuries and administer first aid until emergency personnel arrive.

MAINTEMANCE MANUAL:

Refer to Freightliner's Shuttle Bus Chassis Operator's and Maintenance Manual furnished with your Sunliner Coach. The follow maintenance operations must be included ;

Fastener Torque Checking: Bus Body to Chassis Anchorage fasteners must be torqued at the recommended intervals. Maintenance interval for this operation is **M2**.
Same procedure as 31-01 frame fastener torque checking is to follow, always be sure to check bus frame to chassis rail anchorage at front and back of pass-through luggage compartment.

Torque Specifications: Table 5 for ASME Thread Fasteners with dry plain threads.

Flanged Grade 8 Bolt , Grade G nut 5/8-11 : 190 lbf-ft (258 N-m)

Torque Specifications: Table 6 for Metric Thread Fasteners with plated threads.

Class 10.9 Bolt , Class 10 Nut M 16-2.0 : 148 lbf-ft (201 N-m)

Drive Belt Inspecting: Air Conditioner Compressor and Alternator drive belts must be check at the recommended intervals. Maintenance interval for this operation is **M1**.

COACH CARE & MAINTENANCE

CLEANING

The cleaning information provided in this section is regarded as recommended cleaning practices. Cleaning results will vary depending on the age and condition of the material to be cleaned and the condition of the stain. Always clean stains promptly to prevent setting or etching into the material.

NOTE: *Never use stain protection products on new fabrics. To prevent permanent staining of fabrics, clean stains as soon as possible. Incorrect treatment of stains can lead to permanent discoloration or worse staining. Refer to a cleaning specialist for removal of stubborn stains.*

Caution: *Custom fabrics and materials may require different cleaning and maintenance practices. Consult your dealer for specialized cleaning requirements.*

SEAT UPHOLSTERY

Firmly beat the fabric with a wood paddle or similar blunt object to loosen superficial dust and dirt. Vacuum the seat fabric in the direction of the stitching using an upholstery nozzle.

Note: *The abrasive nature of dirt and dust will reduce fabric life. Always vacuum upholstery regularly.*

Removal of Stains and Marks

Use one of the two methods described below to remove stains from wool plush fabrics:

Method One:

1. Apply a non-flammable solvent, such as dry-cleaning solvent (Perchloroethylene) to the stained area with a clean white rag.

2. Wipe the stain, starting at the outer edges and working inward, frequently turning the cloth.

3. Blot the stained area frequently with a dry white cloth to prevent stain rings from excess solvent.

Warning: Use solvents in a well-ventilated area, away from ignition sources and open flame. Keep all windows and doors of the vehicle being cleaned open – use appropriate breathing apparatus or fume masks.

Method Two:

1. Wet the stain with a solution of household detergent and lukewarm water. Do not flood or over-soak the stain.

2. Wipe the stain with a damp cloth, rinsing the cloth after each application.

Caution: *Do not use soap, soap powder, ammonia, bleach, or any cleaning products containing these ingredients.*

Beverage Stains

Remove beverage stains as per method one. If the stain persists, repeat method one using methylated spirits (95% ethanol) in place of solvent.

Alcoholic Beverage Stains

Remove these stains by wetting the stain with water, then cleaning per method two.

Burns

Scrape the burned area using a knife or razor blade, the cleaning per method two. Consult an upholstery specialist if the burned area is extensive.

Cosmetics

Remove stains left by cosmetics by using method one followed by method two.

Ink Stains

Remove ink stains by following method two. If stain persists, apply a warm oxalic acid solution. Rinse thoroughly with lukewarm water.

Blood, Urine, or Vomit

Remove by sponging or wiping away excess solid matter first. Then clean per method two.

Copying Ink / Ball-Point Pen Ink

Treat with methylated spirits, blotting frequently to prevent stain spread, followed by method two.

Felt-Tip Pen Ink / Permanent Marker Ink

Wipe thoroughly with a clean cloth soaked in MEK, followed by method two.

Oil, Grease, and Paint

Remove excess using a knife. Treat per method one followed by method two. Repeat if stain persists.

COACH CARE & MAINTENANCE

Rust

Remove per method two. Apply a warm oxalic acid solution to the stained area. Rinse with water.

Tar

Soften tar with benzene or naphtha. Treat per method one followed by cleaning per method two.

Chewing Gum

Scrape excess with spatula. Soften remainder with cyclohexane. Carefully scrape off stains with a sharp knife or razor blade.

PLASTIC AND VINYL

Clean plastic and vinyl surfaces with a clean damp cloth or sponge. DO NOT use cleaners or polishes on chromed plastic trim. For marks on vinyl trim, use a lukewarm all-purpose cleaner or a MILD saddle soap. Remove water spots and soap traces with a clean damp cloth, chamois, or sponge. Dry with a clean soft cloth.

Remove grease, tar, or oil stains with a clean cloth or sponge and an all-purpose vinyl cleaner.

Apply a colorless vinyl or leather protectant to maintain luster and pliability of the plastic material.

WINDOWS / GLASS SURFACES

Clean glass surfaces and the inside of windows with a solution of 10% vinegar in purified water.

WINDSHIELD

To prevent wiper streaking, keep all silicone sparys away from the windshield. Remove road film, insect residue, and wax buildup from windows with lukewarm soap and water solution or an alcohol-based liquid cleaner. If a chamois is used for wiping or polishing glass, it must only be used for glass surfaces.

Wiper Blades

In cold weather conditions, loosen wiper blades from windshield to prevent tearing. Periodically remove wiper blades and clean the rubber with an alcohol-based cleaner. Wipe dry with a clean cloth or sponge.

STAINLESS STEEL

Use a stainless steel cleaner and follow the manufacturer's directions. AVOID using abrasive pads or steel wool to clean stainless steel surfaces.

FORMICA

Formica surfaces may be cleaned with a solution of warm water and household detergent; methylated spirits, or mineral turps. Clean with a mild abrasive and water solution (scouring powder) if needed.

CARPET

Vacuum carpeting regularly to prolong carpet life. Clean per manufacturer's instructions. Natural-fiber carpet, polyester / nylon carpet, and synthetic (plastic) carpeting each are cleaned and de-stained in different ways. Always consult manufacturer's recommendations first before attempting removal of any stain from fiber / woven flooring materials.

RUBBER

Only use purified water or glycerin to remove stains from rubber components. NEVER use solvents or detergents on natural or synthetic rubbers or foam.

Note: *After cleaning rubber with a moistened cloth or sponge, apply a thin layer of rubber protectant to maintain suppleness and weather resistance.*

FLOORING

Wash the floor regularly to maintain its original texture and appearance. Clean vinyl floors with manufacturer's recommended non-ionic cleaner or household all-purpose cleaner. Encrusted oil stains or rubber streaks may be removed with thinner.

Remove excess detergent solution with a wet/dry vacuum or mop. Rinse floor with a 10% solution of liquid laundry bleach and warm water.

Polish dry floor with a high-speed buffer equipped with a red Scotchbrite™ pad.

Mop floor periodically with a 5% solution of household liquid bleach and warm water.

VEHICLE EXTERIOR

The exterior finish of any vehicle is subject to damage from pollutants and abrasive airborne particles. Frequent washing and waxing of the exterior will protect the finish and luster of painted surfaces.

COACH CARE & MAINTENANCE

Install keyhole protectors to prevent water penetration. Rinse off vehicle with water to remove loose dirt. Wash vehicle with a quality car wash soap, using a sponge or cotton mitt. Rinse off thoroughly with water. Dry with terry towels or chamois.

NOTE: *Always use cool water for rinsing and washing. Hot water can damage paint and plastic trim.*

NOTE: *When using high pressure washers, do not spray directly into fresh air vents or radiator or condenser doors. High pressure water jets can damage or perforate condenser cooling fins.*

Wash the undercarriage with a high-pressure washer to remove caked-on dirt and road salt. Thoroughly clean the inner fenders, wheel interiors, bumpers, exhaust system, and any exposed brackets. Spray underside of vehicle first and allow to soak before cleaning. Exhaust system must be cool before cleaning.

Perform corrosion prevention treatment per manufacturer's recommendations at least every two years.

Oil, Tar, Asphalt Stains

Remove tar and oil stains as soon as possible with an approved automotive tar remover or naphtha. Clean the area with car wash soap and water. Dry, then wax with quality automotive protectant wax.

Insect Residue / Bird Droppings

Remove insect stains and bird droppings immediately to prevent etching of painted surfaces and discoloration of plastics. Use lukewarm water and mild car wash soap or commercial bug / tar remover for insect residue. Follow with a quality wax to protect cleaned areas.

Tree Sap

Wash off immediately with lukewarm soap and water. Do not allow tree sap to harden on painted surfaces or rubber / vinyl trim.

LAVATORY MAINTENANCE

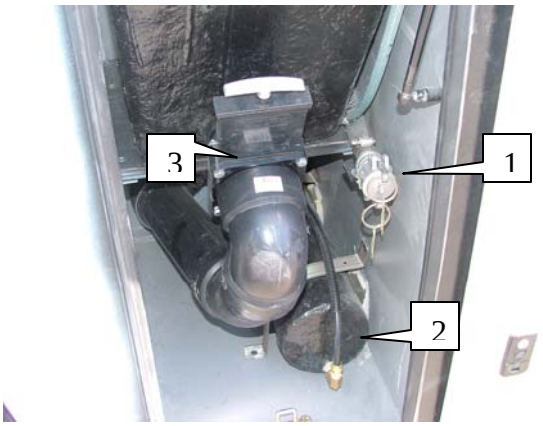
Lavatory with recirculated system

Flush water in the lavatory is recirculated from the sump tank. If two tanks are used, the upper tank is the primary sump and the lower tank is the auxiliary sump. When the main sump tank water is too soiled for recirculation, the driver can dump it into the auxiliary tank until a suitable dump location can be reached. The main sump tank is then filled with fresh water to begin the cycle again.

The optional top tank holds 13 gallons and the lower tank holds 13 gallons .

The sump tank may be equipped with a heating element to prevent freezing during cold weather.

Routine draining and filling of lavatory tanks should be done prior to parking the vehicle overnight in freezing weather.



1- Water inlet connector
2- Pressure tank
3- Dump valve

FILLING THE SUMP TANK

Fill the sump tank to half capacity through the water inlet connector and throw in a packet of commercial toilet deodorant thru lavatory toilet.

DRAINING THE SUMP TANK

Drain the sump tank once recirculating water in the toilet is soiled. If equipped with the optional auxiliary sump tank, drain the lower sump tank contents first by opening it's knife gate valve, then drain the upper tank.

Caution: Lavatory tanks should be serviced only at suitably equipped stations.

Warning: It is illegal to dump sump tank contents in any location other than a designated service dump station.

When a complete tank draining is required, clean main tank by repeating the draining and filling operations with the drain valves open. Once done, close the valves and drop in a packet of commercial toilet deodorant into the toilet before starting the final filling of the main tank.

Warning: The toilet deodorant package contains chemicals that will irritate the skin. Use rubber gloves when handling.

Caution: When cold weather is expected, both sump tanks must be drained if the coach will be parked overnight or for an extended period of time.

Note: Due to the heat it produces, there is less likelihood of the tanks freezing while the engine is on.

Note: Sump tank may be equipped with an optional in-tank heater that automatically comes on when the temperature of the water drops below 35°F (2°C), or a thermal valve that automatically opens the drain valve at the same temperatures.

COACH CARE & MAINTENANCE (cont.)

Wheels and Tires

It is of utmost importance that tires are kept inflated to their respective recommended pressure at all times. Tire pressure should be checked before starting the day's run, while the tires are cold. Maintaining the tires at recommended pressure will lengthen the life of the tires and will insure safe travel and even tire wear.

Note: Recommended inflation pressures are part of the Coach Final Record found in the Maintenance Manual provided for your coach. The cold tire inflation pressures are on the DOT Certification Plate.

Warning: Do not exceed maximum inflation pressure. Incorrect tire pressure hastens tire wear and could lead to loss of driving control.

Warning: If replacement tires are different from those described on the vehicle certification plate, adjust pressure to specifications listed in the Tire and Rim Association Manual.

Doors

Open, then close all exterior doors and windows. Check for tightness and good sealing.

Tools and Spares

Make sure the vehicle is equipped with the following: a wheel nut wrench, door keys, reflectors, a jack, and a serviceable fire extinguisher.

Air System

Drain water from main and accessory air tanks daily. If the vehicle is supplied with an automatic drain valve, assure it is functioning correctly after the system has reached full pressure. See your maintenance manual.

Fuel / Water Separator

Open the drain valve on the bottom of the water separator daily. Close valve after service.

Coolant Level

Check coolant level. Level is correct when visible at the level window of the surge tank.

If coolant level is low, fill surge tank with a 50-50 mix of ethylene glycol antifreeze and water. Refer to the vehicle maintenance manual for further information.

Warning: Hot engine coolant is under pressure. Do not open the coolant filler cap when the engine is hot. Allow the engine to cool before adding coolant.

Wheel Bearings

Check wheel bearing covers for overheating during fuel stops by touching the bearing caps. If excessively hot, refer to service personnel.

Windshield Washer Reservoir

Check washer reservoir level. Add antifreeze washer fluid for cold weather service.

Engine Oil

Check engine oil level with vehicle parked on flat ground. Engage parking brake whenever checking items in the engine compartment.

Belts

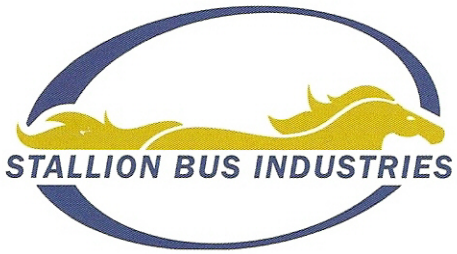
Inspect belts for looseness (noise) or cracking and fraying.
Belt tension may be checked with a pressure gauge – refer to maintenance manual section on engine service.

Fire Extinguisher(s)

Inspect fire extinguishers for correct service pressure and current inspection tag.

Emergency Exits

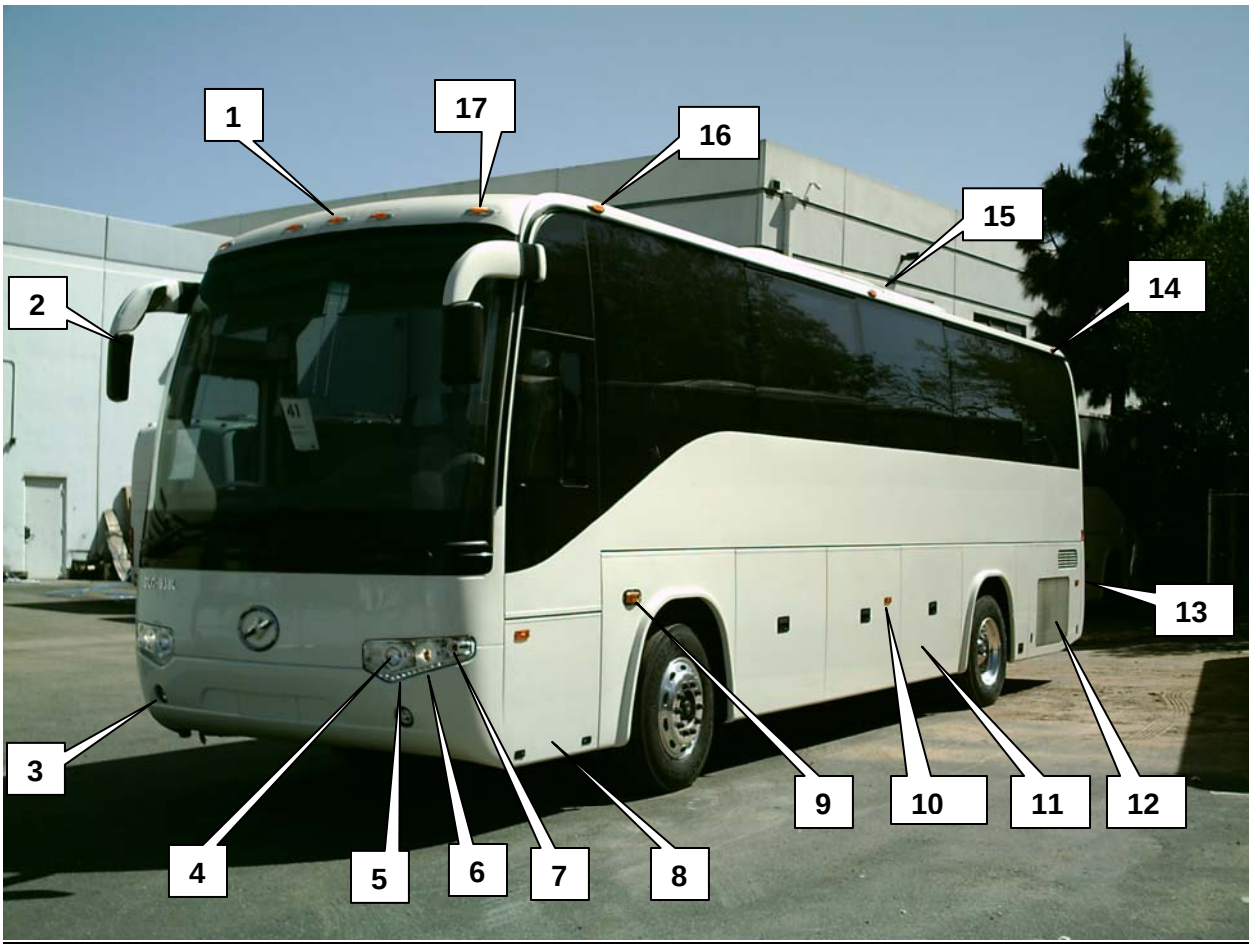
Check all emergency exits (doors, windows, roof hatches, etc.) for correct operation and serviceable condition.



2- EXTERIOR COMPONENTS

EXTERIOR COMPONENTS

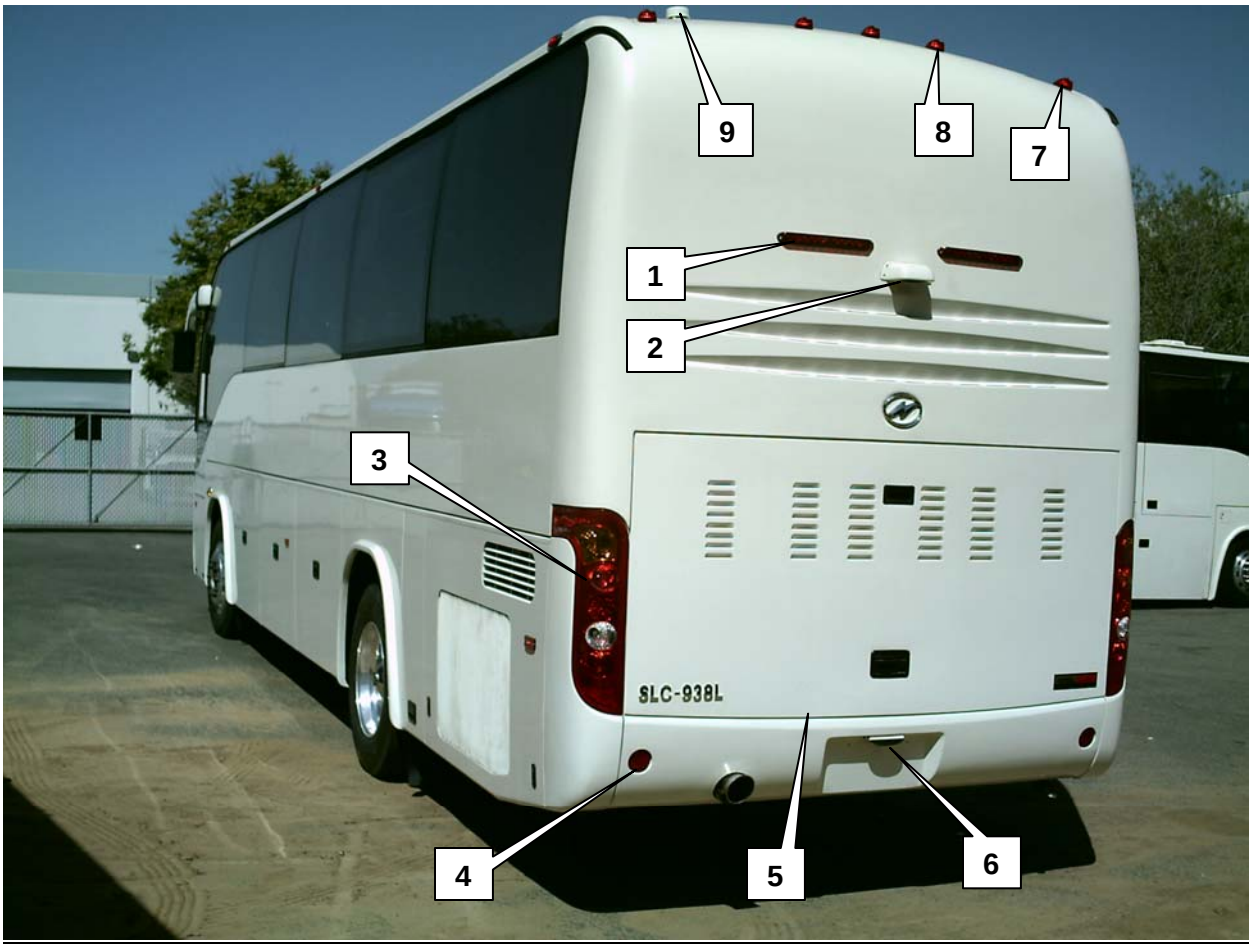
FRONT AND STREET SIDE



1. Front Identification Lamps (Yellow)
2. Side View Mirrors (Left & Right)
3. Fog Lights
4. High Beam Headlights
5. LED Parking Lamps
6. Low Beam Headlights
7. Front Park / Turn Lamps
8. Main Electrical Compartment
9. Front Side Turn Signal
10. Side reflector / marker lamp (Yellow)
11. Luggage Compartments (3), Streetside
12. Radiator Access Door
13. Side reflector / marker lamp rear (Red)
14. Side Marker Lamp, Rear (Red
15. Side Marker Lamp, Center (Yellow)
16. Side marker Lamp, Front(Yellow)
17. Front Clearence lamp, Front(Yellow)

EXTERIOR COMPONENTS

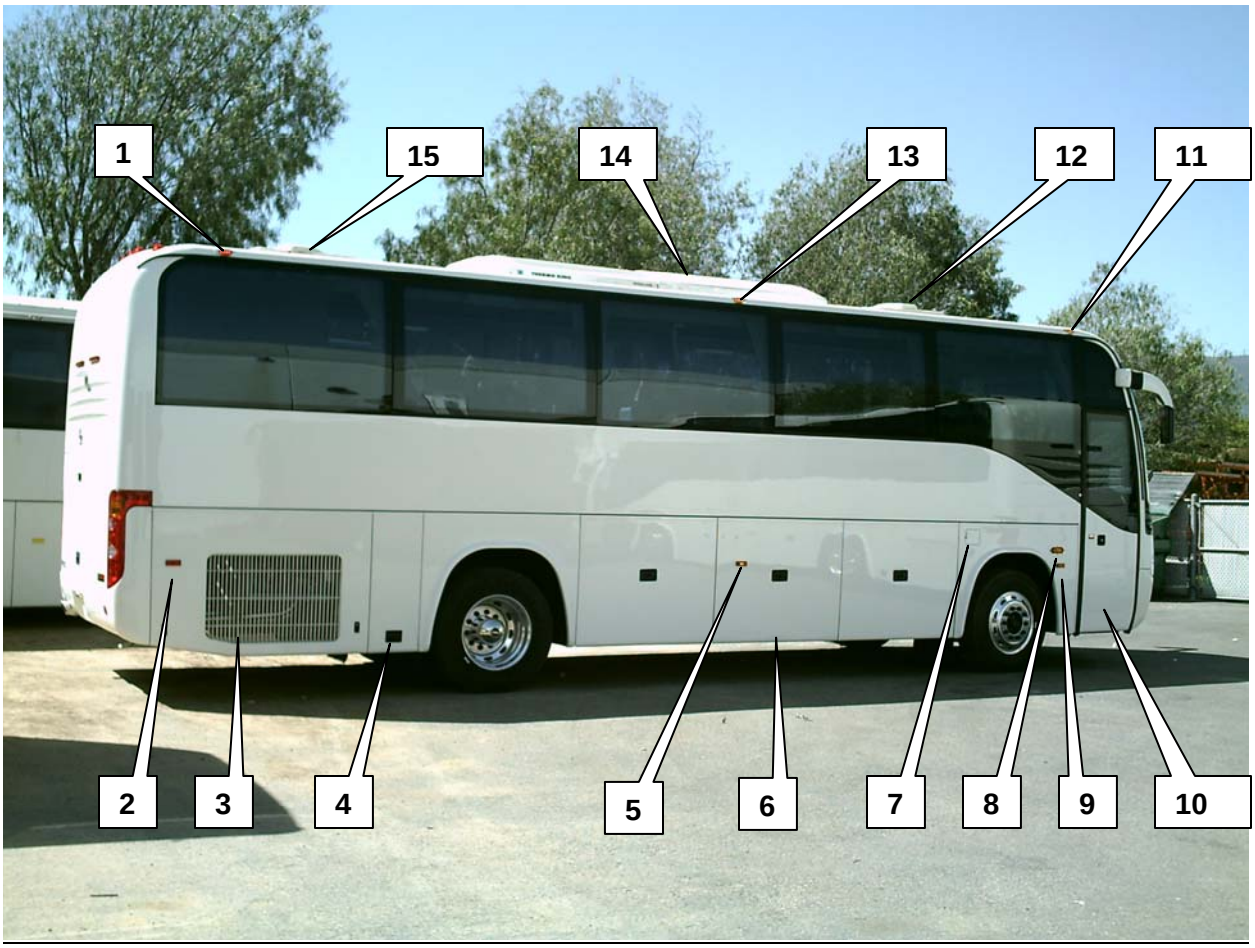
REAR



1. High-Mounted Brake Lights
2. Rear View Camera
3. Rear Lamp Assemblies:
   - Taillights
   - Turn Signals
   - Back-Up (Reverse) Lamps
   - Brake Lights
4. Rear red reflectors
5. Engine Compartment Door
6. Rear License Bracket & Lamp
7. Rear Clearance Lamps (Red)
8. Rear Identification Lamps (Red)
9. Vent (lavatory-equipped models)

EXTERIOR COMPONENTS

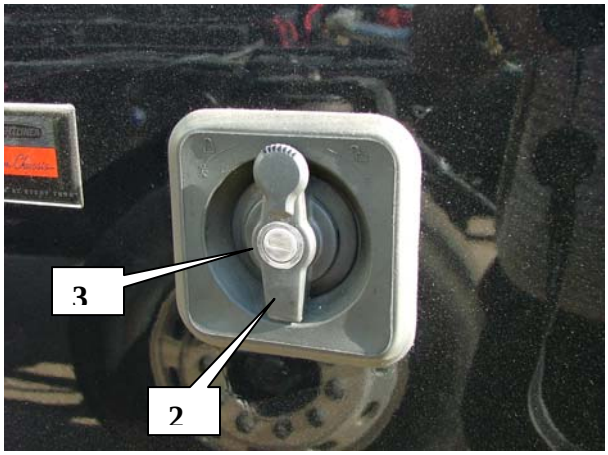
CURB SIDE

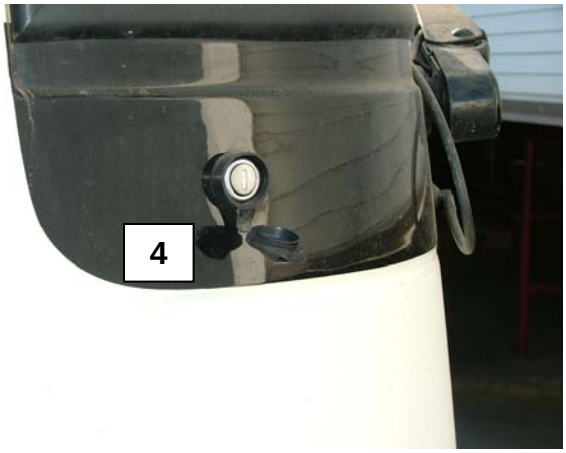


1. Side marker Lamp, rear (Red)
2. Reflector / marker , Rear (Red)
3. Preheater Compartment Door
4. Battery Compartment Door
5. Reflector / marker , Center (Yellow)
6. Luggage Compartments (3), Curbside
7. Fuel Filler Door
8. Side Turn Signal, Front
9. Reflector / marker , Front (Yellow)
10. Entry Door
11. Side marker Lamp, Front (Yellow)
12. Roof Hatch w/Fan, Forward
13. Side marker Lamp , Center(Yellow)
14. Roof A/C Unit
15. Roof Hatch w/Fan, Aft

ENTRY DOOR

Main Entry Door (1) and Door Lock (2)





The entry door may be locked and unlocked manually by inserting the door key into the door key switch (3), turn the key to the right (clockwise) then turn the door handle (2) to the left (counterclockwise) to unlock. Turning the handle to the right (clockwise) will lock the door . Turn the key to its original position and remove the key.

When the door is unlocked, you can opened it or closed it, through the use of the keychain remote control provided with the vehicle or by inserting the door key into the door key switch (4). This remote is a battery-powered radio-frequency device that transmits a short-range signal to the vehicle's door open / close mechanism. See next page for details of operation.

NOTE: The use of the Key Fob or Key Operated Entry Switch DOES NOT lock or unlock the door.

ENTRY DOOR

(Continued)

Door Remote

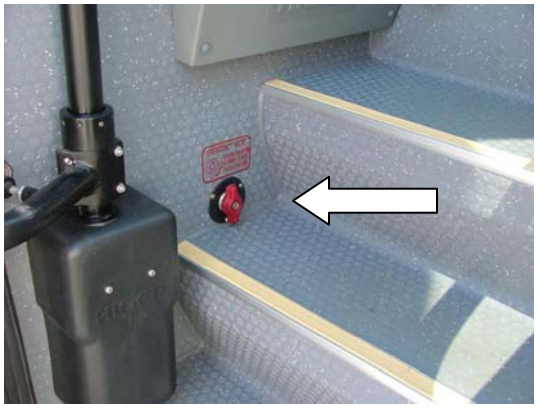
The door remote control unit has two functions – CLOSE and OPEN.
To access the function buttons, slide the protective cover downward to expose the two buttons. Press the right (UNLOCK) button once to open the door.
To close the door, press the left (LOCK) button once.

Each time either button is pressed, the red LED at the top of the remote will light. Should the lamp fail to illuminate when the buttons are pressed, the battery will need to be replaced. The door can only be locked or unlocked manually with the key .

To replace the remote battery, carefully pry open the side of the remote case. The battery (#2032) is located in the front (button side) of the case interior. Remove the old battery and fit the replacement cell into the battery cavity with the positive (+) side of the battery facing downward. Press the case halves back together and press a button to check function.

EMERGENCY DOOR RELEASE

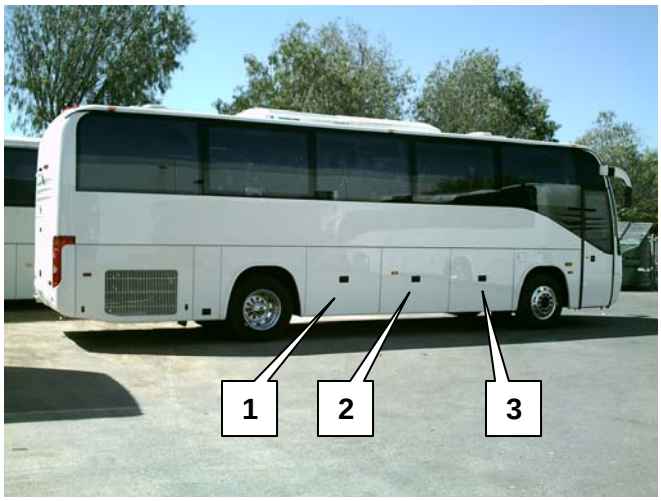
In an emergency, the door may be released from the interior of the vehicle by turning the red emergency air release knob clockwise (rigthwise). The air release valve is located above the first step on the curbside of the bus.



Note: An other manual door release valve is located underneath the vehicle next to the step.

CARGO STORAGE

Front Streetside Cargo Compartment



Curbside Cargo Compartment Doors

Three (3) doors on each side of the bus access the cargo / storage compartments.

The forwardmost doors on each side are smaller separate compartments from the large pass-through compartment that is accessed by the center and rear doors on each side.

The forward curbside cargo compartment contains the tools for changing the spare tire. the forward street-side compartment house electrical components and the windshield water reservoir.

To open the compartment doors, pull out and up on the door handle and allow the door to rise upward.

CAUTION:

When closing the doors, BE SURE to keep fingers away from the door edges and inner frame. Stand slightly back from the door and press downward on the outer face of the door to close. The door edges can be pinch points for hands and feet.

SPARE TIRE

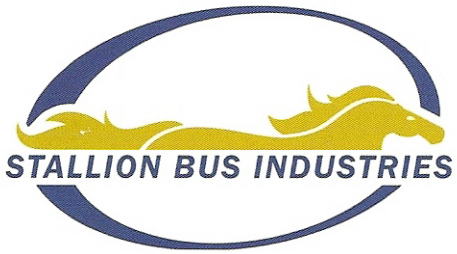
Spare Tire Location (1)
The spare tire is located underneath the vehicle, behind the front bumper.

To access the tire, it must be lowered from its stowed position. The tire is secured in it's location by two 1- 5/16" Gr 8 nuts and the gearbox chain. Once the nuts are removed, the tire hangs on the chain mechanism. A crank is used to turn the mechanism and lower the tire.

Lower the spare tire by removing the crank from its stowed position in the forward curbside storage compartment. Remove the gearbox access port cover at the step below the driver's seat. Insert the pinned end of the crank through the hole and into the mechanism receptacle. Remove the1-5/16" security nuts then turn the crank counterclockwise (left) until the tire is on the ground. Remove the chain end from the center of the wheel and bring the tire out and away from the vehicle.

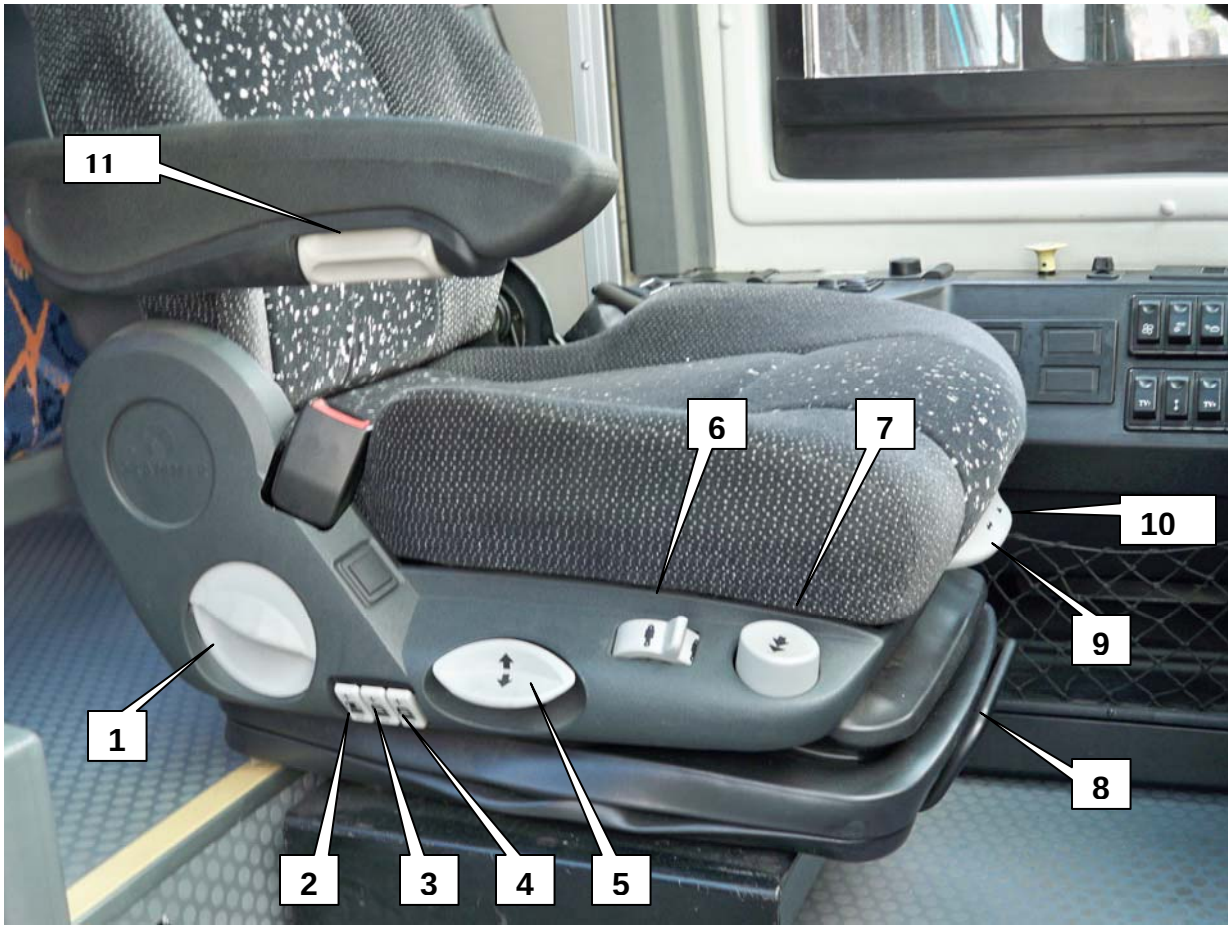
Reverse the above steps to stow a tire under the vehicle.

Note: **Make sure the tire is stowed securely (not loose and nuts tight) before driving away**.



3- INTERIOR COMPONENTS

DRIVER SEAT



DRIVER SEAT CONTROLS

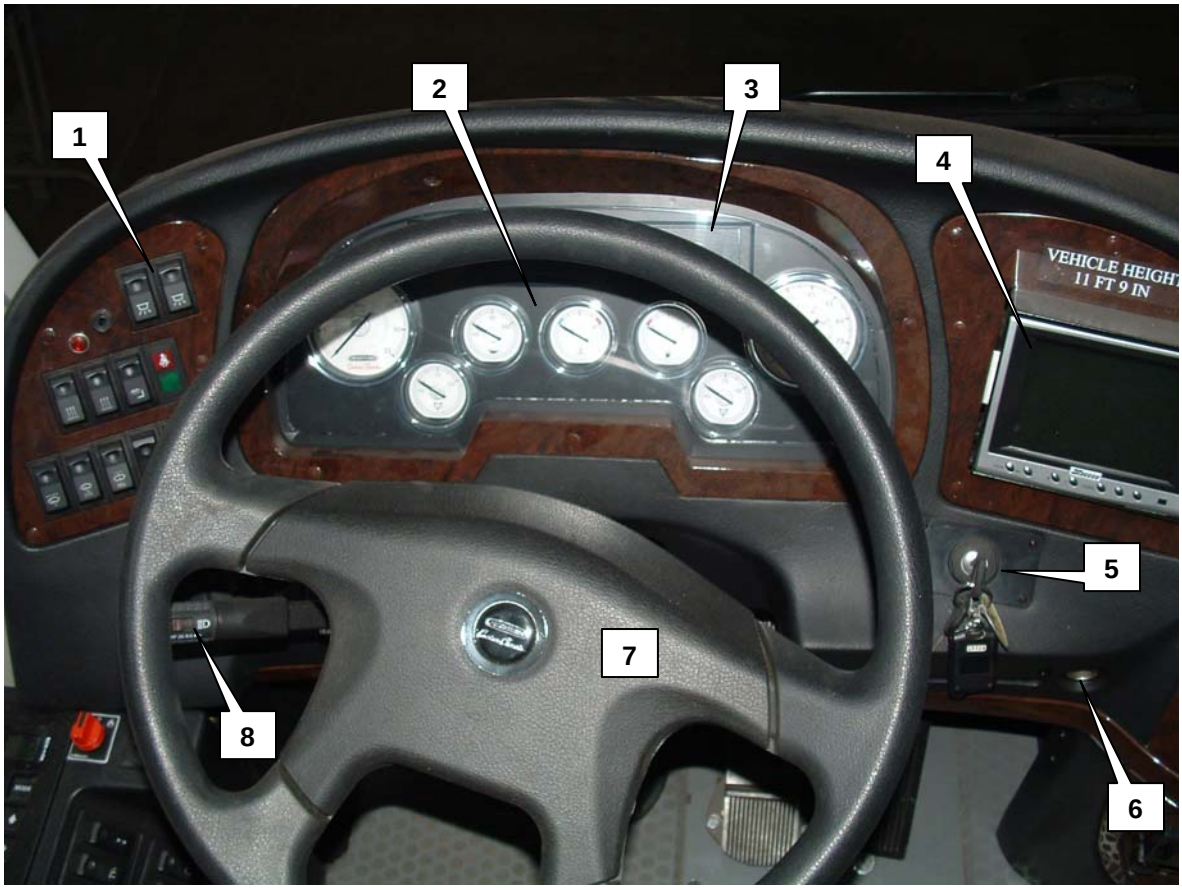
The driver's seat is a pneumatically-adjustable air-suspension seating system that will accommodate a wide variety of operator physiques and that can be adjusted for extreme comfort by most users.

When getting ready to operate the vehicle for the first time, set the seat controls for best viewing height, and then proceed to adjust the auxiliary functions such as seatback angle, cushion rake angle, lumbar support, and suspension stiffness. Always set the seat for the safest and most comfortable position for operating the vehicle and being able to access all controls and pedals.

1. **Seatback Angle Adjuster** – pull upward, adjust seat then release.
2. **Side Bolster Adjustment** – Increases or decreases the side bolster stiffness
3. **Lumbar Support Adjustment** – Center of back
4. **Lumbar Support Adjustment** - Upper and lower back
5. **Seat Height Adjustment** – Push upward to raise seat height, downward to lower.
6. **Suspension Stiffness** – Slide backward to soften suspension, forward to stiffen.
7. **Air Lock / Release** – Push downward to deflate seat.
8. **Seat adjustment forward / backward –** pull upward, adjust seat then release handle.
9. **Seat bottom adjustment forward /backward-** pull upward, adjust seat then release.
10. **Seat inclination adjustment-** pull upward, adjust seat then release.
11. **Armrest Adjuster –** Rotate knob to achieve proper armrest angle.

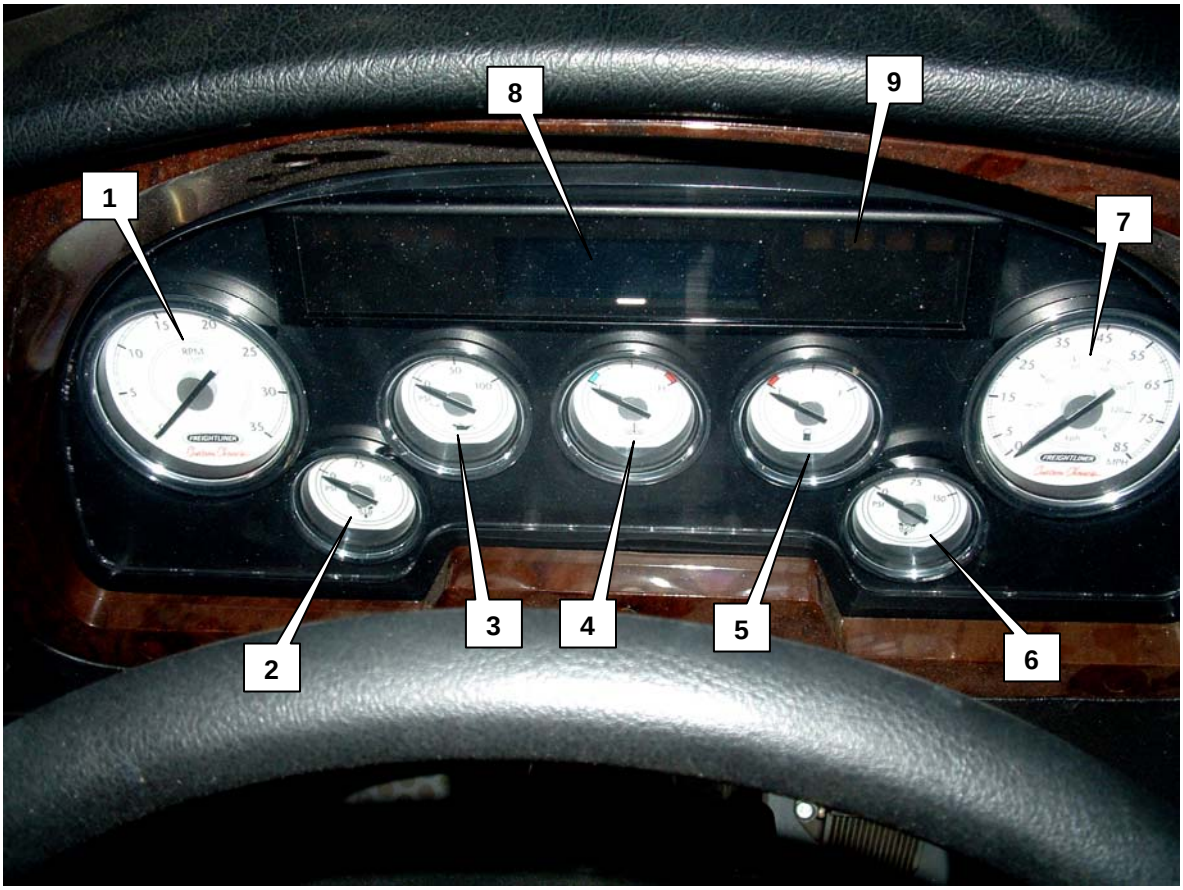
DASHBOARD

The instrument cluster, steering wheel, switch cluster, and warning lamp cluster are located directly in front of the driver. This area comprises the main information and control center for the operator.



1. Switch cluster #1
2. Instrument Cluster
3. Warning lamps cluster
4. Rear view camera monitor
5. Ignition Switch
6. 12V Power socket
7. Steering wheel
8. Multifunction stalk

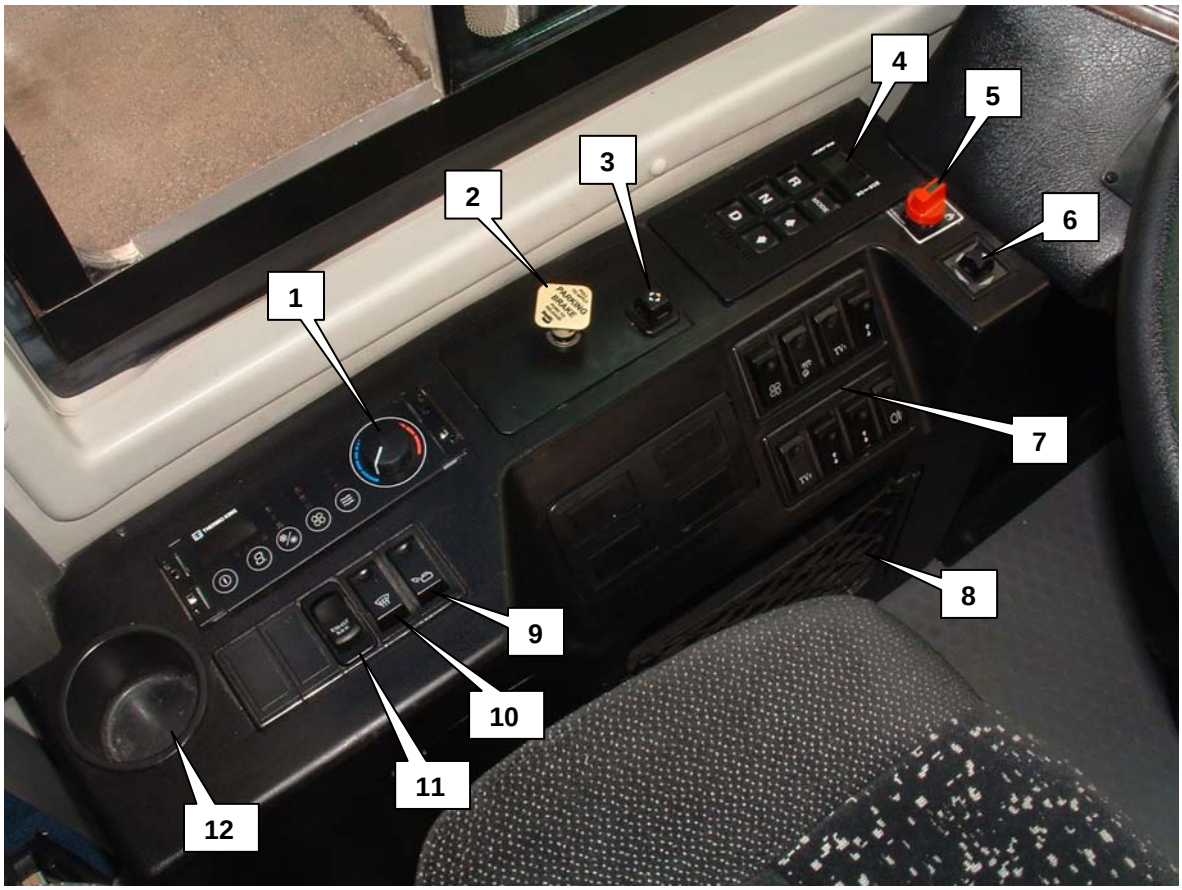
INSTRUMENT CLUSTER



1. Tachometer
2. Air Pressure – Main Tank
3. Oil Pressure
4. Coolant Temperature
5. Fuel Tank Level
6. Air Pressure – Auxiliary Tank
7. Speedometer
8. Service Information Display
9. Warning Lamps (Left & Right sides of Lamp / Diagnostic panel)

CONTROLS CONSOLE

The driver's controls console is located on the left side of the driver's compartment, below the roadside front window. Most of the major controls for the vehicle are situated within easy reach of the operator at this location.



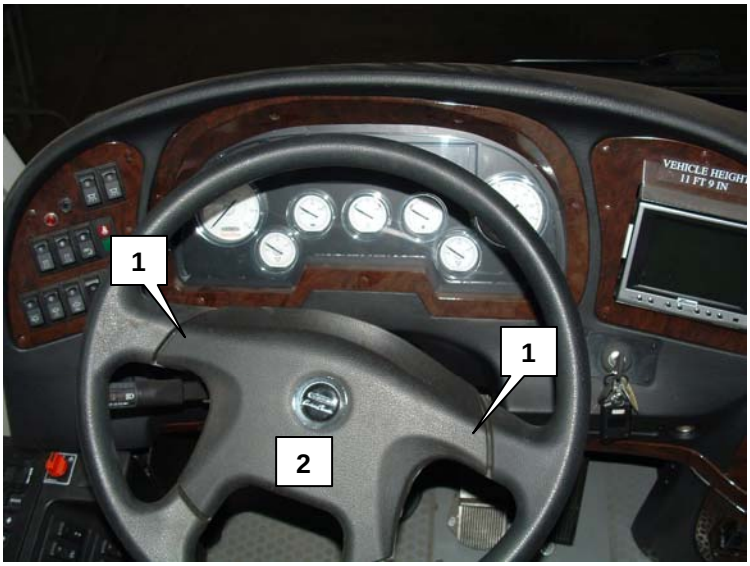
1. Interior climate controller (A/C)
2. Parking Brake
3. Service Information Display Menu Switch
4. Transmission shift control
5. Auxiliary heater ON/OFF switch
6. Mirror controls
7. Switch clusterl #2
8. Side storage pocket
9. Luggage compartment lights
10. Windshield defroster fan and heat
11. Exhaust brake ON/OFF
12. Cup holder

13- Manual regeneration switch (Exhaust Aftertreatment) Engine EPA 2007

A flashing AFTERTREATMENT DIESEL PARTICULATE FILTER lamp indicates that the aftertreatment diesel filter needs to be regenerated at the next possible opportunity. Engine power may be reduced automatically.
When this lamp is flashing, the operator should:

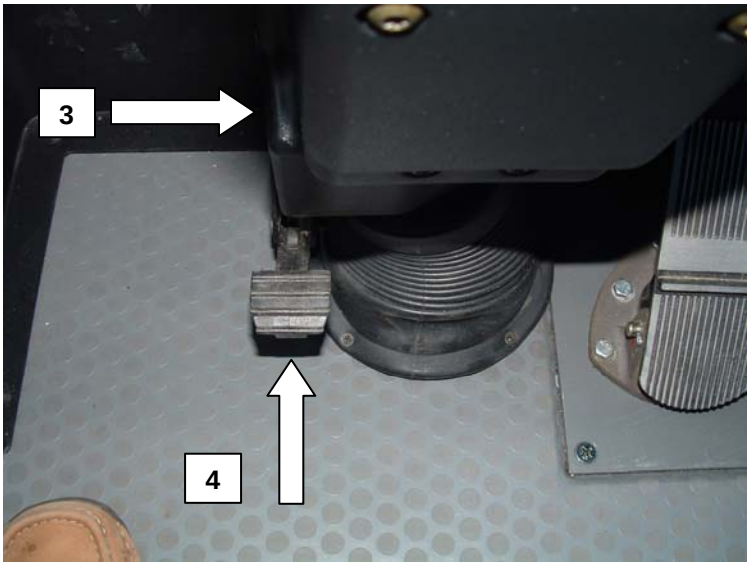
1- Change to more challenging duty cycle , such as highway driving , for at least 20 minutes.
2- Perform a stationary regeneration. Follow all instructions from Cummins Owners Manual ISB 6.7L CM2150 furbished with your Sunliner Coach Bus (pag, 1-19 to 1-25) bulletin 4021601.

STEERING WHEEL



The steering wheel and column are adjustable for steering wheel angle and overall column height. The center pad on the steering wheel can be pressed at the upper outside edges (1) or at the center (2) to activate the horns.

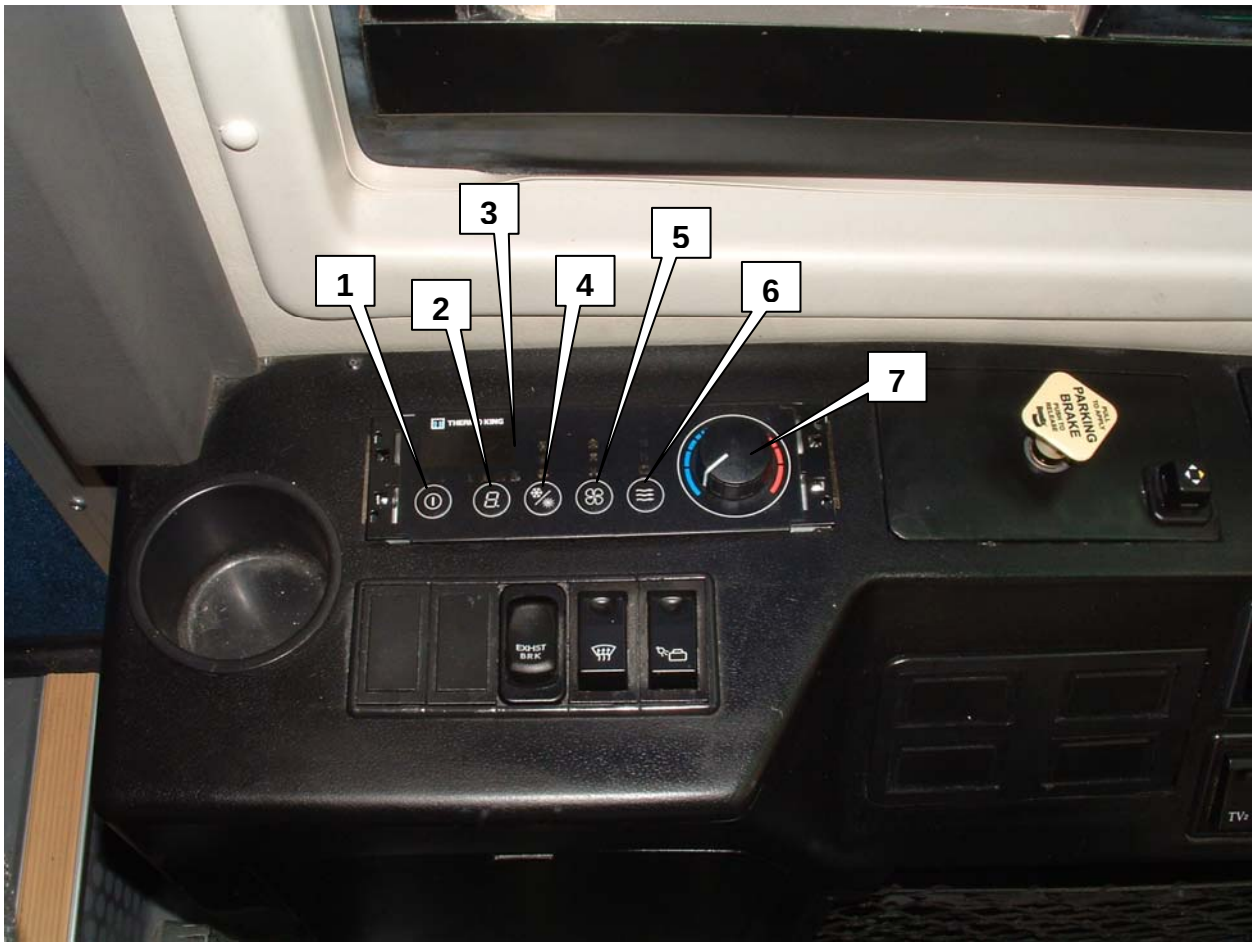
NOTE: *Do not turn the steering wheel all the way to the right with the entry door open – the right front tire will contact the door frame if the wheels are fully turned to the right.*



The steering column height is adjusted with the lever (3) on the left side of the steering column, below the steering wheel. Pull up on the lever, then pull up or push down on the steering wheel to set the best height for the operator. Release the lever to lock it back into position.
Adjust the steering wheel angle by pressing down on the pedal (4) at the base of the column. Move the steering wheel into the best position and release the pedal to lock into position.

NEVER adjust the steering while the vehicle is in motion or under power.

CLIMATE CONTROL

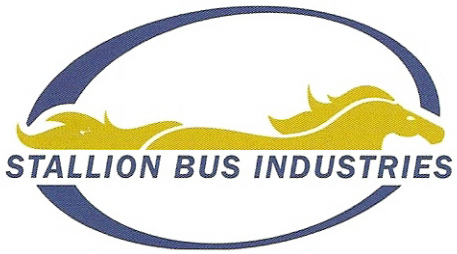


ThermoKing™ Climate Control Panel

The vehicle's interior environment is managed by the ThermoKing™ Controller located on the side control console. The controller functions by balancing heat, cooling, airflow, and intake air for maximum comfort.

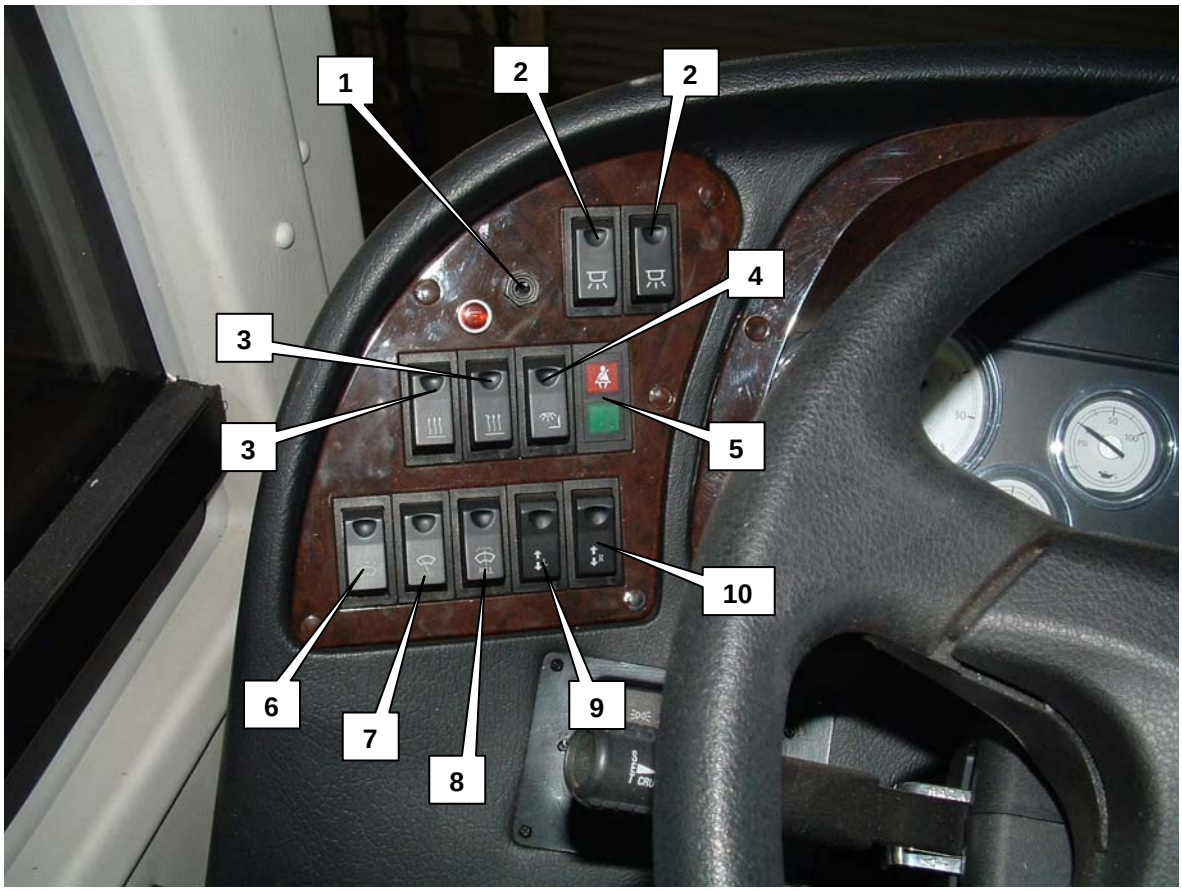
1. **Power** (On / Off)
2. **Display Selector** (Off / On / Interior Temp. / Exterior Temp.)
3. **Display**
4. **Cooling / Heating Selector** (Off / Heat / A/C)
5. **Fan Speed** (Low / Medium / High)
6. **Vent Position** (Closed–Recirculate / 1/2 / Full Open)
7. **Temperature Level** (Blue zone = colder, Red zone = warmer)

Note: Do not power ON the A/C unless the engine is running.



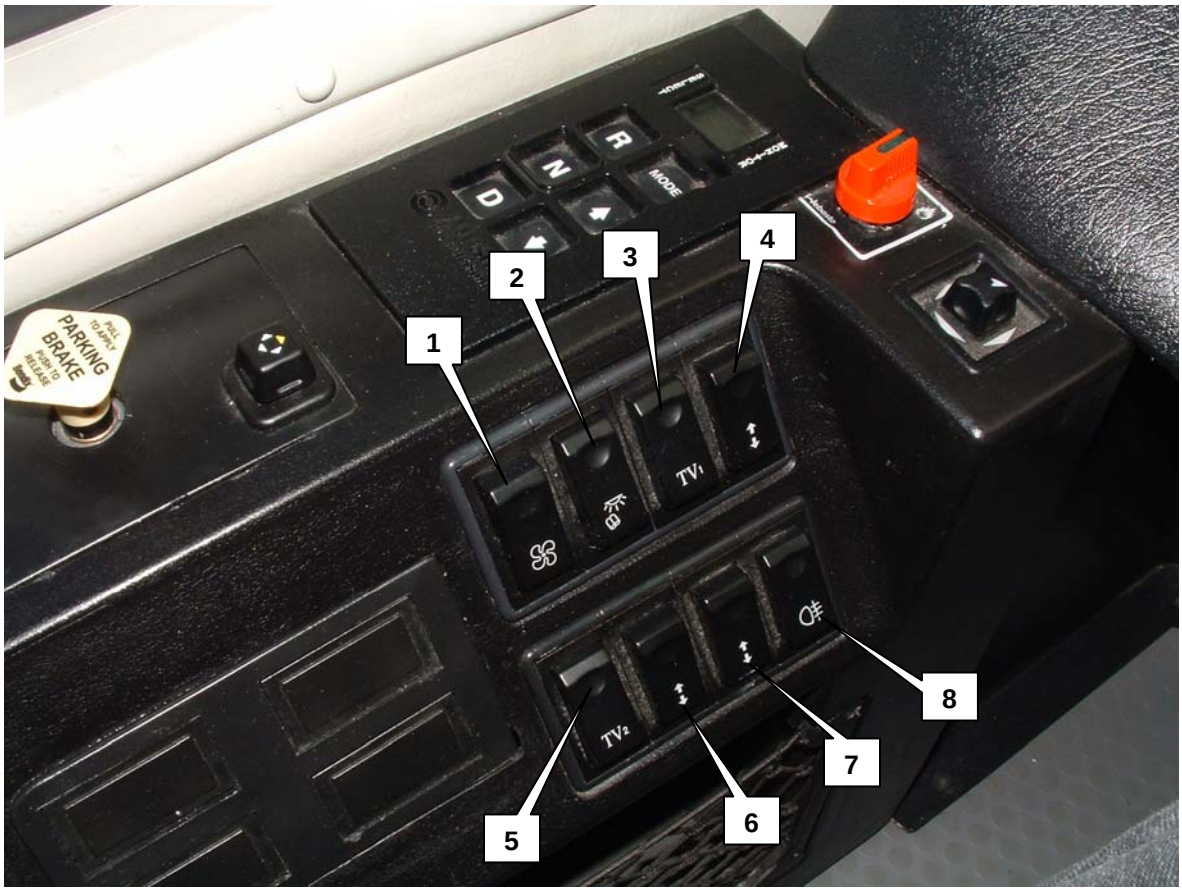
4- CONTROLS

SWITCH CLUSTER #1



1. Microphone Jack
2. Overhead lighting – Right / Left
3. Floor Heaters – Right / Left
4. Driver's Lights power
5. Seat Belt warning lamp - driver
6. Windshield Wiper – Low speed
7. Windshield Wiper – High speed
8. Windshield Washer spray
9. Left windshield visor control
10. Right windshield visor control

SWITCH CLUSTER #2



1. Power Vent Fan Switch
2. Reading Lamp Power Switch
3. Front Video Screen Power
4. Front Video Screen UP/DOWN
5. Rear Video Screen Power
6. Rear Left Video Screen UP/DOWN (optional)
7. Rear Rigth Video Screen UP/DOWN (optional)
8. Not Used (Optional Lamps)

IGNITION SWITCH

The ignition switch is located on the lower right side of the dashboard. It has four positions:

1. **ACCESSORY**
   This position is the furthest left (counterclockwise) position of the switch. It allows use of the electrical items connected thru this option; the entertainment system, interior and exterior lighting, clock / thermometer, and P.A. system.

2. **OFF**
   When the switch is in the OFF position, all electrical devices except those directly connected to the battery (coolant heater, emergency flashers, etc.) are unpowered. The ignition key can be inserted or removed only when the switch is in this position.

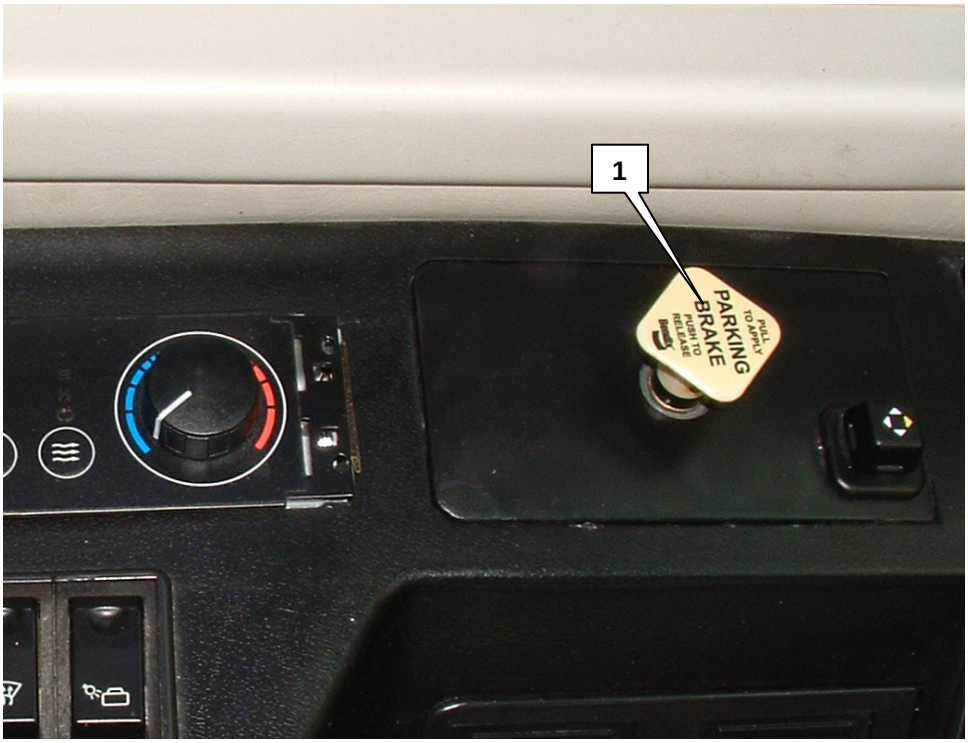
3. **ON**
   All electrical systems are activated. The key cannot be removed in this position. If the engine is not running, do not leave the switch in this position if the engine is not running for extended periods of time. Doing so will drain the batteries.

4. **START**
   This position is the furthest right (clockwise) position of the switch. It is a momentary position for engaging the engine starter to crank the engine. Release the key as soon as the engine starts. Do not crank the engine continuously for more than 10 seconds. If the engine does not start, wait 30 seconds before attempting to restart.

PARKING BRAKE

The parking brake is a pneumatic control switch **(1)** located on the left-hand driver's control console. To apply the parking brake, make sure the vehicle is stopped, the transmission is in neutral, and the service air pressure is within operational limits.

Pull upward on the button to activate the brake, push it downward to release the brake.



The parking brake will not release unless the vehicle's primary air pressure supply is above 60 PSI. Should air pressure fall below 60 PSI, the LOW AIR alarm will sound. The parking brake will be automatically set once air pressure falls below 45 PSI. The vehicle's brakes will remain locked until service air pressure is restored.

DO NOT set the parking brake while the vehicle is in gear. Always stop the coach and shift into neutral before setting the parking brake.

NEVER use the parking brake in place of the service brake.

If it is necessary to leave the driver's seat, place the transmission in neutral, set the parking brake, and turn the engine off.

Warning: FOOT APPLICATION – BREAKE PEDAL – SHOULD ALWAYS BE APPLIED WHEN RELEASING AND APPLYING THE PARKING BRAKE

HEADLAMP SWITCH

HEADLIGHT SWITCH AND INSTRUMENT LIGHTING

The headlight switch is a dual-switch setup, incorporating exterior lighting with instrument illumination in one location. The switch is on the left side of the dashboard next to the steering wheel.

All exterior lights are off when the switch is at its left-most position. The first position to the right (**Parking lights**) will turn on the exterior clearance, parking, and side-marker lamps. The second position (Headlights) activates the low-beam headlamps and parking lamps.

To activate fog lamps, pull upward on the switch.
Note: *Fog lights will be turned off anytime the high beam headlights are activated.*

Instrument lighting is controlled by the roller switch to the right of the headlight switch. Rotate the switch upward to increase instrument illumination, downward to decrease illumination.

MULTI-FUNCTION STALK

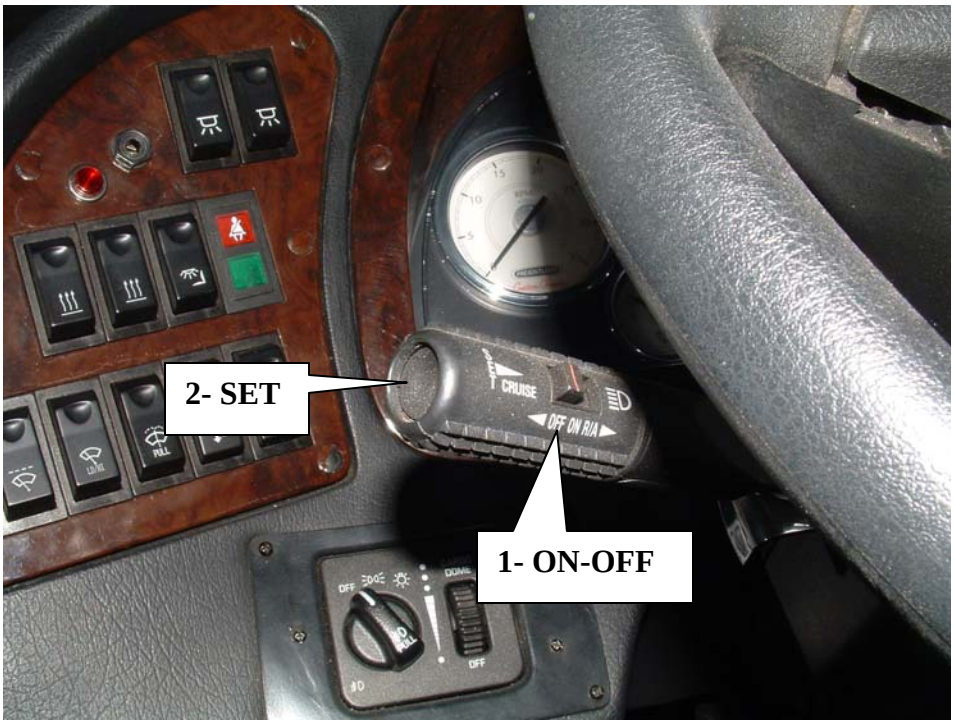
The multi-function stalk is located on the left side of the steering wheel and is used to operate the following (exact functions depend on vehicle model):

1. Turn Signal: Move the lever all the way up or down to a locking position for right or left turn signals, respectively. Turning the steering wheel will reset the switch to OFF.

2. Headlight Beam Toggle: Toggle between high and low beam headlights by pulling the lever towards you. Pulling halfway flashes the high beams. Release the lever to return to normal (low beam) driving lights.

The multi-function stalk also controls the cruise control functions – see next section for Cruise Control function details.

CRUISE CONTROL



CRUISE CONTROL SWITCH

The cruise control function is part of the Cummins engine management system. Cruise control allows the vehicle to operate at a designated speed without foot throttle manipulation from the driver.

To activate the cruise control function, turn the OFF / ON / ACCELERATE switch (1) of the multifunction stalk to ON. Accelerate the vehicle to the desired cruising speed, then press and release the SET button (2) at the end of the stalk. Remove foot from accelerator (throttle) pedal. This will set the cruise speed and store it in memory until the service brake is activated to a speed below 30 MPH or the cruise switch (1) is set to OFF.

While cruise control is active , push cruise switch to R/A to increase set-up speed .

NOTE: *The CRUISE and RESUME switches do not operate at speeds below 30 MPH.*

CRUISE CONTROL (cont).

Increasing Set Speed

The vehicle cruise speed setting can be increased by one of the following methods:

1. Accelerate using the throttle pedal until the desired speed is attained. Depress and release the SET switch to lock in the new setting; OR

2. Depress and hold the RESUME / ACCEL switch until the vehicle attains the desired speed. When the RESUME switch is released, the new speed setting is stored in the cruise control memory. The RESUME switch does not function at speeds below 20 MPH (32 kmh).

When driving with cruise control ON, each time the RESUME switch is depressed, the set speed increases by 1 MPH (1.6 kmh).

Note: *When driving with the cruise control engaged, the vehicle may be accelerated normally by pressing the accelerator pedal in a normal manner. Once the pedal is released, the speed will revert to the previously set (programmed) cruising speed.*

WARNING:

NEVER engage the cruise control under the following circumstances:

- While driving in heavy traffic or stop-and-go conditions
- When driving in inclement weather, such as snow or rain
- If driving the vehicle on a long downhill slope.

Decreasing Set Speed

The vehicle cruise speed setting can be decreased by one of the following methods:

1. Depress and hold the SET switch until the vehicle attains the desired speed. When the SET switch is released, the new speed setting is stored in the cruise control memory.

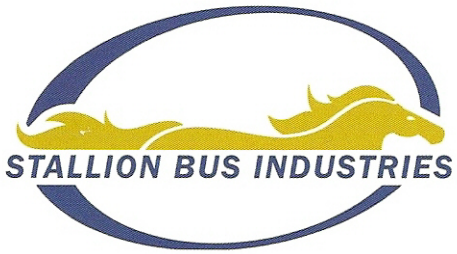
2. Depressing the SET switch momentarily. When released, the preset cruise speed will return to its former level.

3. Slightly apply the service brake. After the brake is released, the preset cruise speed will be re-attained.

4. Depress and release the DECEL switch. Upon release, the vehicle speed will be reduced by 1 MPH (1.6 kmh). Each subsequent press and release of the DECEL switch will diminish speed by this amount.

After disengaging the cruise control, you can return to the preset speed by pressing, then releasing, the RESUME switch, as long as your speed is above 20 MPH (32 kmh).

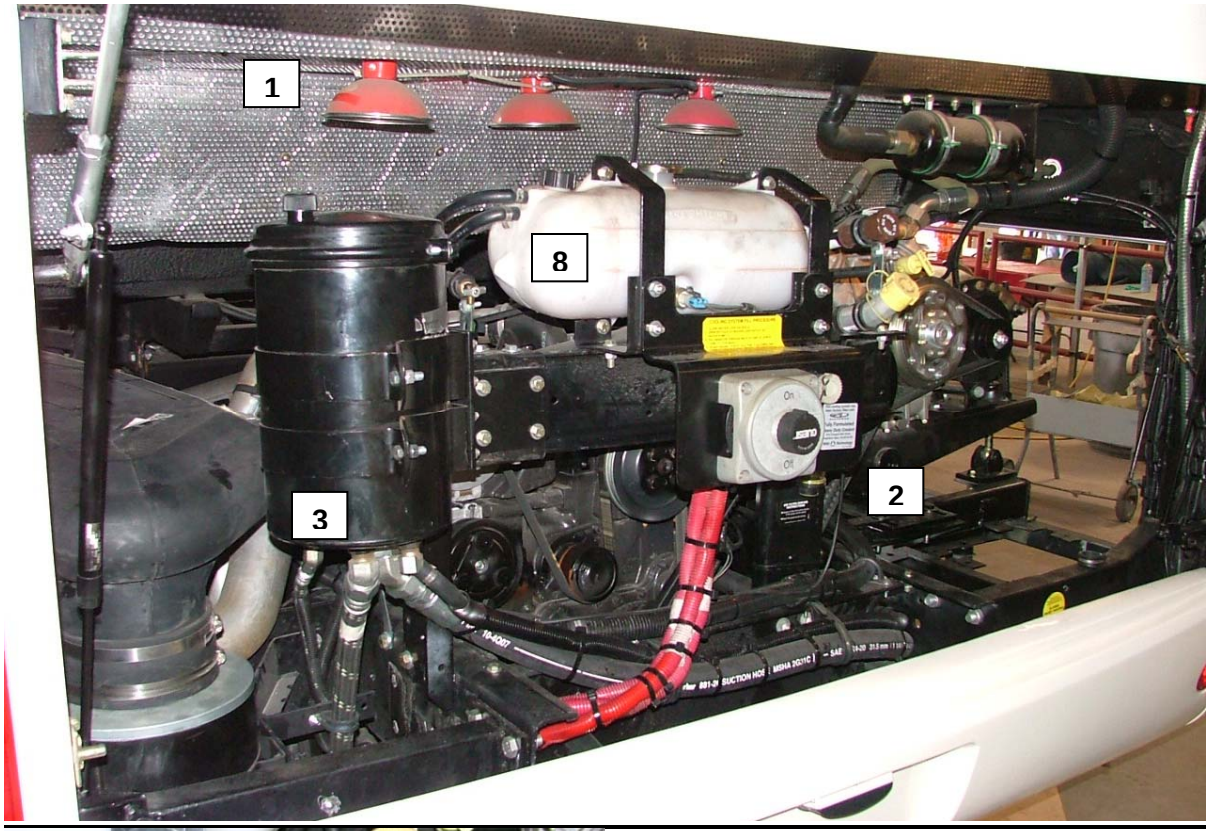
Note: *Once the cruise control switch is set to OFF, the system memory is erased and the cruise control function is disengaged. To re-engage, follow the steps outlined previously in "Increasing Set Speed".*

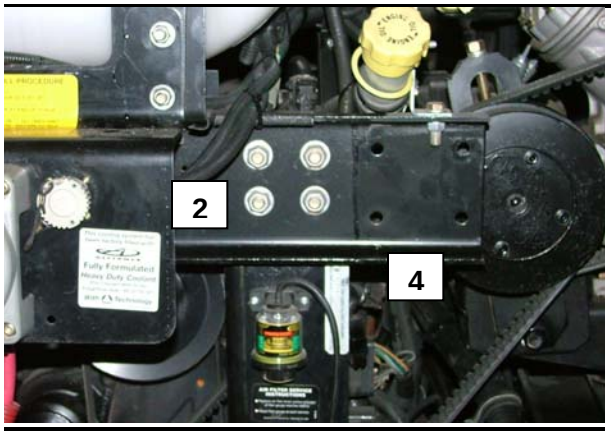


5- MECHANICAL

MECHANICAL

ENGINE COMPARTMENT – Pre EPA 2007 Engine

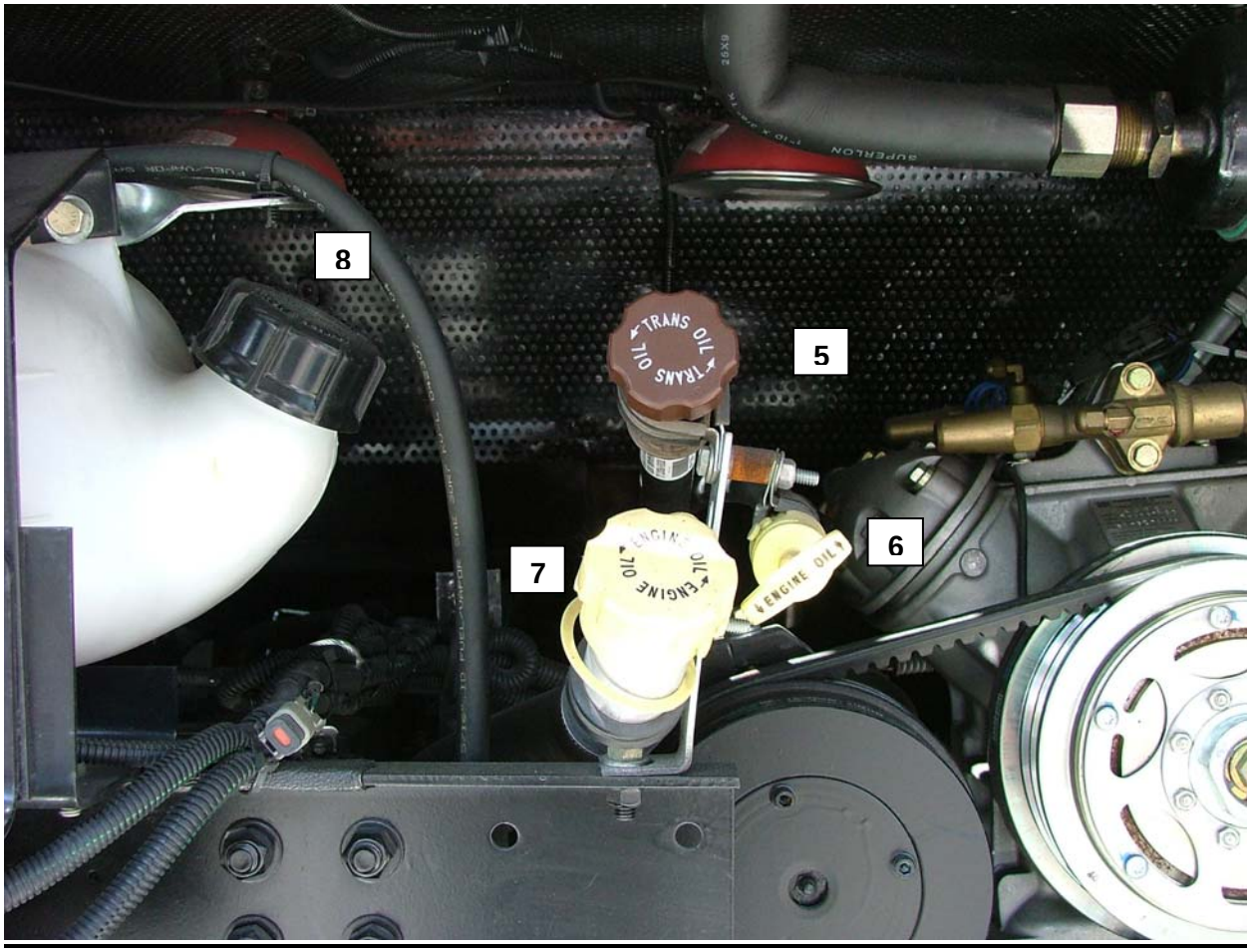




1. Fire Suppression Nozzles (3)
2. Air Filter Restriction Indicator
3. Power Steering / Hydraulic Reservoir
4. Chassis VIN Number

MECHANICAL

ENGINE COMPARTMENT Pre EPA 2007 Engine -cont.



5. Transmission Oil Dipstick

6. Engine Oil Dipstick

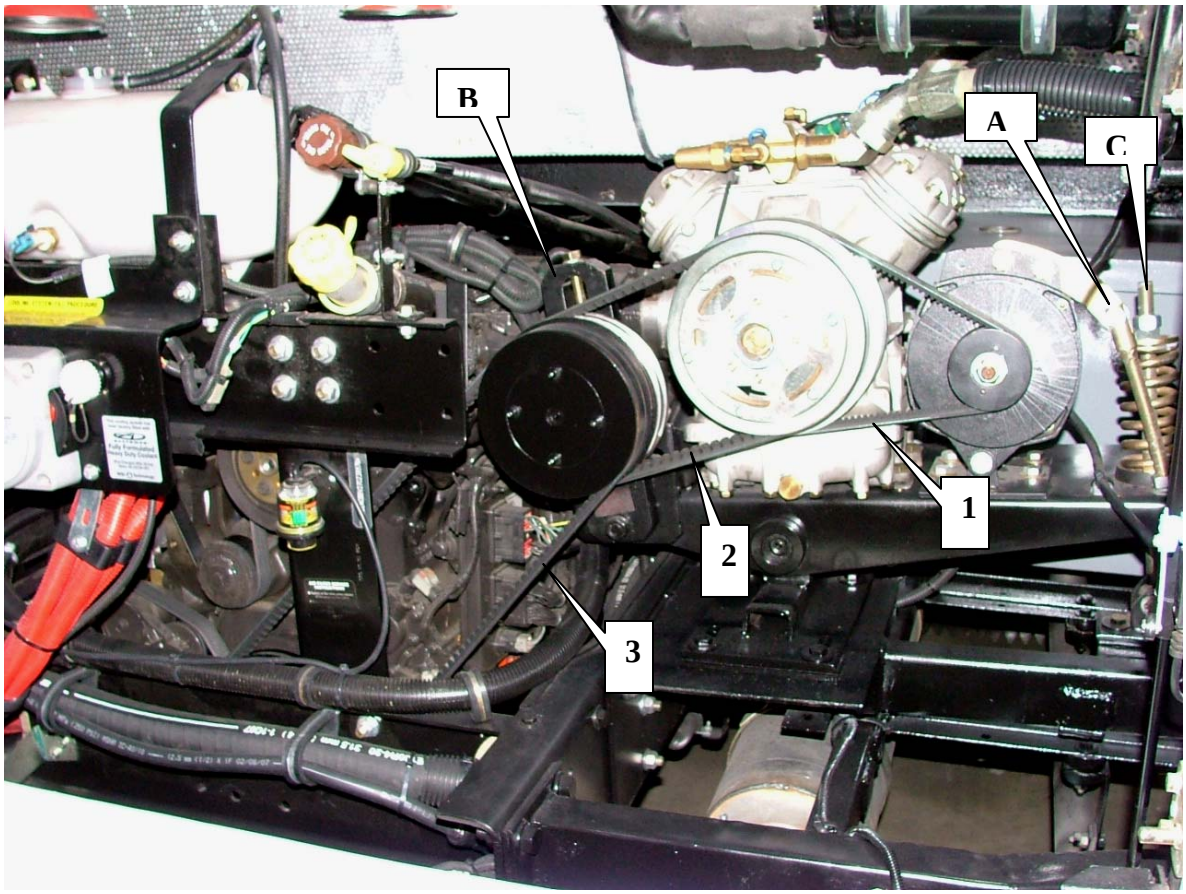
7. Engine Oil Filler Neck

8. Coolant Reservoir (Surge Tank)

MECHANICAL

ENGINE COMPARTMENT Pre EPA 2007 Engine -cont.

AIR CONDITIONER BELT SIZE



1-Belt ref. AX-39 QTY. 1 Adjust belt tension with item “A”.

2- Belt ref. BX-40 QTY. 2 Adjust belt tension with item “B”.

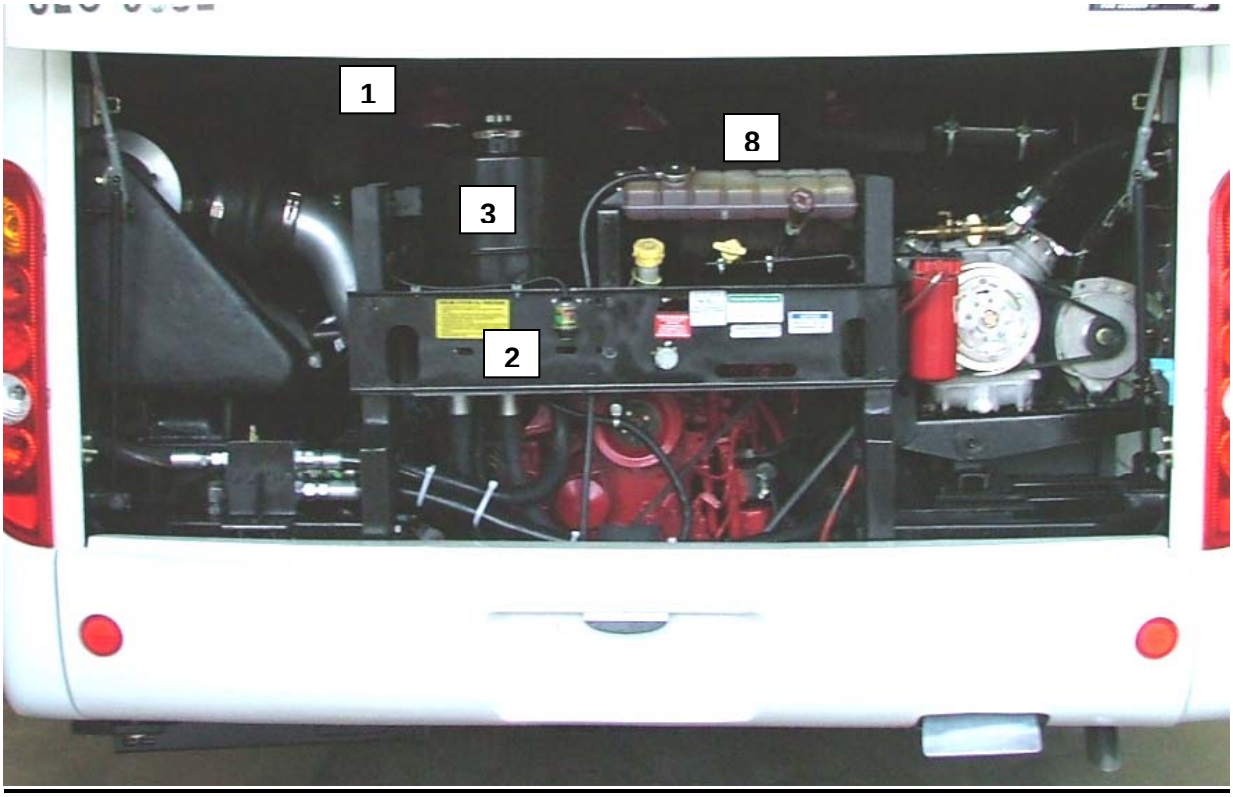
3- Belt ref. BX-68 QTY. 2 Adjust belt tension with item “C”.

ENGINE & TRANSMISSION FLUIDS (Pre EPA 2007 Engines)

Steering : SAE 15w40 (C1-4) motor oil.
Engine : Oil meet or exceed CES 20078 SAE 15w40 heavy duty engine oil
**Consult your Cummins Engine Manual **
Transmission : TranSynd full synthetic transmission fluid.
Diesel : ASTM number 2D diesel
**Consult your Cummins Engine Manual **
Coolant : Heavy duty coolant 50/50 ASTM D4985

MECHANICAL

ENGINE COMPARTMENT – EPA 2007 Engine



MECHANICAL

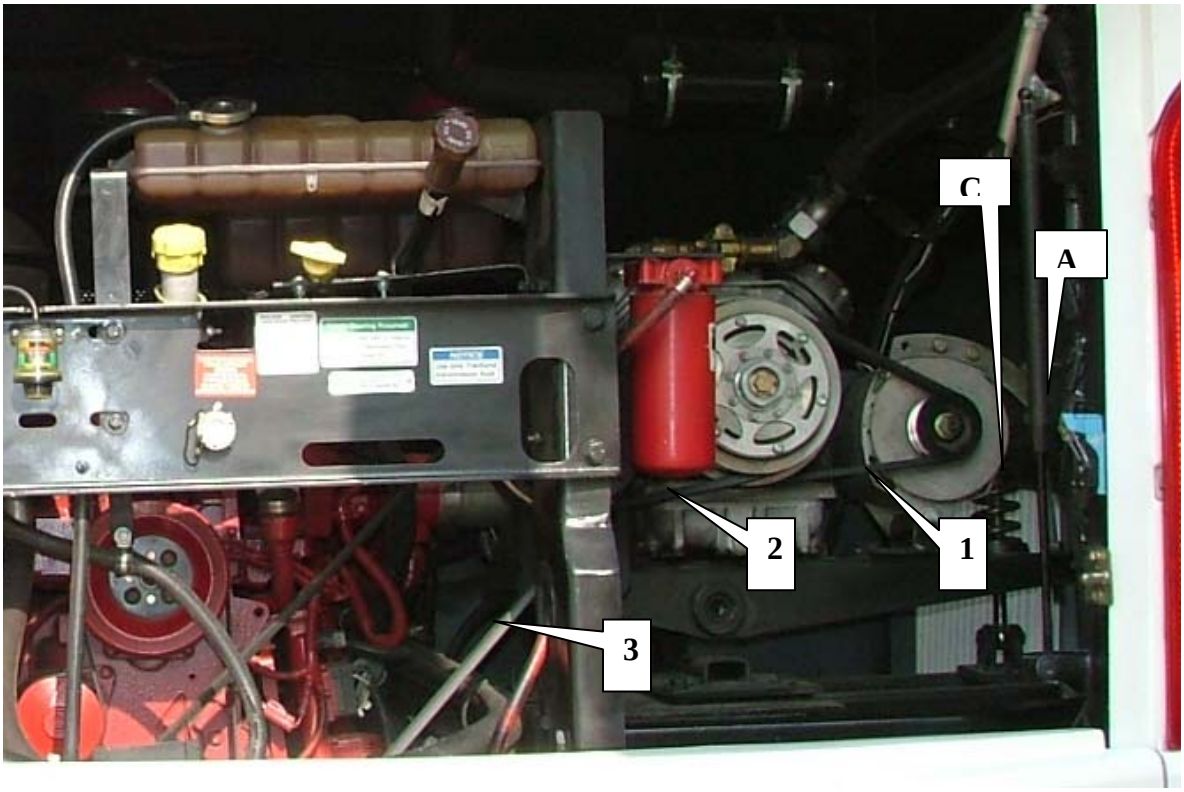
ENGINE COMPARTMENT EPA 2007 Engine -cont.

1. Fire Suppression Nozzles (3)
2. Air Filter Restriction Indicator
3. Power Steering / Hydraulic Reservoir
4. Chassis VIN Number
5. Transmission Oil Dipstick
6. Engine Oil Dipstick
7. Engine Oil Filler Neck
8. Coolant Reservoir (Surge Tank)

MECHANICAL

ENGINE COMPARTMENT EPA 2007 Engine -cont.

AIR CONDITIONER BELT SIZE



1-Belt ref. AX-39 QTY. 1 Adjust belt tension with item “A”.

2- Belt ref. BX-41 QTY. 2 Adjust belt tension with item “B”.

3- Belt ref. BX-78 QTY. 2 Adjust belt tension with item “C”.

ENGINE & TRANSMISSION FLUIDS (EPA 2007 Engines)

Steering : Automatic Transmission Fluid DEXRON III.
Engine : Oil meet or exceed CES 20078 or CES 20081 SAE 15w40 heavy duty engine oil
**Consult your Cummins Engine Manual **
Transmission : TranSynd full synthetic transmission fluid.
Diesel : Ultra-low sulfur diesel ASTM S-15 , number 2D diesel
**Consult your Cummins Engine Manual **
Coolant : Heavy duty coolant 50/50 ASTM D4985

ENGINE OPERATION

STARTING THE ENGINE

Starting from the Driver's Seat

1. Be sure parking brake is applied (pulling upward on the PARKING BRAKE button).

2. Transmission in NEUTRAL

3. With the ignition key in ON position , the engine indicator lamps will come on momentarily and then go out, under cold conditions, the wait-to – start lamp will also illuminate. Once the wait-to-start lamp turns off, the engine could be started.

4. Turn the ignition switch key to START. Release the key once the engine begins running.

Note: *The service brake must be applied when selecting DRIVE ("D") on the transmission – the transmission should remain in neutral otherwise.*

Caution: *Do not engage the starter for more than 10-15 seconds at a time. If the engine does not start after 15 seconds of cranking, turn the ignition OFF and wait for the starter to cool down before attempting a restart.*

Note: *Do not press the accelerator pedal when starting the engine. This is a fuel-injected engine and does not require throttle (fuel pedal) action. Doing so may cause an electronic control unit fault that will prevent the vehicle from starting.*
If the accelerator pedal is pressed before starting, wait 30 seconds before attempting to restart.

Caution: *Special precautions are necessary when starting and shutting down turbocharged engines. After starting, run the engine for at least two minutes to allow oil to lubricate the turbocharger. Allow oil pressure to stabilize at normal pressure before driving off.*

STOPPING THE ENGINE

1. Apply the parking brake and place the transmission in NEUTRAL (N).

2. Shut down all electrical loads

3. Allow the engine to idle at least two minutes before turning OFF. This assures that turbocharger speed has dropped and that exhaust gas temperature has cooled.

4. Turn the ignition switch to OFF.

Caution: *Do not shut off the engine when running above normal idle.*

RELEASE NUMBER	REV LTR	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P13228-01	-	-	INITIAL RELEASE	BDH	08/10/00	MWP
P16543-01	A	C4	ADDED TEE FTG - SHEETS 1&2	BDH	09/17/01	MWP

KEY TO LINE COLORS

RED: FRONT BRAKES (SECONDARY)
GREEN: REAR BRAKES (PRIMARY)
BLACK: AIR TANK SUPPLY AND EMERG/PARK BRAKE SYSTEM
SILVER: AIR SYSTEM GOVERNOR CONTROL
YELLOW: PARK BRAKE CONTROL SUPPLY AND OPT SYSTEMS SUPPLY
BLUE: AIR SUSPENSION SYSTEM
WHITE: AIR SUSPENSION EXHAUST OPTIONS

303 YEL 1/4
LINE CODE:
LINE COLOR:
LINE SIZE (O.D. INCHES):

SPRING BRAKE VALVE MOD 871
PARK BRAKE CONTROL VALVE MOD 882
093 BLK 1/4
092 GRN 1/4
002 BLK 1/4
PARK BK WARNING SENSOR MOD 882
LOW AIR PRESSURE SWITCH MOD 882
060 BLK 1/4
ABS SOL VLV MOD 490
160 1/2 RED
FRT RH BRAKE CHMBR MOD 404
488 RED 3/8
015 RED 3/8
303 YEL 1/4
510 BLK 1/4
QUICK RELEASE VALVE MOD 413
159 1/2 RED
ABS SOL VLV MOD 490
FRT LH BRAKE CHMBR MOD 404
SERVICE BRAKE WABCO ABS COMBO VLV MOD 490
RR RH BRAKE CHMBR MOD 426
166
168
167
SPRING BRAKE RELAY VALVE R-14 MOD 904
165
RR LH BRAKE CHMBR MOD 426
055 GRN 5/8
008 GRN 3/8
304 BLK 1/2
400 BLK 3/8
303 YEL 1/4
488 RED 3/8
015 RED 3/8
007 RED 1/2

VEHICLE DATA COMPUTER MOD 353 (MOUNTED NEAR TRANS)
#4 SEC RED FRONT
#3 PRI GREEN REAR
405 GRN 1/4 MOD 840
404 RED 1/4 MOD 840
STOPLIGHT SWITCH
TREADLE VALVE MOD 880
SEC 2
PRI 1
404 RED 1/4
008 GRN 3/8
092 BLK 1/4
A
DBL CHK MOD 871
057 RED 3/8
FRONT SERVICE TANK
SECONDARY MOD 462
053 RED 5/8
484 BLK 3/8 OPT EXH BRK
087 BLK 3/8
051 GRN 1/2
PPV 65 PSI MOD 462
065 BLK 1/2
CHECK VALVE
AIR DRYER MOD 480
484 BLK 3/8 OPTIONAL EXH BRK
087 BLK 3/8
431 BLK 3/8
BLK
058 1/2
GRN
056 3/8
055 GRN 5/8
GOVERNOR MOD 108
AIR COMPRESSOR
069 5/8 TEFLON MOD 131
005 SLV 1/4
006 SLV 1/4
064 BLK 5/8
005 SLV 1/4
PRIMARY MOD 460
SUPPLY AND REAR SERVICE TANKS
CHECK VALVE
SAFETY VALVE 150 PSI
INVERSION VALVE MOD 909
SUP EXH CNTRL DELV
AIR SOLENOID EXHAUST BRAKE MOD 128
CUSTOMER MANIFOLD MOD 871
AIR SUSPENSION MANIFOLD MOD 871
085 YEL 1/4
406 YEL 1/4
086 YEL 1/4
THIS IS A SYMBOLIC REPRESENTATION ONLY THE ACTUAL VALVE HAS THE SUPPLY PORT ON THE END
089 1/4" WHT MAN DP
011 1/4" WHT
OPTIONAL PNEUMATIC MANUAL DUMP SYSTEM NOT TO BE USED WITH ELECTRIC DUMP
076 1/4" WHT
TOGGLE VALVE MOD 909
089 1/4" WHT AUTO DP
076 1/4" WHT
OPTIONAL ELECTRIC AUTO DUMP ACTUATION MODULATED THROUGH JACK SYSTEM POWER MOD 909
SVE 1/4 WHT
12V+ PWR JACK IN USE
12V+ PWR JACK UP, TRVL

OPTIONAL AIR SUSPENSION (BLUE LINES)

P80 BLU 1/4
RH FRONT AIR BAG MOD 620
P83 BLU 1/4
RH REAR AIR BAG MOD 622
HEIGHT CONTROL VALVE W/DUMP MOD 909
FRD
RRD
406 YEL 1/4
079 BLU 1/4
FLD
HEIGHT CONTROL VALVE W/DUMP MOD 910
076 1/4" WHT
HEIGHT CONTROL VALVE W/DUMP MOD 909
P84 BLU 1/4
LH FRONT AIR BAG MOD 620
LH REAR AIR BAG MOD 622

MOD 909 OR 910 HGT CONT W/O DUMP
CIRCUIT 085, 086, OR 406 TO SUPPLY
CIRCUIT P80, P83, OR P84 TO PING TANK
AIR SUSPENSION DUMP OPTIONS
CIRCUIT 076 AUTO DUMP OR MAN DUMP PILOT CONTROL LINE

-001 2 TANK SYSTEM

FREIGHTLINER LLC

MATERIAL APPROVAL M.PITSENBARGER	DATE 08/14/00	UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.
DRAWN BY BJ SMITH	DATE 08/10/00	
CHECKED BY B.HOWARD	DATE 08/14/00	
RESPONSIBLE ENGINEER D.HOYLE	DATE 08/10/00	THIRD ANGLE PROJECTION; UNITS OF MEASURE MM
APPROVED BY M.PITSENBARGER	DATE 08/14/00	MFG ENGR/PURCH AGENT R.TISDALE DATE 08/14/00

DESCRIPTION: SCHEM-WABCO ABS, AIR BRK, X-LINE
SUPPLEMENTARY DESCRIPTION: 871B1

ITEM/DRAWING NUMBER	REVISION LETTER	SHEET NUMBER
D12-18460	A	2 OF 2

.SCHEM-WABCO ABS,AIR BRK,X-LINE FPL862
. 2 A .
DRAW ID- D12-18460
SHEET FILE- BSIZ.SHEET
PLOT TIME- 10:02
USER ID- CATIA
LAST FILE- 01/10/02 10:02
PLOT DATE- OCTOBER 2, 2001

KEY TO LINE COLORS

RED: FRONT BRAKES (SECONDARY)
GREEN: REAR BRAKES (PRIMARY)
BLACK: AIR TANK SUPPLY AND EMERG/PARK BRAKE SYSTEM
SILVER: AIR SYSTEM GOVERNOR CONTROL
YELLOW: PARK BRAKE CONTROL SUPPLY AND OPT SYSTEMS SUPPLY
BLUE: AIR SUSPENSION SYSTEM
WHITE: AIR SUSPENSION EXHAUST OPTIONS

303 YEL 1/4
LINE CODE:
LINE COLOR:
LINE SIZE (O.D. INCHES):

RELEASE NUMBER	REV LTR	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P13228-01	-	-	INITIAL RELEASE	BDH	08/10/00	MWP
P16543-01	A	C4	ADDED TEE FTG - SHEETS 1&2	BDH	09/17/01	MWP

SPRING BRAKE VALVE MOD 871
PARK BRAKE CONTROL VALVE MOD 882
PARK BK WARNING SENSOR MOD 882
LOW AIR PRESSURE SWITCH MOD 882
ABS SOL VLV MOD 490
FRT RH BRAKE CHMBR MOD 404
QUICK RELEASE VALVE MOD 413
ABS SOL VLV MOD 490
FRT LH BRAKE CHMBR MOD 404
SERVICE BRAKE WABCO ABS COMBO VLV MOD 490
RR RH BRAKE CHMBR MOD 426
RR LH BRAKE CHMBR MOD 426
SPRING BRAKE RELAY VALVE R-14 MOD 904
093 BLK 1/4
092 GRN 1/4
002 BLK 1/4
060 BLK 1/4
160 1/2 RED
159 1/2 RED
166
168
167
165
510 BLK 1/4
303 YEL 1/4
015 RED 3/8
488 RED 3/8
008 GRN 3/8
055 GRN 5/8
304 BLK 1/2
400 BLK 3/8
015 RED 3/8
007 RED 1/2
303 YEL 1/4
488 RED 3/8

OPTIONAL AIR SUSPENSION (BLUE LINES)

080 BLU 1/2
P84 BLU 1/4
P80 BLU 1/4
084 BLU 1/2
080 BLU 1/2
P80 BLU 1/4
RH FRONT AIR BAG MOD 620
RH REAR AIR BAG MOD 622
HEIGHT CONTROL VALVE MOD 909
HEIGHT CONTROL VALVE MOD 910
406 YEL 1/4
083 BLU 1/2
P83 BLU 1/4
P79 BLU 1/4
FRD
RRD
FLD
076 1/4" WHT
084 BLU 1/2
079 BLU 1/2
LH FRONT AIR BAG MOD 620
LH REAR AIR BAG MOD 622
406 YEL 1/4
406 YEL 1/4

VEHICLE DATA COMPUTER MOD 353 (MOUNTED NEAR TRANS)
#4 SEC RED FRONT
#3 PRI GREEN REAR
405 GRN 1/4 MOD 840
404 RED 1/4 MOD 840
STOPLIGHT SWITCH
TREADLE VALVE MOD 880
SEC 2
PRI 1
404 RED 1/4
STOPLIGHT SWITCH
008 GRN 3/8
053 RED 5/8
484 BLK 3/8 OPT EXH BRK
087 BLK 3/8
051 GRN 1/2
064 BLK 5/8
005 SLV 1/4
092 GRN 1/4
A
DBL CHK MOD 871
057 RED 3/8 FRONT SERVICE TANK
RH PING
LH PING
SECONDARY MOD 462
065 BLK 1/2
PPV 65 PSI MOD 462
PPV 65 PSI MOD 462
AIR DRYER MOD 480
GOVERNOR MOD 108
AIR COMPRESSOR
069 5/8 TEFLON MOD 131
005 SLV 1/4
006 SLV 1/4
484 BLK 3/8 OPTIONAL EXH BRK
087 BLK 3/8
431 BLK 3/8
BLK
GRN
058 1/2
056 3/8
055 GRN 5/8
PRIMARY MOD 460
SUPPLY AND REAR SERVICE TANKS
CHECK VALVE
SAFETY VALVE 150 PSI
AIR SUSPENSION MANIFOLD MOD 871
CUSTOMER MANIFOLD MOD 871
AIR SOLENOID EXHAUST BRAKE MOD 128
085 YEL 1/4
406 YEL 1/4
086 YEL 1/4
406 YEL 1/4

INVERSION VALVE MOD 909
SUP EXH CNTRL DCD
089 1/4" WHT MAN DP
011 1/4" WHT
OPTIONAL PNEUMATIC MANUAL DUMP SYSTEM NOT TO BE USED WITH ELECTRIC DUMP
076 1/4" WHT
TOGGLE VALVE MOD 909
089 1/4" WHT AUTO DP
076 1/4" WHT
OPTIONAL ELECTRIC AUTO DUMP ACTUATION MODULATED THROUGH JACK SYSTEM POWER MOD 909
SVE 1/4 WHT
12V+ PWR JACK IN USE
12V+ PWR JACK UP, TRVL

THIS IS A SYMBOLIC REPRESENTATION ONLY THE ACTUAL VALVE HAS THE SUPPLY PORT ON THE END

MOD 909 OR 910 HGT CONT W/O DUMP
1
CIRCUIT 085, 086, OR 406 TO SUPPLY
CIRCUIT P80, P83, OR P84 TO PING TANK

CIRCUIT 076 AUTO DUMP OR MAN DUMP PILOT CONTROL LINE

AIR SUSPENSION DUMP OPTIONS

-000 3 TANK SYSTEM

FREIGHTLINER LLC

MATERIAL APPROVAL	M.PITSENBARGER	DATE 08/14/00
DRAWN BY	BJ SMITH	DATE 08/10/00
CHECKED BY	B.HOWARD	DATE 08/14/00
RESPONSIBLE ENGINEER	D.HOYLE	DATE 08/10/00
APPROVED BY	M.PITSENBARGER	DATE 08/14/00
MFG ENGR/PURCH AGENT	R.TISDALE	DATE 08/14/00

UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.

THIRD ANGLE PROJECTION | UNITS OF MEASURE: MM

ITEM NUMBER	DESCRIPTION
D12-18460-001	SCHEM-WABCO ABS,AIR BRK,2 TANK
D12-18460-000	SCHEM-WABCO ABS,AIR BRK,3 TANK

DESCRIPTION: SCHEM-WABCO ABS,AIR BRK,X-LINE
SUPPLEMENTARY DESCRIPTION: 871B1

ITEM/DRAWING NUMBER: D12-18460 | REVISION LETTER: A | SHEET NUMBER: 1 OF 2

SCHEM-WABCO ABS,AIR BRK,X-LINE FPL862
A . DRAW ID- D12-18460 . BSIZ.SHEET USER ID- CATIA
SHEET FILE- PLOT TIME- 10:02
LAST FILE- 01/10/02 10:02 PLOT DATE- OCTOBER 2, 2001

RELEASE NUMBER	REV LTR	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P20225-82	-	-	INITIAL RELEASE	CTT	04/16/03	MWP
P23116-04	A	D8	A:MMDC WAS VDC	DBR	09/08/03	DBR
		-	A1:SEE SHEET 2			
P29026-03	B	A2	CHANGED TITLE DESCRIPTION	CTT	09/21/05	MWP

KEY TO LINE COLORS

RED: FRONT BRAKES (SECONDARY)
GREEN: REAR BRAKES (PRIMARY)
BLACK: AIR TANK SUPPLY AND EMERG/PARK BRAKE SYSTEM
SILVER: AIR SYSTEM GOVERNOR CONTROL
YELLOW: PARK BRAKE CONTROL SUPPLY AND OPT SYSTEMS SUPPLY
BLUE: AIR SUSPENSION SYSTEM
WHITE: AIR SUSPENSION EXHAUST OPTIONS
ORANGE: ENGINE VG TURBO CONTROL

303 YEL 1/4
LINE CODE:
LINE COLOR:
LINE SIZE (O.D. INCHES):

TO LH AIR BAG (SEE PAGE 2)
TO RH AIR BAG (SEE PAGE 2)
084 BLU 1/2"
080 BLU 1/2"
005 SLV 1/4
AIR DRYER MOD 480
064 BLK 5/8
069 5/8 TEFLON MOD 131
AIR COMPRESSOR
006 SLV 1/4
GOVERNOR MOD 108
MMDC MOD 32A (PARTS BOX ITEM)
A
*3 PRI GREEN REAR
*4 SEC RED FRONT
FRT RH BRAKE CHMBR MOD 620
160 RED 1/2
RR RH AXLE BRAKE CHMBR MOD 426
166
168
404 RED 1/4 MOD 871
PRIMARY MOD 460
P84 BLU 1/4"
092 GRN 1/4
051 GRN 1/2
056 GRN 3/8
055 GRN 5/8
STOPLIGHT SWITCH
007 RED 1/2
AIR SUSPENSION MANIFOLD MOD 871
CUSTOMER MANIFOLD MOD 871
431 BLK 3/8
087 BLK 3/8
PPV MOD 462
SAFETY VALVE 150 PSI
058 BLK 1/2
005 SLV 1/4
080 BLU 1/2"
SERVICE BRAKE WABCO ABS COMBO VLV MOD 490
400 BLK 3/8
SPRING BRAKE RELAY VALVE R-14 MOD 904
TREADLE VALVE MOD 880
FRONT
REAR
053 RED 5/8
051 GRN 1/2
ABS SOL MOD 490
QUICK RELEASE VALVE MOD 413
405 GRN 1/4 MOD 871
STOPLIGHT SWITCH
484 BLK 3/8
PPV MOD 462
064 BLK 5/8
165
167
RR LH AXLE BRAKE CHMBR MOD 426
053 RED 5/8
SECONDARY MOD 462
P80 BLU 1/4"
OPTIONAL AIR SOLENOID EXHAUST BRAKE MOD 128
065 BLK 1/2
058 BLK 1/2
304 BLK 1/2
015 RED 3/8
008 GRN 3/8
092 GRN 1/4
159 RED 1/2
FRT LH BRAKE CHMBR MOD 620
DBL CHK VALVE MOD 871
057 RED 3/8
002 BLK 1/4
303 YEL 1/4
PARK BRAKE CONTROL VALVE MOD 882
LOW AIR PRESSURE SWITCH MOD 882
093 BLK 1/4
008 GRN 3/8
SPRING BRAKE VALVE MOD 871
488 RED 3/8
510 BLK 1/4 FROM INVERSION VALVE
MANUAL DUMP OPTION ONLY
TO LH FRT HCV (SEE PAGE 2)
TO RH FRT HCV (SEE PAGE 2)

STANDARD WIRING ONLY

FREIGHTLINER LLC

MATERIAL APPROVAL M. PITSENBARGER	DATE 05/08/03	UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.
DRAWN BY T. TRAYNHAM	DATE 04/16/03	
CHECKED BY G. HOLMES	DATE 05/08/03	
RESPONSIBLE ENGINEER T. TRAYNHAM	DATE 04/16/03	THIRD ANGLE PROJECTION; UNITS OF MEASURE MM
APPROVED BY M. PITSENBARGER	DATE 05/08/03	MFG ENGR/PURCH AGENT R. TISDALE; DATE 09/21/05

ITEM NUMBER: D12-20359-000
DESCRIPTION: SCHEM-AIR, ABS, AIR, STD, 2F, 1RR

DESCRIPTION: SCHEM-AIR, ABS, AIR, STD, 2F, 1RR
SUPPLEMENTARY DESCRIPTION: 871B1

ITEM/DRAWING NUMBER	REVISION LETTER	SHEET NUMBER
D12-20359	B	1 OF 2

B

D-SIZE

LAST FILE= 05/10/04 08:52
PLOT DATE= OCTOBER 4, 2005
SHEET FILE= SMA.SHEET
PLOT TIME= 08:52
USER ID= CATIA
DRAW ID= ____D12-20359____2B_____
DWG FILE LOC = SMARAGD
SCHEM-AIR.ABS.AIR.STD.2F.1RR_____.01

AIR SUSPENSION DUMP OPTIONS

RELEASE NUMBER	REV LTR	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P20225-82	-	XX	INITIAL RELEASE	CTT	04/16/03	MWP
P23116-04	A	-	A:SEE SHEET 1	DBR	09/08/03	DBR
		B4	A1:ADDED ISL03 TURBO PLUMBING			
P29026-03	B	A2	CHANGED TITLE DESCRIPTION	CTT	09/21/05	MWP

INVERSION VALVE MOD 909

SUP EXH CNTRL DEL

089 1/4" WHT MAN DP

011 1/4" WHT

OPTIONAL PNEUMATIC MANUAL DUMP SYSTEM NOT TO BE USED WITH ELECTRIC DUMP

076 1/4" WHT

TOGGLE VALVE MOD 909

089 1/4" WHT AUTO DP

076 1/4" WHT

OPTIONAL ELECTRIC AUTO DUMP ACTUATION MODULATED THROUGH JACK SYSTEM POWER MOD 909

SVE 1/4 WHT

12V+ PWR JACK IN USE

12V+ PWR JACK UP, TRVL

CIRCUIT 076 AUTO DUMP OR MAN DUMP PILOT CONTROL LINE

FROM SECONDARY PING TANK

510 BLK 1/4

TO SPRING BRAKE VALVE MOD 871

P80 BLU 1/2"

RH FRONT AIR BAG MOD 620

089 WHT 1/4" MAN DP

089 WHT 1/4" AUTO DP

AIR SUSPENSION MANIFOLD MOD 871

HEIGHT CONTROL VALVE W/DUMP MOD 910

RRD WHT 1/4"

083 BLU 1/4"

RH REAR AIR BAG MOD 622

079 BLU 1/4"

LH REAR AIR BAG MOD 622

406 YEL 1/4"

FRD WHT 1/4"

085 YEL 1/4"

P80 BLU 1/4"

FLD WHT 1/4"

086 YEL 1/4"

HEIGHT CONTROL VALVE W/DUMP MOD 909

LH FRONT AIR BAG MOD 620

084 BLU 1/2"

P84 BLU 1/4"

FROM PRIMARY PING TANK

TO PRIMARY PING TANK

TO SECONDARY PING TANK

431 BLK 3/8"

FROM SECONDARY TANK

A1

101 ORANGE 3/8 MOD 111

ENG TURBO VALVE

(CUM-ISL03 ENGINE ONLY) MOD 101

STANDARD WIRING ONLY

ITEM NUMBER: D12-20359-000

DESCRIPTION: SCHEM-AIR, ABS, AIR, STD, 2F, 1RR

FREIGHTLINER® LLC

MATERIAL APPROVAL M. PITSENBARGER	DATE 05/08/03	UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.
DRAWN BY T. TRAYNHAM	DATE 04/16/03	
CHECKED BY G. HOLMES	DATE 05/08/03	
RESPONSIBLE ENGINEER T. TRAYNHAM	DATE 04/16/03	THIRD ANGLE PROJECTION; UNITS OF MEASURE: MM
APPROVED BY M. PITSENBARGER	DATE 05/08/03	MFG ENGR/PURCH AGENT R. TISDALE DATE 09/21/05

DESCRIPTION: SCHEM-AIR, ABS, AIR, STD, 2F, 1RR

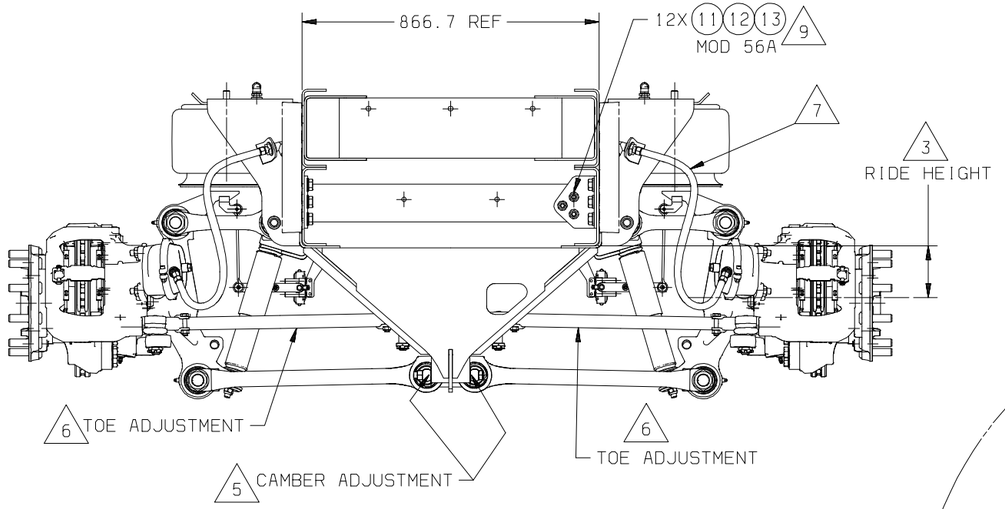
SUPPLEMENTARY DESCRIPTION: 871B1

ITEM/DRAWING NUMBER	REVISION LETTER	SHEET NUMBER
D12-20359	B	2 OF 2

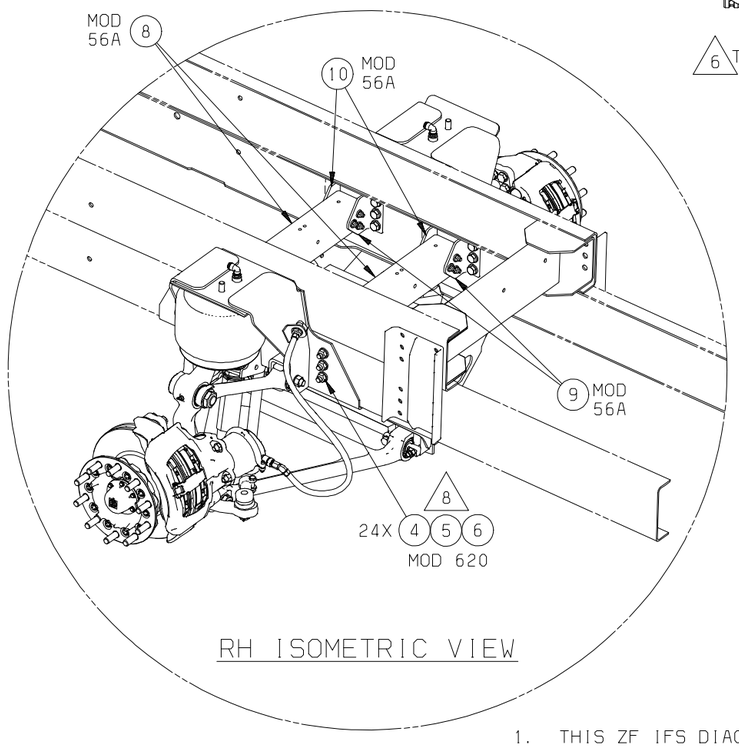
D-SIZE

LAST FILE= 05/10/04 08:52
PLOT DATE= OCTOBER 4, 2005
SHEET FILE= SMA.SHEET PLOT TIME= 08:53
USER ID= CATIA
DRAW ID= D12-20359 2B DWG FILE LOC = SMARAGD
SCHEM-AIR,ABS,AIR,STD,2F,1RR 02

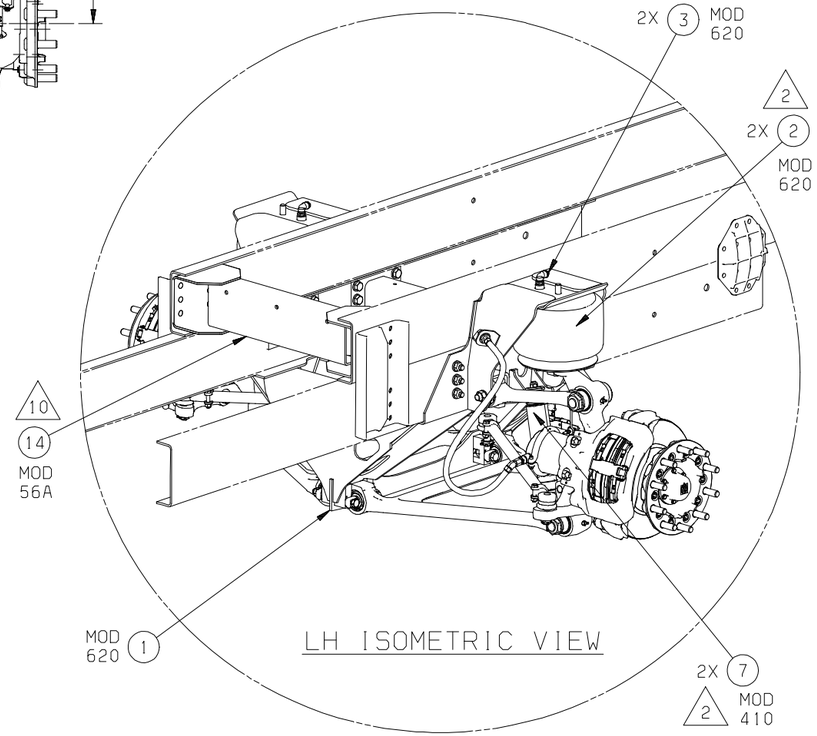
RELEASE NUMBER	REV LTR	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P26951-02	-	XX	INITIAL RELEASE	CBW	09/01/05	MWP
P26951-07	A	A3	ADDED 305/70 TIRE TO NOTE 7.	M3S	03/23/06	MWP



FRONT VIEW



RH ISOMETRIC VIEW



LH ISOMETRIC VIEW

1. THIS ZF IFS DIAGRAM IS FOR XCR CHASSIS.

2 ITEM INSTALLED BY SUPPLIER.

3 RIDE HEIGHT: 6.6". CHECK BY MEASURING LENGTH OF SHOCK FROM UPPER BRKT TO LOWER BRKT. SHOCK LENGTH SHOULD BE 15.75" FOR CORRECT RIDE HEIGHT ON ALL VEHICLE TYPES. ALL ALIGNMENT PROCEDURES SHOULD BE PERFORMED WITH CHASSIS AT CORRECT RIDE HEIGHT.

4. CASTER: NON-ADJUSTABLE, PRESET BY SUPPLIER.

5 CAMBER: 1/2° POSITIVE (±1/4° ; 1/2° RIGHT TO LEFT). ADJUST BY ADDING OR REMOVING WASHERS/SHIMS BETWEEN LOWER CONTROL ARMS AND SUBFRAME. TORQUE 5/8" FASTENERS TO 150±20 FTLBS.

6 TOE IN: 1/32" ± 1/32". ADJUST BY LENGTHENING OR SHORTENING ADJUSTABLE DRAGLINKS. TORQUE DRAGLINK CLAMP BOLTS TO 50-60 FTLBS.

7 WITH THE FRONT TIRES ON TURN PLATES, SET THE STEERING STOPS TO OBTAIN 58°- 60° OF WHEELCUT FOR TIRE SIZES UP TO 295/80R22.5, 54°- 56° FOR TIRE SIZE 305/70R22.5 AND 53°- 55° FOR TIRE SIZE 315/80R22.5. ADJUST THE FRONT BRAKE HOSE FITTINGS IF NECESSARY TO MAKE SURE THE HOSE DOES NOT CONTACT ANY OTHER COMPONENTS DURING FULL WHEELCUT, BOTH SIDES.

8 THESE FASTENERS MUST BE TIGHTENED FIRST TO REMOVE GAP BETWEEN THE RAILS AND SUSPENSION. TORQUE TO 175-221 FTLBS.

9 CROSSMEMBER ADJUSTMENT BOLTS MUST REMAIN LOOSE UNTIL SUSPENSION/CROSSMEMBER MOUNTING BOLTS ARE TIGHTENED (SEE NOTE 8). THEN TORQUE TO 49-63 FTLBS.

10 FASTENERS SPECIFIED IN MODULE 546.

ITEM NUMBER D16-18161-000
DESCRIPTION INSTL-IFS, ZF, RL67EM, XCR

FREIGHTLINER® LLC

MATERIAL APPROVAL	DATE
M.PITSENBARGER	09/01/05
DRAWN BY	DATE
C.WAZNY	08/01/05
CHECKED BY	DATE
D.HOYLE	08/25/05
RESPONSIBLE ENGINEER	DATE
D.HOYLE	08/25/05
APPROVED BY	DATE
M.PITSENBARGER	09/01/05
MFG ENGR/PURCH AGENT	DATE
R.BOST	09/06/05

UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.

THIRD ANGLE PROJECTION | UNITS OF MEASURE: MM

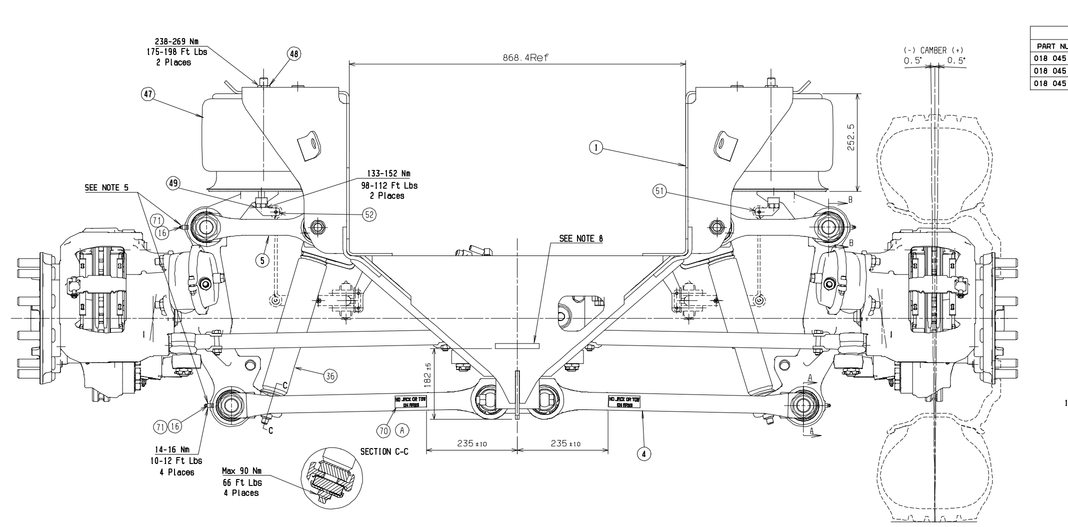
DESCRIPTION: INSTL-IFS, ZF, RL67EM, XCR
SUPPLEMENTARY DESCRIPTION: 620A1

ITEM/DRAWING NUMBER	REVISION LETTER	SHEET NUMBER
D16-18161	A	1 OF 1

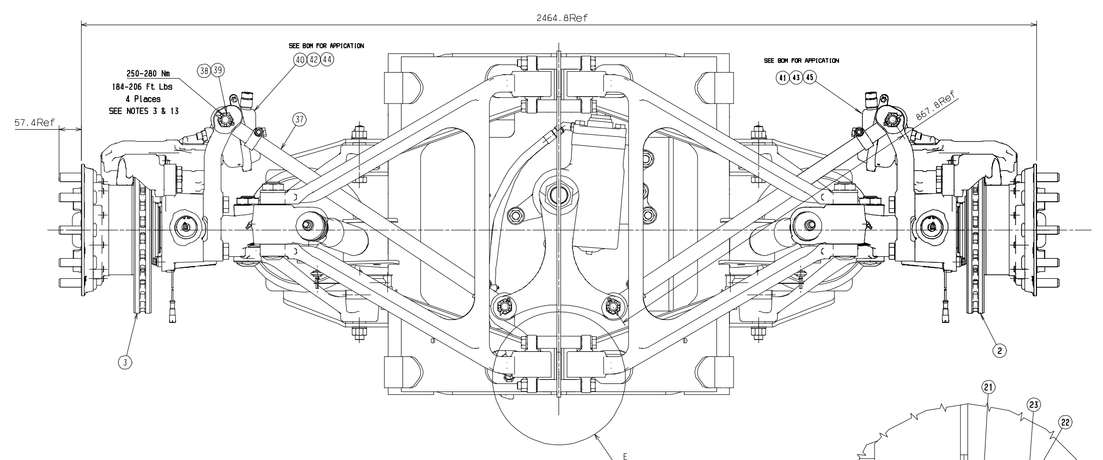
DO NOT SCALE COPIES OF THIS DRAWING

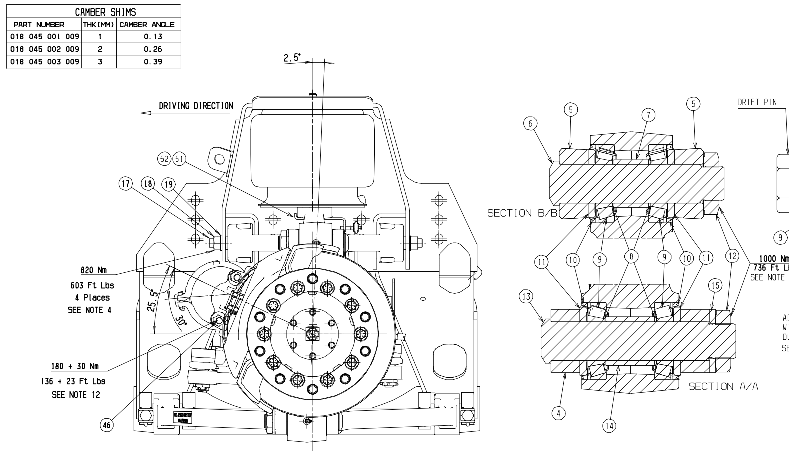
D-SIZE

LAST FILE= 06/03/29 12:52
PLOT DATE= MARCH 29, 2006
DRAW ID= D16-18161 IA INSTL-IFS.ZF.RL67EM .01
DWG FILE LOC = SMARAGD
SHEET FILE= SMA.SHEET
PLOT TIME= 12:52 USER ID= CATIA



CAMBER SHIMS		
PART NUMBER	THK(MM)	CAMBER ANGLE
018 045 001 009	1	0.13
018 045 002 009	2	0.26
018 045 003 009	3	0.39

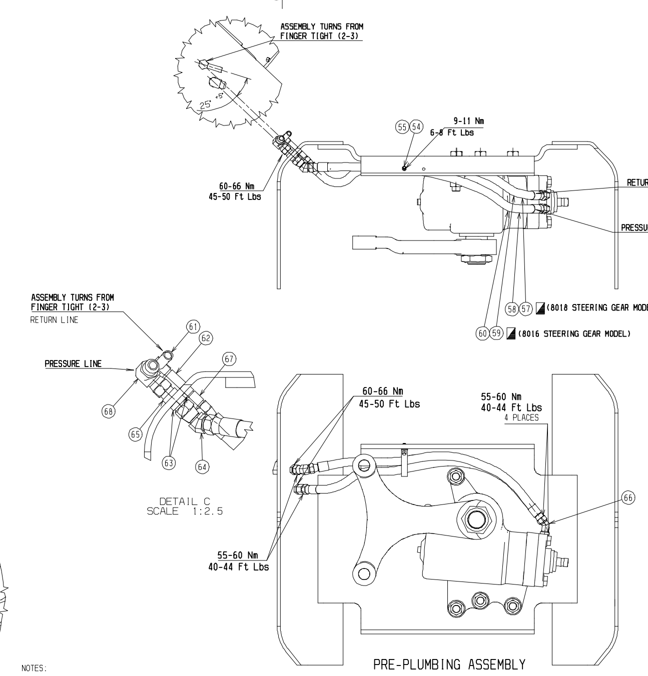


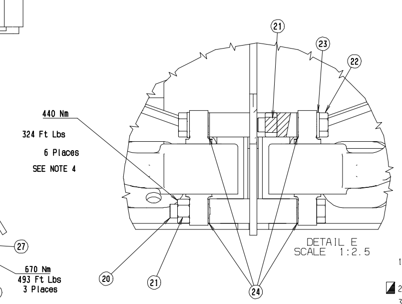


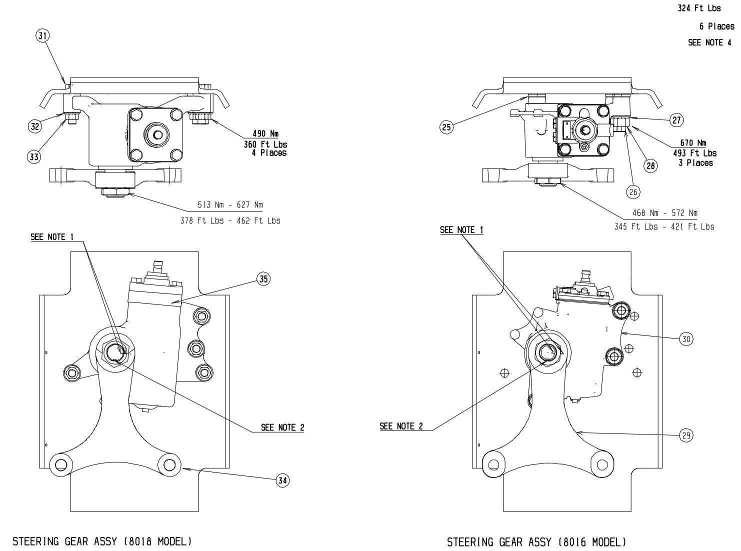
ADJUST ROLLING MOMENT OF THE UCA & LCA BEARING WITH THE SHIMS (SEE TABLE A) DURING THE TIGHTENING, ROTATE THE UCA & LCA BEARING SEVERAL TIMES IN BOTH DIRECTIONS.

ITEM	PART NUMBER	THICKNESS (mm)
24	0730 109 580	1 85
23	0730 109 579	1.825
22	0730 107 837	1 8
21	0730 109 578	1.775
20	0730 107 836	1.75
19	0730 109 577	1.725
18	0730 107 835	1.7
17	0730 109 576	1.675
16	0730 107 834	1.65
15	0730 109 575	1.625
14	0730 107 833	1.6
13	0730 109 574	1.575
12	0730 107 832	1.55
11	0730 109 573	1.525
10	0730 107 831	1.5
9	0730 109 572	1.475
8	0730 107 830	1.45
7	0730 110 529	1 425
6	0730 107 829	1.4
5	0730 110 528	1 375
4	0730 107 828	1.35
3	0730 110 527	1.325
2	0730 107 827	1.3
1	0730 111 645	1.25

TABLE A







NOTES:

1- MARKING ON DROP ARM SHOWING CENTER OF TOOTH GAP.
MARKING ON SECTOR SHAFT SHOWING CENTER OF TOOTH = CENTER LINE OF STEERING GEAR
2- STAKE PITMAN ARM NUT AFTER TORQUE (1.5 mm MINIMUM)
3- APPLY THE MIN TORQUE AND CONTINUE UNTIL ALIGN THE CASTLE NUT GROOVE AND THE TIE ROD HOLE TO ASSEMBLE THE COTTER PIN, BEND THE ENDS OF THE COTTER PIN.
4- TORQUE THE UCA & LCA AT DESIGN HEIGHT (SEE DIM 252.5 MM REF)
5- LUBRICATE WITH GREASE PER SPEC KP2N-35 IN ACCORDANCE TO ISO-L-XCDHB2
6- APPLY LOC-TITE PER SPEC MIL-S-46163A,TYPE II,GRADE O ON THE BOLT THREAD (UCA & LCA) BEFORE TORQUE
7- LEVELING VALVE KIT IS NOT INCLUDED IN THIS ASSY,ONLY IS SHOWN FOR ILUSTRATION
8- PAINT STAMP (WHITE) THE ASSEMBLY PART NUMBER WITH 1/2" TALL LETTERS
9- PUT THE BAR CODE LABEL IN THE BACK SIDE OF THE SUBFRAME IN UPRIGHT VERTICAL
10- ITEM 52 IS ASSEMBLED IN MIRROR IMAGE AS THE ITEM 51 IS SHOWN.
11- AVOID GREASE ON THE DISC BRAKE SURFACES
12- REMOVE PAINT PROTECTION BEFORE ASSEMBLING BRAKE CHAMBER
BRAKE CHAMBER SURFACE MUST BE CLEAN BEFORE ASSEMBLING BRAKE CHAMBER
BRAKE CHAMBER INTERFACE ACCORDING TO KNORR-SPEC C66329
DO NOT REMOVE THE SEALING DIAPHRAGM, IT OPENS AUTOMATICALLY AT CHAMBER ASSEMBLING
13- DEGREASE TAPERED HOLE AND TAPERED PIVOT PRIOR TO ASSEMBLY.
14- SEE LMN 740 FOR CRITICAL CHARACTERISTIC.
(B) 15- TORQUE TOLERANCE, UNLESS NOTED: +/- 10%
(D) 16- AREAS FREE OF PAIT;
Machined surfaces on the wheel end / Stud bolts / Caliper,carrier with pads
Air fitting (Air spring)
Grease fittings
Return beaded adaptor(item 61) / Swivel nut elbow (item 68)
Identification plates and labels.
Input shaft (Steering gear)
* Wheel end seal / ABS sensor components
* Shock absorbers
* In the cleaning and degreasing process avoid any contact of the solvent with the wheel seal and the shock absorber bushings.

	ITEM	PART NUMBER	DESCRIPTION	IFS RL67EM-14.6K 50024-0000	IFS RL67EM-12K 50025-0000	IFS RL67EM-12K 50027-0000	IFS RL67EM-13.2K 50029-0000
(B)	71	50031-8800	GREASE KPN2-35 ACC.TO ISO-L-XCDHB2	160g	160g	160g	160g
	70	50033-8300	LCA - LABEL	2	2	2	2
(A)	69	-	-	-	-	-	-
	68	012 045 012 070	SWIVEL NUT ELBOW, 90 DEGREES	1	1	1	1
	67	012 045 011 070	ORIFICE CONNECTOR, 0.162"	1	1	1	1
	66	012 045 010 070	STRAIGHT THREADED ELBOW, 45 DEGREES	2	2	2	2
	65	012 045 009 070	PRESSURE LINE BULKHEAD	1	1	1	1
	64	012 045 008 070	SWIVEL NUT ELBOW, 45 DEGREES	1	1	1	1
	63	012 045 007 070	BULK HEAD JAM NUT, 3/4-16 UNF 2B	2	2	2	2
	62	012 045 006 070	RETURN LINE BULKHEAD	1	1	1	1
	61	012 045 005 070	RETURN BEADED ADAPTOR, 90 DEGREES	1	1	1	1
	60	012 045 003 070	PRESSURE HOSE ASSEMBLY,12K	-	1	-	-
	59	012 045 001 070	RETURN HOSE ASSEMBLY,12K	-	1	-	-
	58	012 045 004 070	PRESSURE HOSE ASSEMBLY,14.6K	1	-	1	1
	57	012 045 002 070	RETURN HOSE ASSEMBLY,14.6K	1	-	1	1
	56	000 045 002 059	HOSE RETENTION CLAMP	1	1	1	1
	55	10115-9400	LOCKNUT 1/4-20 UNC	1	1	1	1
	54	10115-9000	BOLT 1/4-20 UNC 1.00 GR5	1	1	1	1
(A)	53	-	-	-	-	-	-
	52	50022-8600	IFS UPR BRKT-LEV VALVE,RH	1	1	1	1
	51	50021-8600	IFS UPR BRKT-LEV VALVE,LH	1	1	1	1
(A)	50	-	-	-	-	-	-
	49	016 060 032 035	BOLT 5/8-11 UNC 2.00 GR8	2	2	2	2
	48	12170-9400	LOCK NUT 3/4-10 UNC-2A	2	2	2	2
	47	000 045 004 070	AIR SPRING & FASTENER KIT- FCCC CNSGD	1	1	1	1
	46	10106-9400	LOCKNUT M16 x 1.5 - 10	4	4	4	4
	45	0501 314 934	BRAKE CHAMBER 20" LEFT SIDE	1	-	-	-
	44	0501 314 933	BRAKE CHAMBER 20" RIGHT SIDE	1	-	-	-
	43	0501 321 247	BRAKE CHAMBER 16" LEFT SIDE	-	-	-	1
	42	0501 321 971	BRAKE CHAMBER 16" RIGHT SIDE	-	-	-	1
	41	0501 321 312	BRAKE CHAMBER 14" LETT SIDE	-	1	1	-
	40	0501 321 311	BRAKE CHAMBER 14" RIGHT SIDE	-	1	1	-
	39	005 000 005 034	COTTER PIN 1/8 X 1-3/4"	4	4	4	4
	38	024 000 001 033	CASTLE NUT, M24 X 1.5 -17H DIN 937	4	4	4	4
	37	040 360 014 772-AP	TIE ROD	2	2	2	2
	36	481700000493	SHOCK ABSORBER,FCCC P/N 16-18103-000	2	2	2	2
	35	8018 955 103	STEERING GEAR (8018)	1	-	1	1
	34	7383 012 233	PITMAN ARM (8018)	1	-	1	1
	33	020 060 011 037	NUT M20 X 1.5 GR 10	4	-	4	4
	32	020 060 003 042	WASHER 21 X 37 DIN T2	4	-	4	4
	31	020 060 008 035	BOLT M20 X 1.5 X 90, GR 10.9	4	-	4	4
	30	8016 955 103 A	STEERING GEAR (8016)	-	1	-	-
	29	7374 012 147	PITMAN ARM (8016)	-	1	-	-
	28	022 060 013 037	NUT M22 X 1.5 GR 10	-	3	-	-
	27	022 060 002 042	WASHER 23 X 39 DIN T2	-	3	-	-
	26	022 060 004 035	BOLT M22 X 1.5 110, GR 10.9	-	3	-	-
	25	022 060 004 042	SPACER 7.9 MM	-	3	-	-
	24	018 045 002 009	CAMBER SHIM, 2 MM	8	8	8	8
	23	019 060 003 042	WASHER 19 MM DIN T2 PHOS & OIL	4	4	4	4
	22	018 060 007 035	BOLT M18 X1.5 X 80 GR 10.9	4	4	4	4
	21	018 000 004 037	LOCK NUT M18 X 1.5 GR 10	6	6	6	6
	20	018 060 005 035	BOLT M18 X 1.5 X 190 GR 10.9	2	2	2	2
	19	022 060 002 042	WASHER 23 X 39 DIN T2	4	4	4	4
	18	022 060 014 037	NUT M22 X 1.5 GR 10	4	4	4	4
	17	022 060 003 035	BOLT M22 X 1.5 130, GR 10.9	4	4	4	4
	16	0632 604 008	GREASE FITTING M10X1	4	4	4	4
	15	0730 104 962	WASHER	2	2	2	2
	14	4474 385 031	BUSHING-SPACER	2	2	2	2
	13	4474 385 030	PIN - LCA	2	2	2	2
	12	0737 006 074	HEX NUT M36X1.5	4	4	4	4
	11	4474 385 032	RING	8	8	8	8
	10	0734 317 276	SEAL	8	8	8	8
	9	0750 117 224	ROLLER BEARING	8	8	8	8
	8	0769 123 056	SHIM	8	8	8	8
	7	4474 375 030	BUSHING-SPACER	2	2	2	2
(A)	6	4474 375 075	PIN - UCA	2	2	2	2
	5	055 360 005 622	UPPER CONTROL ARM	4	4	4	4
	4	062 360 025 622	LOWER CONTROL ARM	2	2	2	2
	3	50031-0000	IFS RL66EM-WHEEL END,RH	1	1	1	1
	2	50032-0000	IFS RL66EM-WHEEL END,LH	1	1	1	1
(C)(A)	1	50013-4800	IFS RL66EM SUBFRAME	1	1	1	1

QUANTYTY

Halbzeug / Werkstoff / Semifinished product / Material: -
Gewicht / Weight: - g
SEE PART NUMBER OF THE IFS RL67EM
CAD System CATIA
ZF Lemförder Fahrwerktechnik
IFS RL67EM ASSY INSTRUCTIONS — P-280 — D

1. SUPPLIER: ZF COMMERCIAL SUSPENSION SYSTEMS
LANCASTER, SC 29721

SUPPLIER P/N: P-280

2. DETAILED DRAWING FOR WHEELEND ASSEMBLIES.
ITEMS 2 AND 3, FOUND ON SHEET 2.

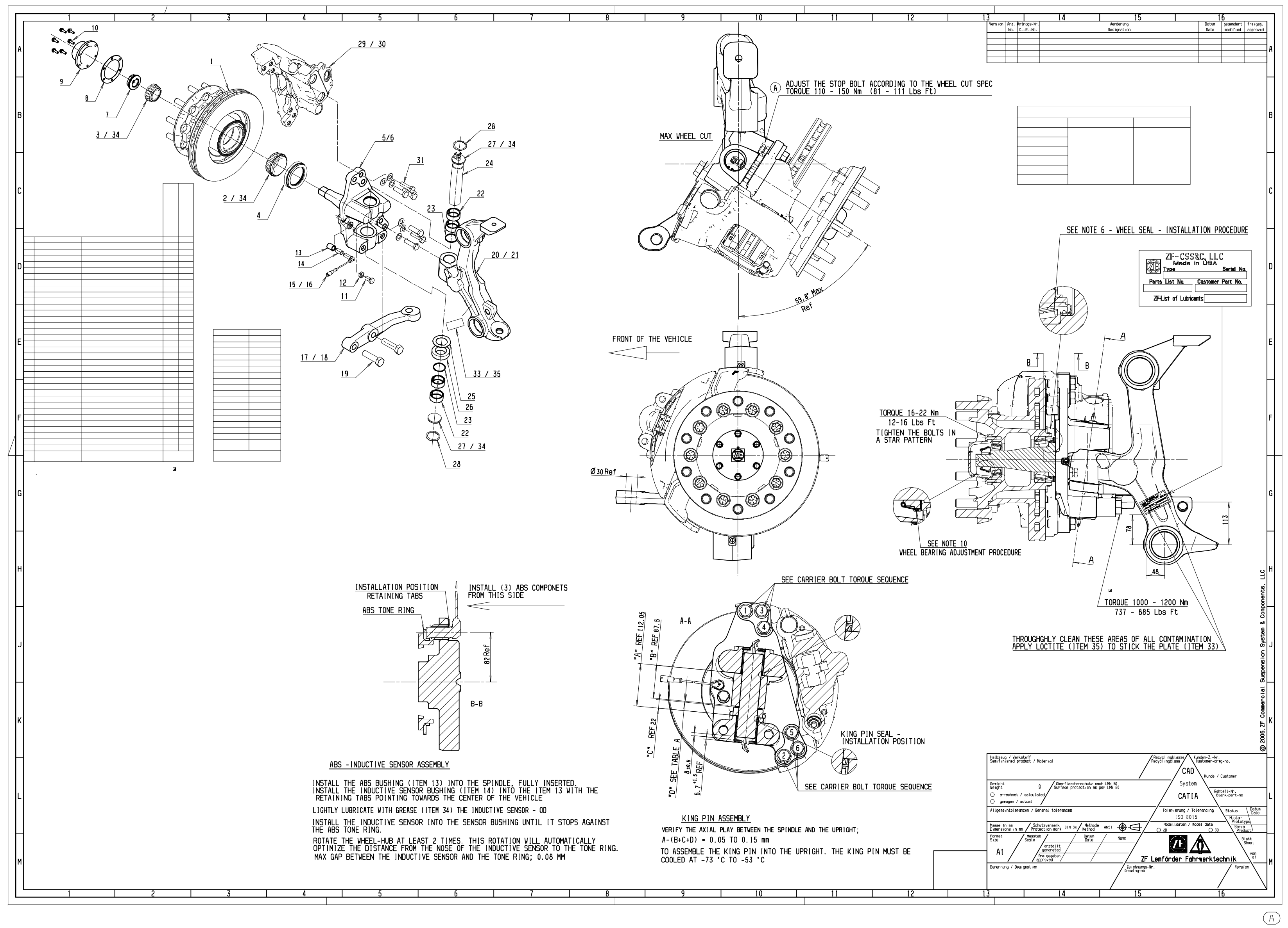
FREIGHTLINER LLC

ASSY-SUPT, FRT, ZFIFS, RL67EM
620A1
D16-18171 — REVISION A — SHEET 1 OF 2

DO NOT SCALE COPIES OF THIS DRAWING

42 X 66

RELEASE NUMBER	REV LTR	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P26951-01	-	XX	INITIAL RELEASE	CBW	09/08/05	MWP
P28218-H7	A	C4	UPDATED TO VENDOR REVISION "D"	M3S	08/24/06	MWP



FREIGHTLINER® LLC

MATERIAL APPROVAL: M.PITSENBERGER	DATE: 09/08/05	UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.
DRAWN BY: C.WAZNY	DATE: 08/24/05	
CHECKED BY: D.HOYLE	DATE: 09/06/05	THIRD ANGLE PROJECTION — UNITS OF MEASURE: MM
RESPONSIBLE ENGINEER: D.HOYLE	DATE: 09/06/05	
APPROVED BY: M.PITSENBERGER	DATE: 09/08/05	MFG ENGR/PURCH AGENT: R BOST — DATE: 09/06/05

DESCRIPTION: ASSY-SUSP, FRT, ZFIFS, RL67EM

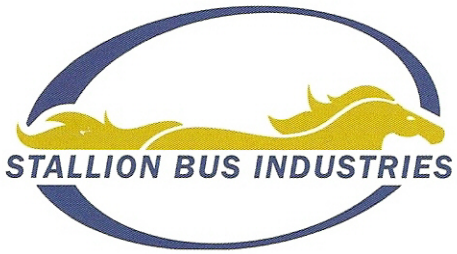
SUPPLEMENTARY DESCRIPTION: 620A1

ITEM/DRAWING NUMBER	REVISION LETTER	SHEET NUMBER
D16-18171	A	2 OF 2

DRAWING NUMBER	REVISION	SHEET	FRAME
D16-18171	A	2	2

DO NOT SCALE COPIES OF THIS DRAWING

42 X 66



6- TRANSMISSION

Operator's Manual

2005 FEBRUARY
Rev. 1 2005 SEPTEMBER
OM3751EN

Allison Transmission

VOCATIONAL MODELS

Pupil Transport/Shuttle Series (PTS) Transmissions

3000 Product Family
WTEC III Controls and Allison 4th Generation Controls

3000 PTS

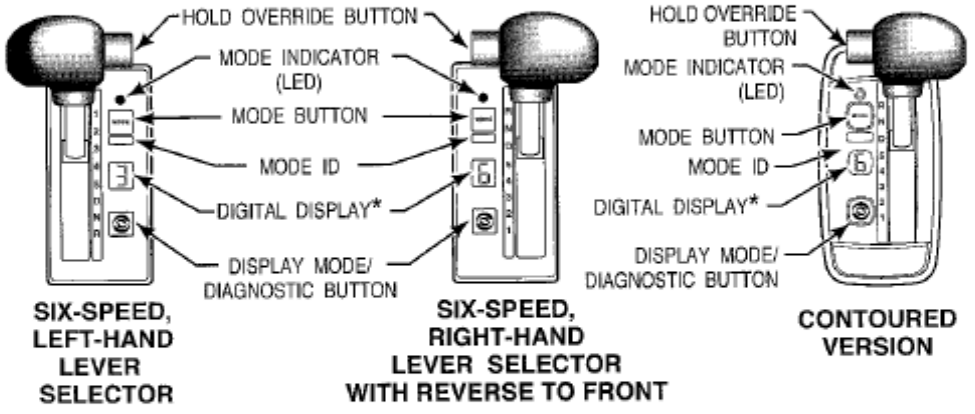
Allison Transmission
Allison Transmission, General Motors Corporation
P.O. Box 894 Indianapolis, Indiana 46206-0894
www.allisontransmission.com

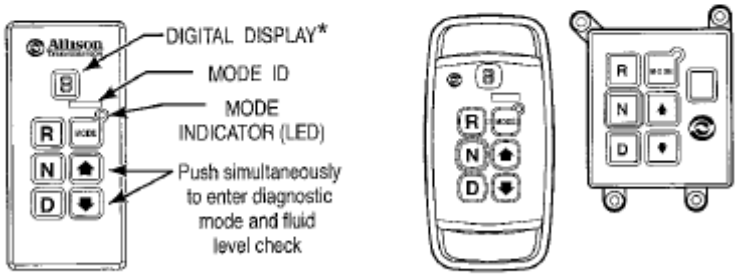
Printed in USA

PUPIL TRANSPORT/SHUTTLE SERIES

SHIFT SELECTORS

DESCRIPTION OF AVAILABLE TYPES





PUSHBUTTON SELECTORS

*** NOTE:** *Number displayed is highest forward range available in selected position. Visually check to confirm range selected. If display is flashing, shift is inhibited.*

V07343.01.02

Figure 5. WTEC III Shift Selectors

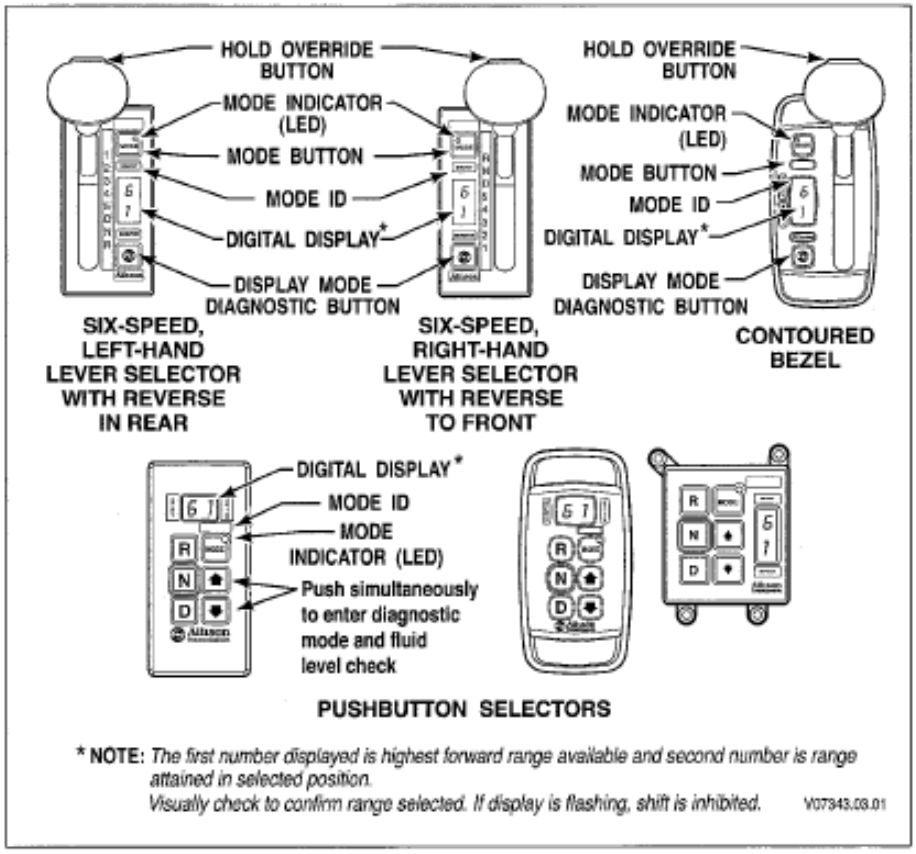


Figure 6. Allison 4th Generation Controls Shift Selectors

INTRODUCTION

Vehicle manufacturers may choose different types of shift selectors for their vehicles. The shift selector in your Allison-equipped vehicle will be similar to one of the pushbutton or lever styles shown above.

With an Allison-equipped vehicle, it is not necessary to select the right moment to upshift or downshift during changing road and traffic conditions. The Allison Pupil Transport/Shuttle Series transmission does it for you. However, knowledge of the shift selector positions, available ranges, and when to select them, make vehicle control and your job even easier. Select lower ranges when descending long grades (with or without retarder) to reduce wear on service brakes. Refer to the Range Selection table at the end of this section for related information.

LEVER SHIFT SELECTOR

General Description. The lever shift selector (refer to Figure 5 and Figure 6) is an electro-mechanical control. Typical lever positions are:

- **R** (Reverse)
- **N** (Neutral)
- **D** (Drive)
- Some number of lower forward range positions

Pupil Transport/Shuttle Series transmissions can be programmed to have up to six forward ranges. Shift selector positions should agree with the programming of the TCM/ECU unit.

The lever selector includes the following:

- **HOLD OVERRIDE** button
- **MODE** button
- Digital display
- **DISPLAY MODE/DIAGNOSTIC** button

HOLD OVERRIDE Button. The lever shift selector has three locked positions to prevent accidentally selecting **R** (Reverse), **N** (Neutral), or **D** (Drive). Select **R** (Reverse), **N** (Neutral), or **D** (Drive) by pressing the **HOLD OVERRIDE** button and moving the lever to the desired position. Once **D** (Drive) is selected, lower forward range positions may be selected without pressing the **HOLD OVERRIDE** button.

MODE Button. The **MODE** button can allow the driver to enable a secondary shift schedule or other special functions that have been programmed into the TCM/ECU unit at the request of the OEM. For example, an emergency vehicle OEM may have provided a secondary shift schedule for improved fuel economy. The name of the special function (ECONOMY) appears on the MODE ID label adjacent to the **MODE** button. Pressing the **MODE** button activates the ECONOMY shift schedule and illuminates the MODE INDICATOR (LED).

When the Diagnostic Display Mode has been entered, the **MODE** button is used to view and toggle through diagnostic code information. After viewing the first diagnostic code which appears in the digital display, press the **MODE** button to view the 2nd diagnostic code logged. Repeat this procedure to view the 3rd, 4th, and 5 th code positions. The code displayed is active if the MODE INDICATOR (LED) is illuminated.

NOTE: Visually check the digital display whenever the lever is moved to be sure the range selected is shown. **N** should appear in the digital display if the **N** (Neutral) button is pressed.

Digital Display. During normal operation, if **D** (Drive) is selected, the digital display shows the highest forward range attainable for the shift schedule in use.

Abnormal operation is indicated by the WTEC III digital display as follows:

- When all segments of the digital display are illuminated for more than 12 seconds, the ECU did not complete initialization.
- When the digital display is blank, there is no power to the selector.
- When the display shows a "^\/\" (cateye), a selector-related fault code has been logged.
- Conditions which illuminate the **CHECK TRANS** light disable the shift selector and the digital display displays the range actually attained. For a detailed explanation, refer to the CHECK TRANS LIGHT paragraph in the DRIVING TIPS section.

Abnormal operation is indicated by the Allison 4th Generation Controls digital display as follows:

- When all segments of the digital display are illuminated, the shift selector did not complete initialization.
- When both digital displays remain blank for 10 seconds after initialization and then show a "^\/\" (cateye), the shift selector is unable to communicate with the TCM or has experienced an internal fault.
- When the display shows a "^\/\" (cateye), a selector-related fault code has been logged.
- Conditions which illuminate the **CHECK TRANS** light disable the shift selector. The SELECT digit is blank and the MONITOR digit displays the range actually attained. For a detailed explanation, refer to the CHECK TRANS LIGHT paragraph in the DRIVING TIPS section.

The transmission will not shift into range if a **CHECK TRANS** code is active. When the display shows **R** or **D** has been requested and the display is flashing, the requested range has not been achieved due to an inhibit function.

Some inhibit functions are vehicle-related and do not result in diagnostic codes. Some examples are mentioned in the Range Selection tables at the end of this Section.

Check for active codes if no other inhibit function has been located. Once **D** (Drive) is attained, the transmission will shift into the lowest range programmed for the **D** (Drive) position, usually first-range.

Display Mode/Diagnostic Button. The **DISPLAY MODE/DIAGNOSTIC** button allows access to optional fluid level check information and diagnostic code information. Press the **DISPLAY MODE/DIAGNOSTIC** button once to obtain transmission fluid level information and a second time to obtain diagnostic code information.

PUSHBUTTON SHIFT SELECTOR

General Description. The pushbutton shift selector (refer to Figure 5 and Figure 6) has the following:

- **R** (Reverse)—Press this button to select Reverse.
- **N** (Neutral)—Press this button to select Neutral.
- **D** (Drive)—Press this button to select Drive. The highest forward range available will appear in the digital display window. The transmission will start out in the lowest available forward range and advance automatically to the highest range.
- **↑ (Up) Arrow**—Press the ↑ (Up) Arrow when in **DRIVE** to request the next higher range. Continuously pressing the ↑ (Up) Arrow will request the highest range available.
- **↓ (Down) Arrow**—Press the ↓ (Down) Arrow when in **DRIVE** to request the next lower range. Continuously pressing the ↓ (Down) Arrow will request the lowest range available.
- **MODE Button and Display Mode/Diagnostic Button**—This is the same function as described previously in the LEVER SHIFT SELECTOR paragraph, **MODE Button** paragraph.

NOTE: The oil level sensor is a standard feature on Pupil Transport/Shuttle Series transmissions. Fluid level information is displayed after pressing both the ↑ (Up) and ↓ (Down) arrow buttons simultaneously. Simultaneously press both buttons again to obtain diagnostic data.

Refer to the Care And Maintenance section, FLUID LEVEL CHECK USING PUSHBUTTON OR LEVER SHIFT SELECTOR for more information about fluid level data. Refer to the Driving Tips section, DIAGNOSTIC CODES and DIAGNOSTIC CODE DISPLAY PROCEDURE, for more information about diagnostic codes and display procedure.

Refer to the Allison Transmission® section of your Stallion Bus Maintenance Manual for diagnostic code details.

TRANSMISSION

RANGE SELECTION

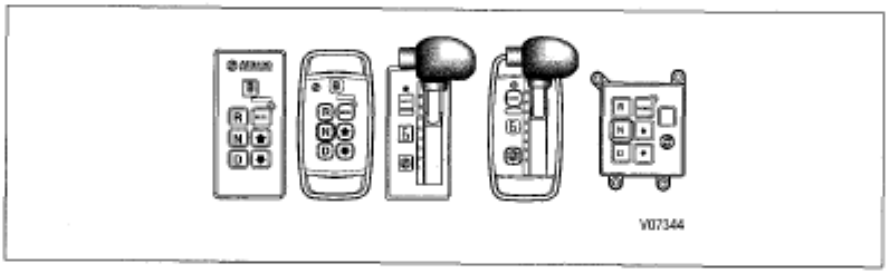


Figure 7. Typical Pupil Transport/Shuttle Series Shift Selectors (WTEC III Controls)

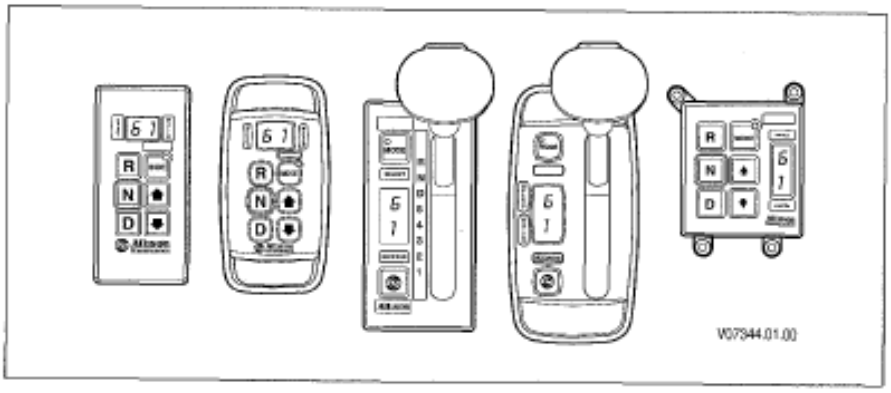


Figure 8. Typical Pupil Transport/Shuttle Series Shift Selectors (Allison 4th Generation Controls)

TRANSMISSION

PUSHBUTTON AND LEVER SHIFT SELECTORS WITH DIGITAL DISPLAY

Description of Available Ranges (refer to Figure 7 and Figure 8)

WARNING: If you leave the vehicle and the engine is running, the vehicle can move unexpectedly and you or others could be injured. If you must leave the engine running, do not leave the vehicle until you have completed all of the following procedures:

1. Put the transmission in **N** (Neutral).
2. Be sure the engine is at low idle (500–800 rpm).
3. Apply the parking brakes and emergency brake and make sure they are properly engaged.
4. Chock the wheels and take any other steps necessary to keep the vehicle from moving.

WARNING: R (Reverse) may not be attained due to an active inhibitor. Always apply the service brakes when selecting **R** (Reverse) to prevent unexpected vehicle movement and because a service brake inhibit may be present. When **"R"** is flashing, it indicates the shift to **R** (Reverse) is inhibited. Check for active diagnostic codes if **R** (Reverse) is not attained. See DOWNSHIFT AND DIRECTION CHANGE INHIBITOR FEATURE in the DRIVING TIPS section.

CAUTION: Do not idle in **R** (Reverse) for more than five minutes. Extended idling in **R** (Reverse) can cause transmission overheating and damage. Always select **N** (Neutral) whenever time at idle exceeds five minutes.

NOTE: Visually check the digital display window whenever a button is pushed or the lever is moved to be sure the range selected is shown (i.e., if the **N** (Neutral) button is pressed, **"N"** should appear in the digital display). A flashing display indicates the range selected was not attained due to an active inhibit.

PUSHBUTTON AND LEVER SHIFT SELECTORS WITH DIGITAL DISPLAY *(cont'd)*

Description of Available Ranges (refer to Figure 7 and Figure 8)	
R	Completely stop the vehicle and let the engine return to idle before shifting from a forward range to **R** (Reverse) or from **R** (Reverse) to a forward range. The digital display will display **"R"** when **R** (Reverse) is selected.
	**WARNING:** When starting the engine, make sure the service brakes are applied. Failure to apply the service brakes can result in unexpected vehicle movement.
	**WARNING:** Vehicle service brakes, parking brake, or emergency brake must be applied whenever **N** (Neutral) is selected to prevent unexpected vehicle movement. Selecting **N** (Neutral) does not apply vehicle brakes, unless an auxiliary system to apply the parking brake is installed (see the Operator's Manual for the vehicle).
	**WARNING:** If you let the vehicle coast in **N** (Neutral), there is no engine braking and you could lose control. Coasting can also cause severe transmission damage. To help avoid injury and property damage, do not allow the vehicle to coast in **N** (Neutral).
N	Use **N** (Neutral) when starting the engine, to check vehicle accessories, and for extended periods of engine idle operation (longer than five minutes). For vehicles equipped with the pushbutton selector, **N** (Neutral) is selected by the ECU during start-up. For vehicles equipped with the lever selector, the vehicle will not start unless **N** (Neutral) has been selected. If the vehicle starts in any range other than **N** (Neutral), seek service immediately. **N** (Neutral) is also used during stationary operation of the power takeoff (if the vehicle is equipped with a PTO). The digital display will show **"N"** when **N** (Neutral) is selected. Always select **N** (Neutral) before turning off the vehicle engine.

PUSHBUTTON AND LEVER SHIFT SELECTORS WITH DIGITAL DISPLAY *(cont'd)*

Description of Available Ranges (refer to Figure 7 and Figure 8)	
	**WARNING:** **D** (Drive) may not be attained due to an active inhibitor. Always apply the service brakes when selecting **D** (Drive) to prevent unexpected vehicle movement and because a service inhibit may be present. When **"D"** is flashing, it indicates the shift to **D** (Drive) is inhibited. Check for active diagnostic codes if **D** (Drive) is not attained. See DOWNSHIFT AND DIRECTION CHANGE INHIBITOR FEATURE in the DRIVING TIPS section.
	**CAUTION:** Do not idle in **D** (Drive) or any forward range for more than five minutes. Extended idling in **D** (Drive) can cause transmission overheating and damage. Always select **N** (Neutral) whenever time at idle exceeds five minutes.
	**NOTE:** Turn off the vehicle HIGH IDLE switch, if present, before shifting from **N** (Neutral) to **D** (Drive) or **R** (Reverse). **D** (Drive) or **R** (Reverse) will not be attained unless the shift is made with the engine at idle. Also, be aware of other interlocks that would prevent attaining **D** (Drive) or **R** (Reverse). Examples are "wheelchair lift not stored" and "service brakes not applied" (service brake interlock present).
D	The transmission will initially attain first-range when **D** (Drive) is selected (except for those units programmed to start in second-range). As vehicle speed increases, the transmission will upshift automatically through each range. As the vehicle slows, the transmission will downshift automatically through each range. The digital display will show the highest range available in **D** (Drive).
	**WARNING:** The transmission incorporates a hold feature to prohibit upshifting above the range selected during normal driving. For downhill operation, select a lower transmission range. If the engine governed speed is exceeded in the held range, however, the transmission will upshift to the next higher range to prevent engine damage. To avoid injury and/or property damage due to loss of vehicle control, use the vehicle brakes to prevent exceeding engine governed speed in the held range.

PUSHBUTTON AND LEVER SHIFT SELECTORS WITH DIGITAL DISPLAY *(cont'd)*

Description of Available Ranges (refer to Figure 7 and Figure 8)	
6* 5* 4* 3 2	Lower ranges provide greater engine braking for going down grades (the lower the range, the greater the braking effect). Occasionally, it may be desirable to restrict automatic shifting to a lower range because of: • Road conditions. • Load. • Traffic conditions. • Etc. The pushbutton shift selector arrow buttons access individual forward ranges. Push the ↑ (Up) or ↓ (Down) arrow for the desired range. The digital display shows the range chosen. Even though a lower range is selected, the **transmission may not downshift** until vehicle speed is reduced (this prevents excessive engine speed in the lower range).
1	First-range provides the vehicle with its maximum driving torque and engine braking effect. Use first-range when: • Pulling through mud and deep snow. • Maneuvering in tight spaces. • Driving up or down steep grades. For vehicles equipped with the pushbutton selector, push the ↓ (Down) arrow until first-range appears in the select window.
* Actual ranges available depend on programming by vehicle manufacturer.	

PUPIL TRANSPORT/SHUTTLE SERIES

DRIVING TIPS

CHECK TRANS LIGHT

The electronic control system is programmed to inform the operator of a problem with the transmission system and automatically take action to protect the operator, vehicle, and transmission. When the Electronic Control Unit (ECU) or the Transmission Control Module (TCM) detects a problem condition, the TCM/ECU:

- Restricts shifting.
- Illuminates the **CHECK TRANS** light on the instrument panel.
- Registers a diagnostic code.

NOTE: For some problems, diagnostic codes may be registered without the TCM/ECU activating the **CHECK TRANS** light. Your Allison Transmission authorized service outlet should be consulted whenever there is a transmission-related concern. They have the equipment to check for diagnostic codes and to correct problems which arise.

Each time the engine is started, the **CHECK TRANS** light will illuminate, then turn off after a few seconds. This momentary lighting is to show that the status light circuits are working properly. If the **CHECK TRANS** light does not illuminate during ignition, or if the light remains on after ignition, the system should be checked immediately.

Continued illumination of the **CHECK TRANS** light during vehicle operation (other than start-up) indicates that the TCM/ECU has signaled a diagnostic code. Illumination of the **CHECK TRANS** light is accompanied by a flashing display from the shift selector. The shift selector display will show the actual range attained and the transmission will not respond to shift selector requests.

Indications from the shift selector are provided to inform the operator the transmission is not performing as designed and is operating in the "limp home" mode with reduced capabilities. Before turning off the ignition, the transmission may be operated for a short time in the selected range in order to "limp home" for

service assistance. Service should be performed immediately in order to minimize the potential for damage to the transmission.

When the **CHECK TRANS** light comes on and the ignition switch is turned off, the transmission will remain in **N** (Neutral) until the condition causing the **CHECK TRANS** light is corrected.

Generally, while the **CHECK TRANS** light is on, upshifts and downshifts will be restricted and **direction changes will not occur**. Lever and pushbutton shift selectors **do not respond** to any operator shift requests while the **CHECK TRANS** light is illuminated. The lockup clutch is disengaged when transmission shifting is restricted or during any critical transmission malfunction.

DIAGNOSTIC CODES

Diagnostic Codes Overview. Diagnostic codes are numerical indications relating to a malfunction in transmission operation. These codes are logged in a list in the TCM/ECU memory with the most severe or most recent code listed first. A maximum of five codes (numbered d1–d5) may be listed in memory at one time. As codes are added, the oldest non-active code is dropped from the list. If all codes are active, the code with the lowest priority that is not included on the severity list is dropped from the list.

Diagnostic codes and code information may be accessed through the pushbutton and lever shift selectors or using an Allison DOC™ diagnostic tool.

The TCM/ECU separately stores the active and historical (non-active) codes. An active code is any code that is current in the TCM/ECU decision-making process.

Historical codes are codes that are retained in the TCM/ECU's memory and will not necessarily affect the TCM/ECU decision-making process. Historical codes are useful in determining if a problem:

- Is isolated.
- Is intermittent.
- Results from a previous malfunction.

The TCM/ECU may automatically delete a code from memory if it has not recurred.

If the MODE INDICATOR (LED) is illuminated, the displayed code is active. If the mode indicator (refer to Figure 5 and Figure 6) is not illuminated, the displayed code is not active. An illuminated mode indicator during normal operation signifies secondary mode operation.

Diagnostic Codes—WTEC III Controls. When the diagnostic mode is entered, the first code (position d1) is displayed as follows:

Example—Code 1312:
Displayed as: **d, 1, 1, 3, 1, 2** (each item appears for about one second)

- d1 (code position)—Code position indicates that this is the first diagnostic code listed in the ECU memory.
- 13 (main code)—Main codes (2 digits displayed one-at-a-time) are listed first and provide the general condition or area of a fault detected by the ECU.
- 12 (subcode)—Subcode (2 digits displayed one-at-a-time) are listed second and provide specific areas or conditions within the main code that cause the fault. This subcode indicates the problem is caused by low voltage.

Diagnostic Codes—Allison 4th Generation Controls. When the diagnostic mode is entered, the first code (position d1) is displayed as follows:

Example—Code P0722:
Displayed as: **d1, P, 07, 22**
The code list position is the first item displayed, followed by the DTC. Each item is displayed for about one second. The display cycles continuously until the next code list position is accessed by pressing the **MODE** button. The following example shows how DTC P0722 is displayed on the pushbutton and lever shift selectors.

SELECT	MONITOR
d	1
	P
0	7
2	2

- d1 (code list position)—The position which a code occupies in the code list. Positions are displayed as "d1" through "d5" (Code List Position 1 through Code List Position 5).
- P0722 (DTC)—The diagnostic trouble code number referring to the general condition or area of fault detected by the TCM.

DIAGNOSTIC CODE DISPLAY PROCEDURE

Diagnostic codes can be read and cleared by two methods:

- Using an Allison DOC™ diagnostic tool. For specific instructions on how to use an Allison DOC™ diagnostic tool, refer to the User Guide.
- Using the pushbutton or lever shift selector.

TRANSMISSION

ACCELERATOR CONTROL

WARNING: To help avoid injury or property damage caused by sudden movement of the vehicle, do not make shifts from **N** (Neutral) to **D** (Drive) or **R** (Reverse) when the throttle pedal is depressed. If you shift while the throttle pedal is depressed too far, the transmission will only engage if the throttle pedal is released in the next three seconds. This may cause a sudden movement of the vehicle. Leaving the throttle pedal depressed longer than three seconds causes the transmission to remain in **N** (Neutral). Avoid this condition by making shifts from **N** (Neutral) to **D** (Drive) or **R** (Reverse) only when the throttle is closed.

The position of the accelerator pedal influences when automatic shifting occurs. An electronic throttle position signal tells the TCM/ECU how much the operator has depressed the pedal. When the pedal is fully depressed, upshifts will occur automatically at high engine speeds. A partially depressed position of the pedal will cause upshifts to occur at lower engine speeds. Excessive throttle position affects directional changes—shifts from **N** (Neutral) to **D** (Drive) or **R** (Reverse).

DOWNSHIFT AND DIRECTION CHANGE INHIBITOR FEATURE

NOTE: Turn off the vehicle HIGH IDLE switch, if present, before shifting from **N** (Neutral) to **D** (Drive) or **R** (Reverse). The shift from **N** (Neutral) to **D** (Drive) or **R** (Reverse) is inhibited when engine speed is above idle.

There is no speed limitation on upshifting, but there is a limitation on downshifting and for shifts that cause a direction change such as **D** (Drive)-to-**R** (Reverse) or **R** (Reverse)-to-**D** (Drive).

Manual range downshifts will not occur until a calibration output speed (preset) is reached. When a range downshift is manually selected and the transmission output speed is above the calibration speed, the transmission will stay in the range it was in even though a lower range was requested. Apply the vehicle service brakes or a retarding device to reduce the transmission output speed to the calibration speed and then the shift to the lower range will occur.

Directional shifts, **D** (Drive)-to-**R** (Reverse) or **R** (Reverse)-to-**D** (Drive), will not occur if selected when throttle position, engine speed, or transmission output speed is above the calibration limit for a calibration time period. The current calibration time period for engine speed is 0.5 seconds and for throttle position and output speed is three seconds.

Shifts from **N** (Neutral)-to-**D** (Drive) or **N** (Neutral)-to-**R** (Reverse) are also inhibited when the TCM/ECU has been programmed (by input/output function) to detect that auxiliary equipment is in operation and the shift should not be allowed.

When directional change shifts are inhibited, the TCM/ECU will put the transmission in **N** (Neutral) and the digital display, if present, will flash the letter of the range selected (D or R). To reselect **D** (Drive) or **R** (Reverse) when engine throttle, engine speed, and transmission output speed are below the calibration value:

- Pushbutton selector—Press the desired pushbutton again.
- Lever selector—Move the lever to **N** (Neutral) and then to the desired range.

When a direction change shift is requested and engine throttle, engine speed, and transmission output speed drop below the calibration value during the calibration time interval, the shift to **D** (Drive) or **R** (Reverse) will occur.

For example, if the transmission output speed was just above the calibration limit when **R** (Reverse) was selected, but dropped below the limit during the next three seconds, the shift to **R** (Reverse) would occur (assuming the engine was at idle and the throttle was closed).

USING THE ENGINE TO SLOW THE VEHICLE

> **WARNING:** To avoid loss of control, use a combination of downshifting, braking, and other retarding devices. Downshifting to a lower transmission range increases engine braking and can help you maintain control. The transmission has a feature to prevent automatic upshifting above the lower range selected. However, during downhill operation, if engine governed speed is exceeded in the lower range, the transmission will upshift to the next higher range to prevent engine damage. This will reduce engine braking and could cause a loss of control. Apply the vehicle brakes or other retarding device to prevent exceeding engine governed speed in the lower range selected.

Engine braking provides good speed control for going down grades. When the vehicle is heavily loaded, or the grade is steep, it may be desirable to preselect a lower range before reaching the grade. If engine-governed speed is exceeded, the transmission will upshift automatically to the next range.

To use the engine as a braking force, select the next lower range. If the vehicle is exceeding the maximum speed for this range, use the service brakes and/or retarder to slow the vehicle. When a lower speed is reached, the TCM/ECU will automatically downshift the transmission.

TRANSMISSION

NOTE: CUMMINS ENGINE COMES EQUIPED WITH AN EXHAUST BRAKE IN LIEU OF TRANSMISSION RETARDER.

NOTE: Transmission fluid level must be set correctly for highest retarder effectiveness. As much as 2 liters (2 quarts) too high or too low can reduce retarder effectiveness and increase transmission temperature.

RANGE PRESELECTION

NOTE: Preselecting during normal operation may result in reduced fuel economy.

Range preselection means selecting a lower range to match driving conditions encountered or expect to be encountered. Learning to take advantage of preselected shifts will give you better control on slick or icy roads and on downgrades.

Downshifting to a lower range increases engine braking. The selection of a lower range often prevents cycling between that range and the next higher range on a series of short up-and-down hills.

COLD WEATHER STARTS

All Pupil Transport/Shuttle Series transmissions are programmed to restrict full operation until specific fluid temperatures are reached. Refer to the following table for temperature restrictions.

Minimum Fluid Operating Temperatures

Sump Fluid Temperature	CHECK TRANS Light	Operation
–32°C (–25°F) to –7°C (19°F)	OFF	Neutral, Reverse, Second
–7°C (19°F)	OFF	Full operation in all ranges

NOTE: When sump temperature is below 10°C (50°F) and transmission fluid is C4 (**not DEXRON® or TranSynd™**), follow these procedures when making directional shift changes:

- To shift from forward to reverse, select **N** (Neutral) and then **R** (Reverse).
- To shift from reverse to forward, select **N** (Neutral) and then **D** (Drive) or other forward range.

Failure to follow these procedures may cause illumination of the **CHECK TRANS** light and the transmission will be restricted to **N** (Neutral).

TRANSMISSION

Transmission operation at cold ambient temperatures may require preheating or the use of a lower viscosity transmission fluid. Refer to RECOMMENDED AUTOMATIC TRANSMISSION FLUID AND VISCOSITY GRADE in the Care And Maintenance section.

DRIVING ON SNOW OR ICE

WARNING: Using the retarder on wet or slippery roads may cause loss of traction on the drive wheels—your vehicle may slide out of control. To help avoid injury or property damage, turn the retarder enable to OFF when driving on wet or slippery roads.

NOTE: The retarder is automatically disabled whenever the vehicle ABS is active. However, in case the anti-lock brake system (ABS) malfunctions, it is recommended that the retarder enable switch, if present, be disabled.

If possible, reduce vehicle speed and select a lower range before losing traction. Select the range that will not exceed the speed expected to be maintained.

Accelerate or decelerate very gradually to prevent the loss of traction. It is very important to decelerate gradually when a lower range is selected. It is important that you reach the selected lower range before attempting to accelerate. This will avoid an unexpected downshift during acceleration.

ROCKING OUT

WARNING: To help avoid injury or property damage caused by sudden movement of the vehicle, do not make shifts from **N** (Neutral) to **D** (Drive) or **R** (Reverse) when the throttle is open. The vehicle will lurch forward or rearward and the transmission can be damaged. Avoid this condition by making shifts from **N** (Neutral) to a forward range or **R** (Reverse) only when the throttle is closed and the service brakes are applied.

CAUTION: DO NOT make **N** (Neutral) to **D** (Drive) or directional shift changes when the engine rpm is above idle. Also, if the wheels are stuck and not turning, do not apply full power for more than 10 seconds in either **D** (Drive) or **R** (Reverse). Full power for more than 10 seconds under these conditions will cause the transmission to overheat. If the transmission overheats, shift to **N** (Neutral) and operate the engine at 1200–1500 rpm until it cools (2–3 minutes).

TRANSMISSION

If the vehicle is stuck in deep sand, snow, or mud, it may be possible to rock it out using the following procedure:

1. Shift to **D** (Drive) and apply steady, light throttle (**never full throttle**).
2. When the vehicle has rocked forward as far as it will go, apply and hold the vehicle service brakes.
3. When engine has returned to idle, select **R** (Reverse).
4. Release the brakes and apply a steady, light throttle allowing the vehicle to rock in **R** (Reverse) as far as it will go.
5. Again, apply and hold the service brakes and allow the engine to return to idle.

This procedure may be repeated in **D** (Drive) and **R** (Reverse) if each directional shift continues to move the vehicle a greater distance. **Never** make **N** (Neutral)-to-**D** (Drive) or directional shift changes when the engine rpm is above idle.

HIGH FLUID TEMPERATURE

The transmission is considered to be overheated when any of the following temperatures are exceeded:

Sump fluid	121°C (250°F)
Fluid to cooler	149°C (300°F)
Retarder out fluid	165°C (330°F)

If the transmission overheats during normal operations, check the fluid level in the transmission. Refer to the fluid level check procedures described in the CARE AND MAINTENANCE section.

CAUTION: The engine should never be operated for more than 10 seconds at full throttle with the transmission in range and the output stalled. Prolonged operation of this type will cause the transmission fluid temperature to become excessively high and will cause severe overheat damage to the transmission.

If the engine temperature gauge indicates a high temperature, the transmission is probably overheated. Stop the vehicle and check the cooling system. If it appears to be functioning properly, run the engine at 1200–1500 rpm with the transmission in **N** (Neutral). This should reduce the transmission and engine temperatures to normal operating levels in 2 or 3 minutes. If temperatures do not decrease, reduce the engine rpm.

TRANSMISSION

If the engine temperature indicates a high temperature, an engine or radiator problem is indicated. If high temperature in either the engine or transmission persists, stop the engine and have the overheating condition investigated by maintenance personnel.

PARKING BRAKE

WARNING: If you leave the vehicle and the engine is running, the vehicle can move unexpectedly and you or others could be injured. If you must leave the engine running, **DO NOT LEAVE** the vehicle until you have completed all of the following procedures:

- Put the transmission in **N** (Neutral).
- Be sure the engine is at low idle (500–800 rpm).
- Apply the parking brake and emergency brake and make sure they are properly engaged.
- Chock the wheels and take other steps necessary to keep the vehicle from moving.

The parking brake is only intended to secure an unattended vehicle with the engine ignition **OFF**. Always maintain the vehicle parking brake system according to the manufacturer's specifications. The parking brake may not have sufficient capacity to restrain a vehicle with the engine running and the transmission in a forward or reverse-range. When the vehicle is unattended and the engine is in operation, the transmission **must be in N** (Neutral) with the **brakes fully applied** and the **wheels chocked**.

TOWING OR PUSHING

CAUTION: Failure to lift the driving wheels off the road, disconnect the driveline, or remove the axle shafts before pushing or towing can cause serious transmission damage.

The engine cannot be started by pushing or towing. Before pushing or towing a vehicle do one of the following:

- Disconnect the driveline.
- Lift the drive wheels off the road.
- Remove the axle shafts from the drive wheels.

An auxiliary air supply will usually be required to actuate the vehicle brake system.

When the axle shafts are removed, be sure to cover the wheel openings to prevent loss of lubricant and entry of dust and dirt.

TRANSMISSION

TURNING OFF THE VEHICLE

Always select **N** (Neutral) prior to turning off the vehicle engine.

PRIMARY/SECONDARY SHIFT SCHEDULES

The points at which shifts occur depend upon predetermined speeds and other operating conditions. A transmission "shift calibration" includes several sets of shift points which may be used according to current or anticipated operating conditions. Some shift schedules may be inhibited as a result of operating conditions, such as engine or transmission fluid temperature. Shift schedules may be changed using the **MODE** button (some applications may use a dash-mounted switch)—which is typically associated with a change in anticipated vehicle operation.

The TCM includes the capacity for two separate and distinct shift calibrations (customer-selectable), one for use in "Primary Mode" of operation and one in "Secondary Mode."

- **Primary**—This shift schedule is typically used for all normal vehicle operations.
- **Secondary**—This is an alternate shift schedule that the TCM uses upon request. Not all vehicles will be equipped with a secondary shift schedule. The request can be interlocked with a vehicle component, or be operator-controlled using the **MODE** button.

Your vehicle may have a dash-mounted light that illuminates when the secondary mode is active.

CRUISE CONTROL OPERATION

Operating an Allison WTEC III Controls or Allison 4th Generation Controls-equipped vehicle on cruise control may cause the transmission to shift cycle if the cruise control speed setting is set too close to a scheduled shift point. One of the following actions may eliminate shift cycling:

- Select the secondary shift schedule by pushing the **MODE** button (refer to Figure 5 or Figure 6) on the shift selector.
- Select a lower range by pushing the ↓ (Down) arrow or moving the lever on the shift selector.
- Change the cruise control setting away from the shift point.

Some vehicles equipped with an engine brake and an Allison WTEC III Controls or Allison 4th Generation Controls-equipped transmission will have the engine brake controlled by the TCM/ECU. This is done so the transmission will automatically select a lower range when the engine brake is turned on and the throttle is near idle position.

TRANSMISSION

Operating a vehicle on cruise control with the engine brake turned on and controlled by the transmission TCM/ECU, may cause an unwanted application of the engine brake when the cruise control decelerates for downhill grades. Eliminate this condition by turning off the engine brake while operating the vehicle on cruise control.

PUPIL TRANSPORT/SHUTTLE SERIES

CARE AND MAINTENANCE

PERIODIC INSPECTIONS

Careful attention to the fluid level and connections for the electronic and hydraulic circuits is very important.

For easier inspection, the transmission should be kept clean. Make regular periodic inspections and check:

- For loose bolts.
- For leaking fluid around fittings, lines, and transmission openings.
- The condition of the electrical harnesses.
- The engine cooling system for presence of transmission fluid and check the transmission fluid for presence of coolant, which would indicate a faulty oil cooler.
- The breather (refer to Figure 3 and Figure 4) to make sure it is clean and free from dirt or debris.

Report any abnormal condition to service management.

PREVENT MAJOR PROBLEMS

Help Allison 4th Generation Controls or WTEC III Controls oversee the operation of the transmission. Minor problems can be kept from becoming major problems if an Allison Transmission distributor or dealer is notified when one of these conditions occur:

- Shifting feels odd.
- Transmission leaks fluid.
- Unusual transmission-related sounds (changes in sound caused by normal engine thermostatic fan cycling, while climbing a long grade with a heavy load, have been mistaken for transmission-related sounds).
- **CHECK TRANS** light comes on frequently.

TRANSMISSION

IMPORTANCE OF PROPER FLUID LEVEL

It is important that the proper fluid level be maintained at all times because the transmission fluid cools, lubricates, and transmits hydraulic power. If the fluid level is too low, the converter and clutches do not receive an adequate supply of fluid. If fluid level is too high, the fluid can aerate. Aerated fluid can cause the transmission to shift erratically or overheat.

Pupil Transport/Shuttle Series transmissions have an oil level sensor (OLS) that allows the operator to obtain an indication of fluid level from the shift selector. However, no oil level sensor diagnostics take place unless the OLS is "autodetected" by Allison 4th Generation Controls or WTEC III Controls.

Frequently check for the presence of oil level diagnostics if the transmission is known to contain an OLS. If an OLS is not detected during a fixed number of engine starts, the WTEC III or Allison 4th Generation Controls system concludes that no OLS is present. If an OLS is known to be present, but has not been detected, then troubleshooting of the OLS circuit is required. After the OLS circuit is repaired, reset "autodetect" or manually select the OLS function using Allison DOC™ For PC–Service Tool. For detailed troubleshooting procedures refer to the Troubleshooting Manual. Refer to the SERVICE LITERATURE section for specific publication numbers.

NOTE: To correctly check the transmission fluid level using the dipstick, the transmission fluid must be at operating temperature.

The oil level sensor method of checking the fluid level compensates for transmission fluid temperature between 60°C–104°C (140°F–220°F). Any temperature below 60°C (140°F) or above 104°C (220°F) will result in an **Invalid for Display** condition.

FLUID LEVEL CHECK USING PUSHBUTTON OR LEVER SHIFT SELECTOR

The transmission must be equipped with the oil level sensor to be able to read fluid level information.

NOTE: WTEC III Controls pushbutton and lever selectors display fluid level diagnostic information one character at a time. Allison 4th Generation Controls pushbutton and lever selectors display fluid level diagnostic information two characters at a time.

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1. Park the vehicle on a level surface, shift to **N** (Neutral), and apply the parking brake.

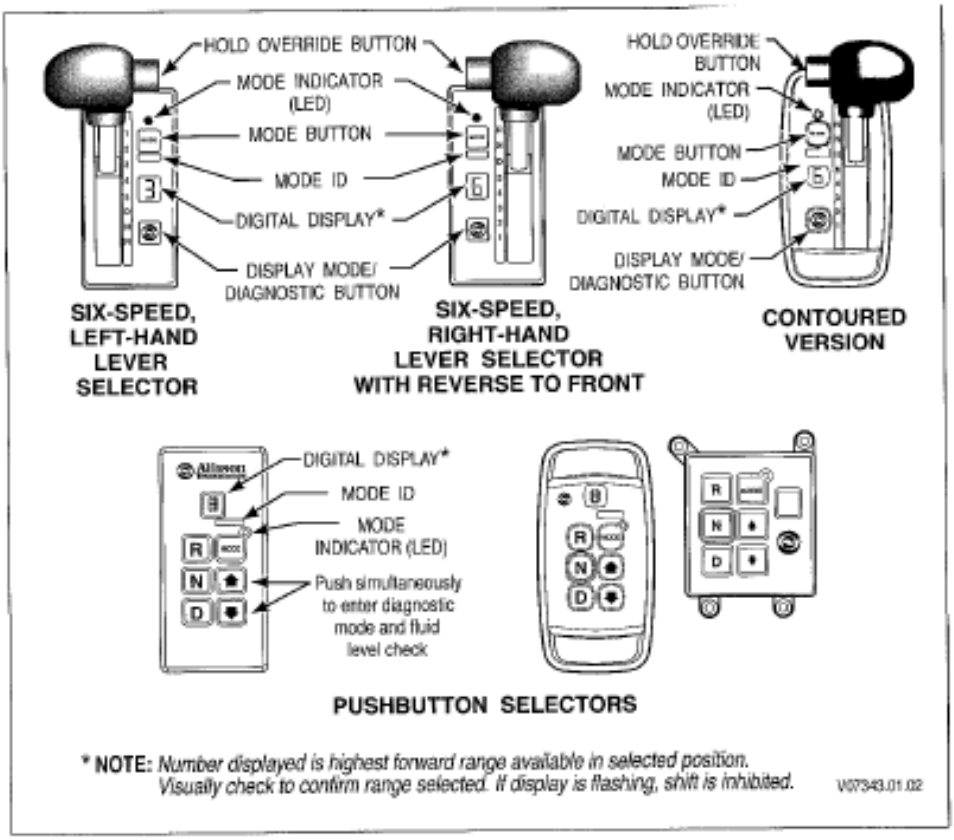


Figure 9. WTEC III Controls Shift Selectors and Pushbutton Selectors

2. **Pushbutton shift selector**—If equipped with an oil level sensor, simultaneously press the ↑ (Up) and ↓ (Down) arrow buttons.
3. **Lever shift selector**—If equipped with an oil level sensor, press the display mode button one time.

NOTE: The fluid level check may be delayed until the following conditions are met:

- The fluid temperature is above 60°C (140°F) and below 104°C (220°F).
- The transmission is in **N** (Neutral).
- The engine is at idle.
- The transmission output shaft is stopped.
- The vehicle has been stationary for approximately two minutes to allow the fluid to settle.

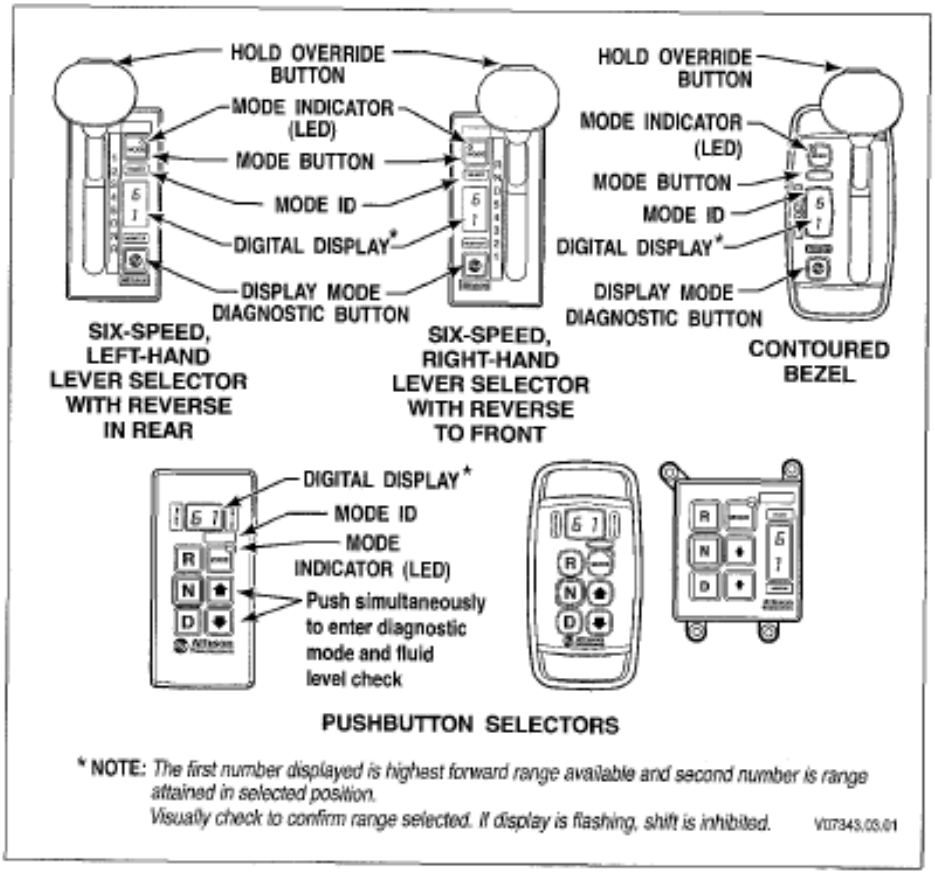


Figure 10. Allison 4th Generation Controls Shift Selectors and Pushbutton Selectors

A delayed fluid level check for transmissions with WTEC III Controls is indicated by a "—" in the display window followed by a numerical countdown. The countdowns, starting at 8, indicates the time remaining in the two minutes setting period.

The indication of a delayed fluid level check for Allison 4th Generation Controls is a flashing display under **SELECT** and a digit countdown from 8 to 1 under **MONITOR**.

- **Correct Fluid Level**—"**o L**" is displayed ("**o L**" represents "Fluid (Oil) Level Check Mode"), followed by "**o K**". The "**o K**" display indicates the fluid is within the correct fluid level zone. The sensor display and the transmission dipstick may not agree exactly because the oil level sensor compensates for fluid temperature.

NOTE: WTEC III Controls displays fluid level diagnostic information one character at a time.

Allison 4th Generation Controls displays fluid level diagnostic information two characters at a time.

- **Low Fluid Level**—"**o L**" is displayed ("**o L**" represents "Fluid (Oil) Level Check Mode"), followed by "**L o**" ("**L o**" represents "Low Oil Level") and the number of quarts the transmission fluid is low.
  Example: **o L L o 0 2**
  Where "2" indicates that 2 additional quarts of fluid will bring the fluid level within the middle of the "**o K**" zone.
- **High Fluid Level**—"**o L**" is displayed ("**o L**" represents "Fluid (Oil) Level Check Mode"), followed by "**H I**" ("**H I**" represents "High Oil Level") and the number of quarts the transmission is overfilled.
  Example: **o L H I 0 1**
  Where "1" indicates 1 quart of fluid above the full transmission level.
- **Invalid for Display** — "**o L**" is displayed ("**o L**" represents "Fluid (Oil) Level Check Mode"), followed by "—" (for WTEC III Controls) or "– –" (for Allison 4th Generation Controls) and a numerical display. The numerical display is a fault code and indicates conditions are not proper to receive the fluid level information, or that there is a system malfunction. The fault codes that may be encountered are shown in the Fluid Level Fault Codes tables:

Fluid Level Fault Codes (for WTEC III Controls)

Display	Cause of Code
o,L, —, 0, X	Settling time too short
o,L, —, 5, 0	Engine speed (rpm) too low
o,L, —, 5, 9	Engine speed (rpm) too high
o,L, —, 6, 5	Neutral must be selected
o,L, —, 7, 0	Sump fluid temperature too low
o,L, —, 7, 9	Sump fluid temperature too high
o,L, —, 8, 9	Output shaft rotation
o,L, —, 9, 5	Sensor failure*

* Report sensor failure display to a distributor or dealer in your area (check the telephone directory for an Allison Transmission distributor or dealer).

Fluid Level Fault Codes (for Allison 4th Generation Controls)

Display	Cause of Code
oL, - -, 0X	Settling time too short
oL, - -, 50	Engine speed (rpm) too low
oL, - -, 59	Engine speed (rpm) too high
oL, - -, 65	Neutral must be selected
oL, - -, 70	Sump fluid temperature too low
oL, - -, 79	Sump fluid temperature too high
oL, - -, 89	Output shaft rotation
oL, - -, 95	Sensor failure*

* Report sensor failure display to a distributor or dealer in your area (check the telephone directory for an Allison Transmission distributor or dealer).

CAUTION: A low or high fluid level can cause overheating and irregular shift patterns. Incorrect fluid level can damage the transmission.

NOTE: To exit the fluid level display mode, press any range button on the pushbutton shift selector, or press the display mode (diagnostic) button once on the lever shift selector.

FLUID LEVEL CHECK USING DIAGNOSTIC TOOLS

The transmission must be equipped with the oil level sensor to be able to read fluid level information.

1. Park the vehicle on a level surface and shift to **N** (Neutral). Apply the parking brake and/or emergency brakes.
2. Obtain fluid level information by following the procedure in the Allison DOC™ For PC–Service Tool User Guide, or by using the OEM-supplied auxiliary display.
3. Fluid level information may be delayed when certain conditions are not met. The Allison DOC™ For PC–Service Tool will display a message showing which conditions have not been met. The following conditions may delay a fluid level check:
   - — Settling time too short
   - — Engine speed (rpm) too low
   - — Engine speed (rpm) too high
   - — **N** (Neutral) must be selected

— Sump fluid temperature too low (below 60°C or 140°F)

— Sump fluid temperature too high (above 104°C or 220°F)

— Output shaft rotation

MANUAL FLUID CHECK PROCEDURE

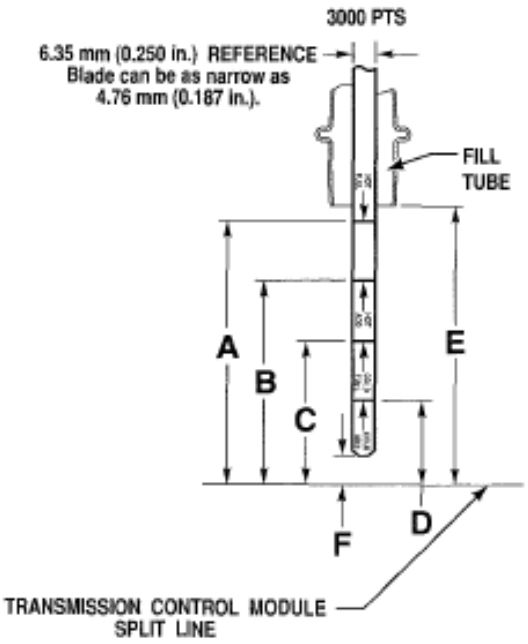
Refer to Figure 3 and Figure 4 for the location of the fill tube and dipstick.

> **WARNING:** If you leave the vehicle and the engine is running, the vehicle can move unexpectedly and you or others could be injured. If you must leave the engine running, do not leave the vehicle until you have completed all of the following procedures:
>
> 1. Put the transmission in **N** (Neutral).
> 2. Be sure the engine is at low idle (500–800 rpm).
> 3. Apply the parking brakes and emergency brake and make sure they are properly engaged.
> 4. Chock the wheels and take any other steps necessary to keep the vehicle from moving.

Clean around the end of the fill tube before removing the dipstick. This will aid in preventing dirt or foreign matter from entering the hydraulic system, which can cause:

- Valves to stick.
- Undue wear of transmission parts.
- Clogged passages.

Check the fluid level using the procedures in COLD CHECK and HOT CHECK. Report an abnormal fluid level to service management.



OIL SUMP	TRANSMISSION/SUMP DESCRIPTION	DIMENSION A	DIMENSION B	DIMENSION C	DIMENSION D	DIMENSION E	DIMENSION F
4.00 in.	3000 PRODUCT FAMILY	101.6 mm (4.00 in.)	63.5 mm (2.50 in.)	45.7 mm (1.80 in.)	*	86.6 mm (3.41 in.)	5.9 mm (0.23 in.)

NOTE: *Calibrate level marking locations with respect to transmission control module split line and fill tube.*
Scale none.
**Dimension determined by installation.*

V08681.00.00

Figure 11. Standard Pupil Transport/Shuttle Series Transmission Dipstick Markings

TRANSMISSION

COLD CHECK

The Cold Check determines if the transmission has enough fluid to be operated safely until a Hot Check can be made.

NOTE: The correct fluid level **can not be determined** unless the transmission is in a level position.

CAUTION: DO NOT start the engine until the presence of sufficient transmission fluid has been confirmed. Remove the transmission fluid dipstick and be sure the static fluid level is near the HOT FULL mark.

CAUTION: The fluid level rises as fluid temperature rises. DO NOT fill the transmission above the "COLD CHECK" band if the transmission fluid is below normal operating temperatures. During operation, an overfull transmission can become overheated, leading to transmission damage.

A cold check may be made after initial start-up and the presence of transmission fluid has been confirmed (the sump fluid temperature is then typically 16°–49°C (60°–120°F). To perform a COLD CHECK, do the following:

1. Start the engine and run it at idle (500–800 rpm) in **N** (Neutral) for about one minute.
2. Shift to **D** (Drive) and then to **R** (Reverse) to clear the hydraulic circuits of air.
3. Shift to **N** (Neutral) and leave engine at idle.
4. Move the vehicle to a level surface, put transmission in **N** (Neutral), and set the parking brake.
5. With the engine idling (500–800 rpm), shift to **D** (Drive) and then to **R** (Reverse) to clear air from the hydraulic circuits.
6. Shift to **N** (Neutral) and leave engine at idle.
7. Remove the dipstick and wipe it clean. Insert the dipstick into the fill tube, pushing down until it stops.
8. Remove the dipstick and observe the fluid level. If the fluid on the dipstick is within the COLD CHECK band, the level is satisfactory. If the fluid level **is not** within this band, add or drain fluid as necessary to bring the level within the COLD CHECK band.
9. Perform a Hot Check at the first opportunity after normal operating temperature (71°–93°C; 160°–200°F) is reached.

TRANSMISSION

CAUTION: DO NOT operate the transmission for extended periods of time until a Hot Check has verified proper fluid level. Transmission damage can result from extended operation at improper fluid level conditions.

CAUTION: Obtain an accurate fluid level by imposing the following conditions:

- Engine is idling (500–800 rpm) in **N** (Neutral)
- Transmission fluid is at the normal operating temperature
- The vehicle is on a level surface

HOT CHECK

The transmission fluid **must be hot** to obtain an accurate check, because the fluid level rises as temperature increases.

To perform a HOT CHECK, do the following:

1. Be sure fluid has reached normal operating temperature (71°–93°C; 160°–200°F). If a transmission temperature gauge is not present, check fluid level when the engine water temperature gauge has stabilized and the transmission has been operated under load for at least one hour.
2. Park the vehicle on a level surface and shift to **N** (Neutral). Apply the parking brake and allow the engine to idle (500–800 rpm).
3. Remove the dipstick and wipe it clean. Insert the dipstick into the fill tube, pushing down until it stops.
4. Remove the dipstick and observe the fluid level. The safe operating level is anywhere within the HOT RUN band on the dipstick.
5. If the level is not within this band, add or drain fluid as necessary to bring the level within the HOT RUN band.
6. Be sure fluid level checks are consistent. Check level more than once and if readings are not consistent, check to be sure the transmission breather is clean and not clogged. If readings are still not consistent, contact your nearest Allison distributor or dealer.

RECOMMENDED AUTOMATIC TRANSMISSION FLUID AND VISCOSITY GRADE

- Hydraulic fluids used in the transmission are important influences on transmission performance, reliability, and durability. TranSynd™ and DEXRON®-III fluids are recommended for on-highway applications. TranSynd™ and DEXRON®-III fluids are recommended for all Pupil Transport/Shuttle Series applications.

TRANSMISSION

- TranSynd™ is a full synthetic transmission fluid developed by Allison Transmission and Castrol Ltd. This fluid meets Allison specifications for Severe Duty and Extended Drain Intervals. TranSynd™ is fully qualified to the Allison TES 295 specifications and is available through Allison distributors and dealerships.
- To be sure a fluid is qualified for use in Allison transmissions check for the DEXRON®-III license numbers on the container or consult the lubricant manufacturer. Consult your Allison Transmission dealer or distributor before using other fluid types.

CAUTION: Disregarding minimum fluid temperature limits can result in transmission malfunction or reduced transmission life.

- When choosing the optimum viscosity grade of fluid, duty cycle, preheat capabilities, and/or geographical location must be taken into consideration. The Transmission Fluid Operating Temperature Requirements table lists the minimum fluid temperatures at which the transmission may be safely operated without preheating. Preheat with auxiliary heating equipment or by running the equipment or vehicle with the transmission in neutral for a minimum of 20 minutes before attempting range operation.

Transmission Fluid Operating Temperature Requirements

SAE Viscosity Grade* or Fluid Type	Minimum Operating Temperature	
	Celsius	Fahrenheit
MIL-PRF-46167	–32	–25
SAE 0W–20 or TranSynd™	–30	–22
DEXRON®-III	–25	–13
SAE 10W	–20	–4
SAE 15W–40	–15	5
SAE 30W	0	32
SAE 40W	10	50

* SAE "W" designation indicates winter weight based on cold temperature properties.

KEEPING FLUID CLEAN

CAUTION: Containers or fillers that have been used for antifreeze solution or engine coolant must NEVER be used for transmission fluid. Antifreeze and coolant solutions contain ethylene glycol which, if put into the transmission, can cause the clutch plates and some seals to fail.

It is absolutely necessary that transmission fluid be clean. The fluid **must be handled** in clean containers to prevent foreign material from entering the transmission.

TRANSMISSION

FLUID AND INTERNAL FILTER CHANGE INTERVAL RECOMMENDATIONS

CAUTION: Transmission fluid and filter change frequency is determined by the severity of transmission service. To help avoid transmission damage, more frequent changes can be necessary than recommended in the general guidelines when operating conditions create high levels of contamination or overheating.

Allison requires all 3000 Family transmissions to have the main filter (not the lube filter or fluid) changed after the first 5000 mile (8000 km) or 200 hours of operation, whichever comes first. Refer to the latest revision of Service Tips #1099 for convenient kit and fluid information. Refer to Mechanic's Tips, latest version, for location of the main filter and the filter change procedure. Service Tips #1099 and Mechanic's Tips are available online at ***www.allisontransmission.com.***

Refer to the following Recommended Fluid/Filter Change tables for guidelines for fluid and filter change intervals.

NOTE: Change fluid/filters at or before recommended mileage, months, or hours have elapsed, whichever comes first. In some cases, operating hours may represent a more reliable measure of oil life; therefore, fluid change intervals should not be based on mileage alone.

Recommended Fluid/Filter Change For 3000 PTS Transmissions

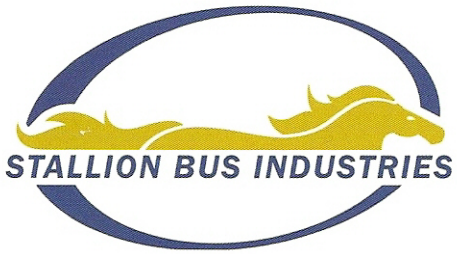
NOTE: Severe and General Vocations—Local conditions, severity of operation, or duty cycle may require more or less frequent fluid change intervals that differ from the published recommended fluid change intervals of Allison Transmission. Transmission protection and fluid change intervals can be optimized by using fluid analysis. Filters **must be changed** at or before recommended intervals. Change fluid/filter after recommended mileage, months, or hours have elapsed, whichever comes first.

SEVERE VOCATION*				GENERAL VOCATION**			
	Filters				Filters		
Fluid	Main	Internal	Lube/ Auxiliary	Fluid	Main	Internal	Lube/ Auxiliary
Schedule 1—Non-TranSynd™/Non-TES 295 Fluid							
12,000 Miles (20 000 km) 6 Months 500 Hours	12,000 Miles (20 000 km) 6 Months 500 Hours	Overhaul	12,000 Miles (20 000 km) 6 Months 500 Hours	25,000 Miles (40 000 km) 12 Months 1000 Hours	25,000 Miles (40 000 km) 12 Months 1000 Hours	Overhaul	25,000 Miles (40 000 km) 12 Months 1000 Hours
Schedule 2***—TranSynd™/TES 295 Fluid							
75,000 Miles (120 000 km) 36 Months 3000 Hours	75,000 Miles (120 000 km) 36 Months 3000 Hours	Overhaul	75,000 Miles (120 000 km) 36 Months 3000 Hours	150,000 Miles (240 000 km) 48 Months 4000 Hours	75,000 Miles (120 000 km) 36 Months 3000 Hours	Overhaul	75,000 Miles (120 000 km) 36 Months 3000 Hours

* Pupil Transport/Shuttle Series transmissions with retarders, on/off highway.

** Pupil Transport/Shuttle Series transmissions without retarders, on-highway only.

*** Recommendations in Schedule 2 are based on the transmission containing 100 percent TranSynd™ fluid and Allison Transmission Gold Series filters.



7- ELECTRICAL

ELECTRICAL

Warning: Unless otherwise stated, do not run the engine with the rear engine compartment door OPEN.

BATTERY COMPARTMENT

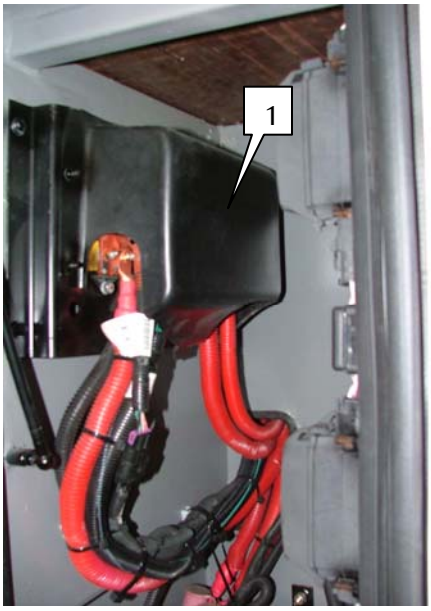
This compartment houses the batteries and electrical system disconnects. It is physically separated from the main engine compartment.

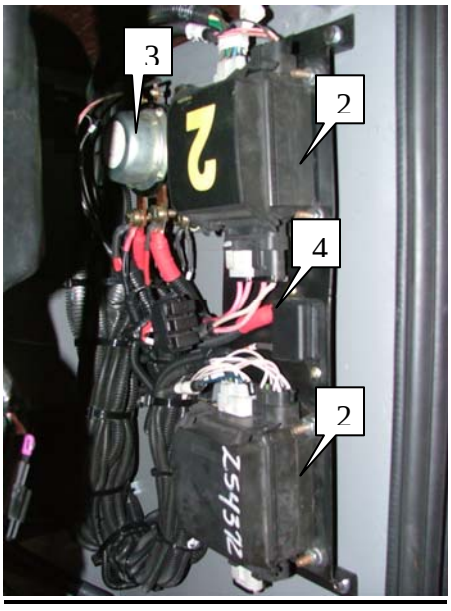
The following items are located in the electrical compartment (vehicle configuration dependent):

Engine pre EPA 2007

- 12 Volt batteries
- Chassis fuse/relay center 355 (1)
- Chassis fuse/relay center 296 (2)
- Body main power relay (3)
- Floor heaters fuses (4)

To access the compartment, release the safety catches and open the door.

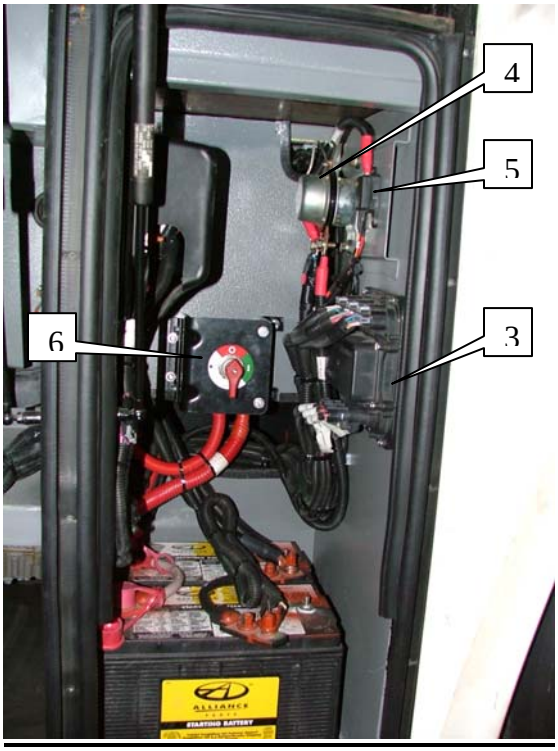




BATTERY COMPARTMENT –cont.
Engine pre EPA 2007

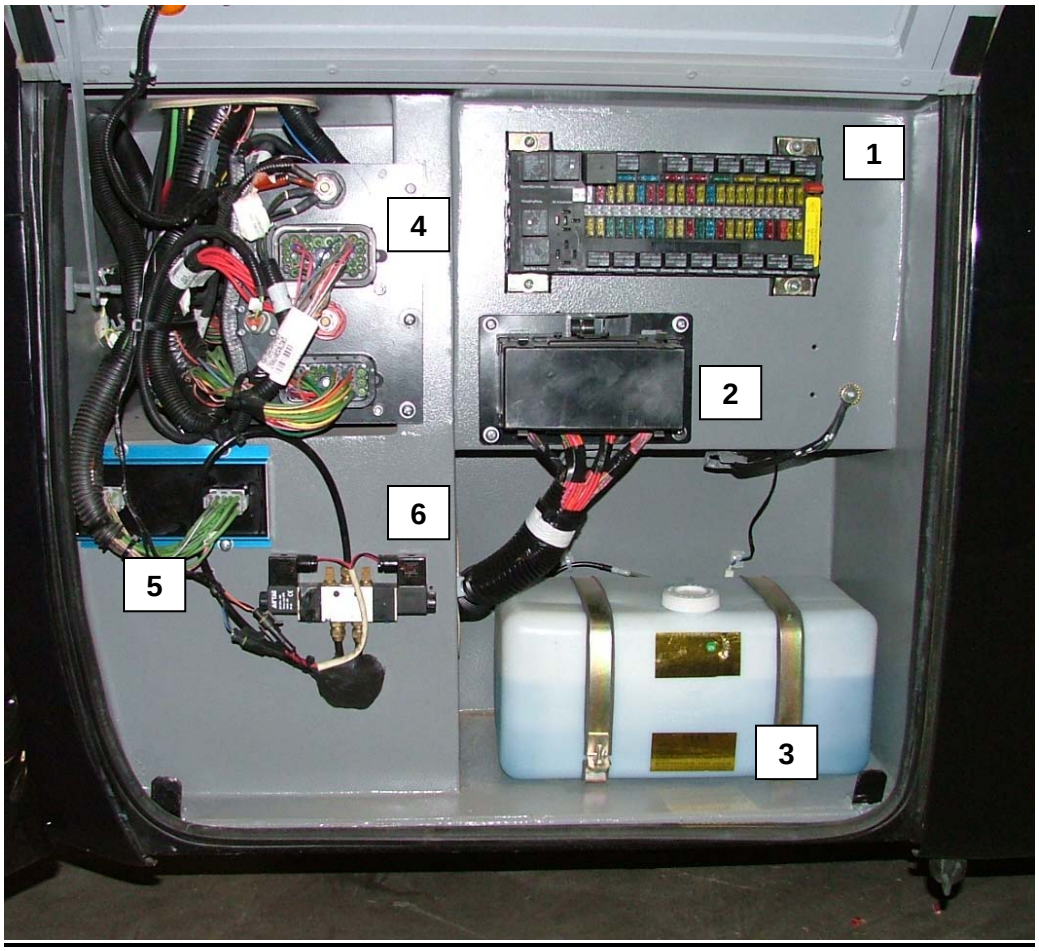
- 12 Volt batteries
- Chassis fuse/relay center 355 (1)
- Chassis Parker Hydraulic fan control (2)
- Chassis fuse/relay center (3)
- Body main power relay (4)
- Floor heaters fuses (5)
- **Main Electrical Disconnect** (6)

To access the compartment, release the safety catches and open the door.



ELECTRICAL

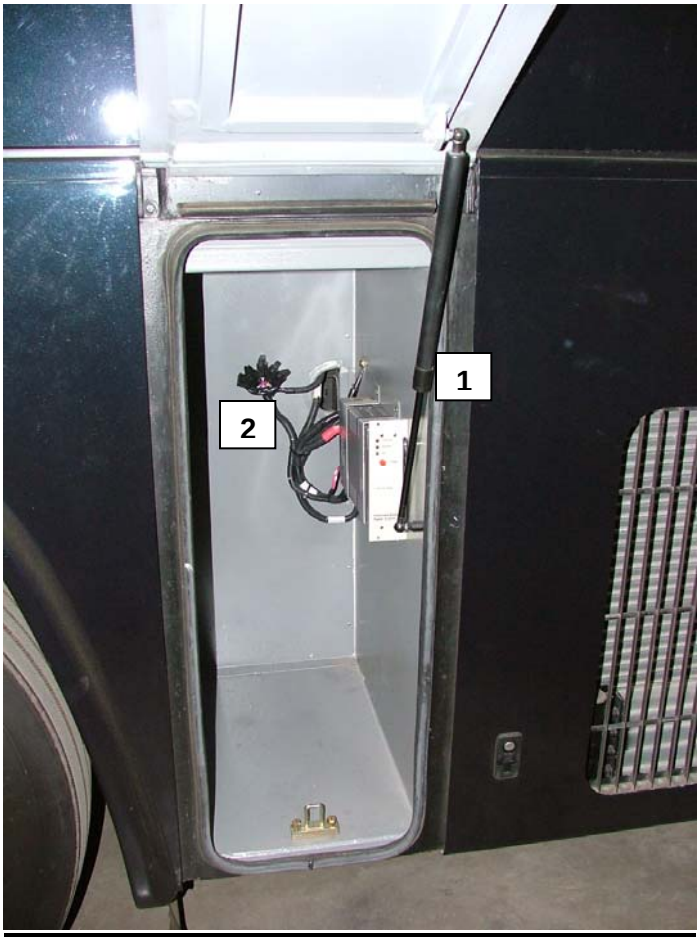
FRONT ELECTRICAL COMPARTMENT (JUNCTION BOX)



1. Body main relay and fuse panel
2. Chassis fuse/relay center 335
3. Windshield Washer Fluid Reservoir
4. Dash harness connectors
5. Lighting control module
6. Entry door pneumatic valve

ELECTRICAL

24 VOLTS POWER SUPPLY



1. 12 / 24 Volt Switched-Mode Power Supply
2. Fuses

24V DC is supply to:

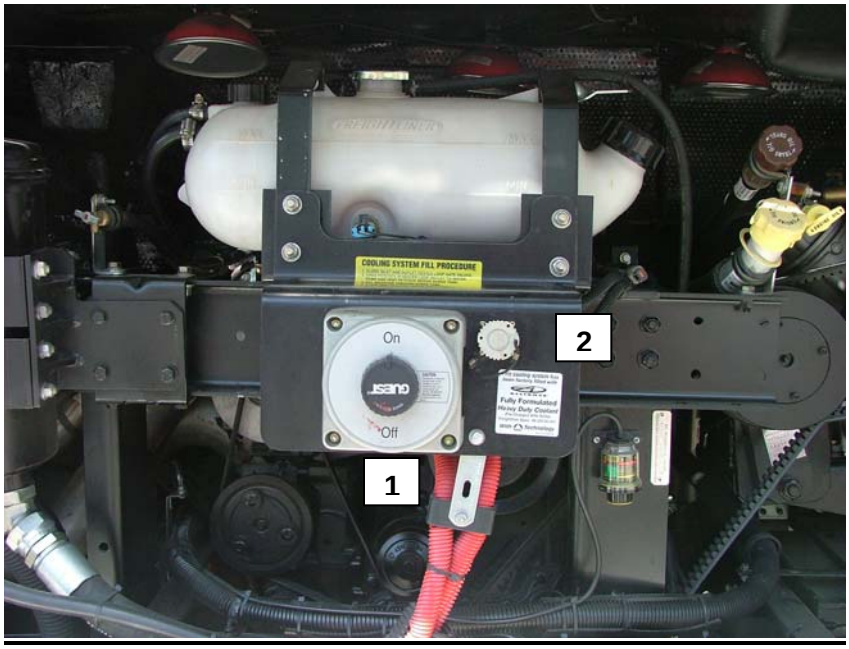
- TV Monitors
- Air Conditioner controller unit and Air conditioner alternator excitation Current. When 24Vdc excitation alternator is in place.

Note: 24 Volt power supply unit optional location is in first luggage compartment roadside.

ELECTRICAL

1-Main Electrical Disconnect

Turn knob to “OFF” / “0” to disconnect batteries from electrical system.



Engine Pre EPA 2007

2. Engine Diagnostic Connector

Engine EPA 2007

ELECTRICAL

Lamps & bulbs replacement

SEE PHOTOS EXTERIOR COMPONENTS SECTION 2

HEADLAMP HIGH BEAM : Halogen bulb H1-55 12V 55W

HEADLAMP LOW BEAM : Halogen bulb H1-55 12V 55W

HEADLAMP TURN SIGNAL : Miniature Lamp B7 12V 21W

FOG LAMP : Halogen bulb H3 12V 55W

REAR COMBINATION LAMP:
- TURN SIGNAL : Miniature Lamp A7 12v 21W
- TAIL LAMPS : Miniature Lamp A7 12v 5W
- BRAKE LAMP : LED
- BACK UP LAMP : Miniature Lamp A7 12v 21W

FRONT IDENTIFICATION LED LAMP (YELLOW) : GROTE ref. 45583

FRONT , SIDE ; CLEARENCE AND MARKER LED LAMP (YELLOW) : GROTE ref. 45583

SIDE MARKER LAMP REAR (RED) : LED GROTE ref. 45582

REAR IDENTIFICATION & CLEARENCE LED LAMP (RED) : GROTE ref. G5052

FRONT SIDE TURN SINGNAL LED LAMP : GROTE ref. 52323

SIDE REFLECTOR /MARKER LED LAMP(RED) : GROTE ref. 47732

SIDE REFLECTOR /MARKER LED LAMP(YELLOW) : GROTE ref. 47733

HIGH-MOUNTED BRAKE LIGHTS LED LAMP : GROTE ref. 53562

REAR LICENCE LAMP : GROTE ref. 60331

WIRE NUMBER AND FUNCTION REFERENCE

No.	COLOR	FUNCTION	
1	GrL	POWER SUPPLY FRONT AND REAR DOOR/ FREEZER	
2	GY	WARNING LIGHTS SWITCH	
3	RG	STEERING LIGHTS SWITCH	
4	LR	RIGHT STEERING LIGHTS	
5	YR	LEFT STEERING LIGHTS	
6	LY	POWER SUPPLY WARNING LIGHTS SWITCH	
7	GW	FLASH COMPONENT OUTPUT	
8	GL	POWER SUPPLY STOP LIGHTS	
9	Br	POWER SUPPLY INSTRUMENTS	
10	RY	POWER SUPPLY AC. CONTROL	
11	RG	MAIN POWER SUPPLY	
11A		MAIN BODY RELAY POWER	
12	R	LIGHT SHIFT CONTROL HEADLIGHTS	
13	BrW	ELECTRIC HORN	
14	G	LOW HEADLIGHT CONTROL	
15	LB	RIGHT HIGHT HEADLIGHT	
16	RL	POWER SUPPLY WIDTH AND SWITCH CONTROL	
17	Y	CLEARENCE LIGHTS	
18	LR	POWER SUPPLY BACKUP LIGHT	
19	V	POWER SUPPLY RADIO	
20	GrR	POWER SUPPLY WINDSHIELD WIPER	
22		ANTENA FOR RADIO	
23	WR	SWITCH FOR EMPTY GEAR	
24	Y	POWER SUPPLY OVERHEAD LIGHT (L)	
25		FRONT FOG LIGHTS	
26	GBr	CONTROL FOR HIGH HEADLIGHT	
27	BL	CONTROL FOR FOGLIGHTS	
28		LEFT HIGHT HEADLIGHT	
29	BrY	SWITCH FOR WATER TEMPERATURE WARNING	
31		CONTROL FOR ON GEAR	
32		PLUS OF BATTERY	
33		CONTROL FOR OPENING FRONT DOOR	
34		INDICATOR LIGHT FOR CHARGING	
35		NIMUS OF BATTERY - GROUND	
36		CONTROL FOR OPENING REAR DOOR	
37		CONTROL FOR ACC GEAR	

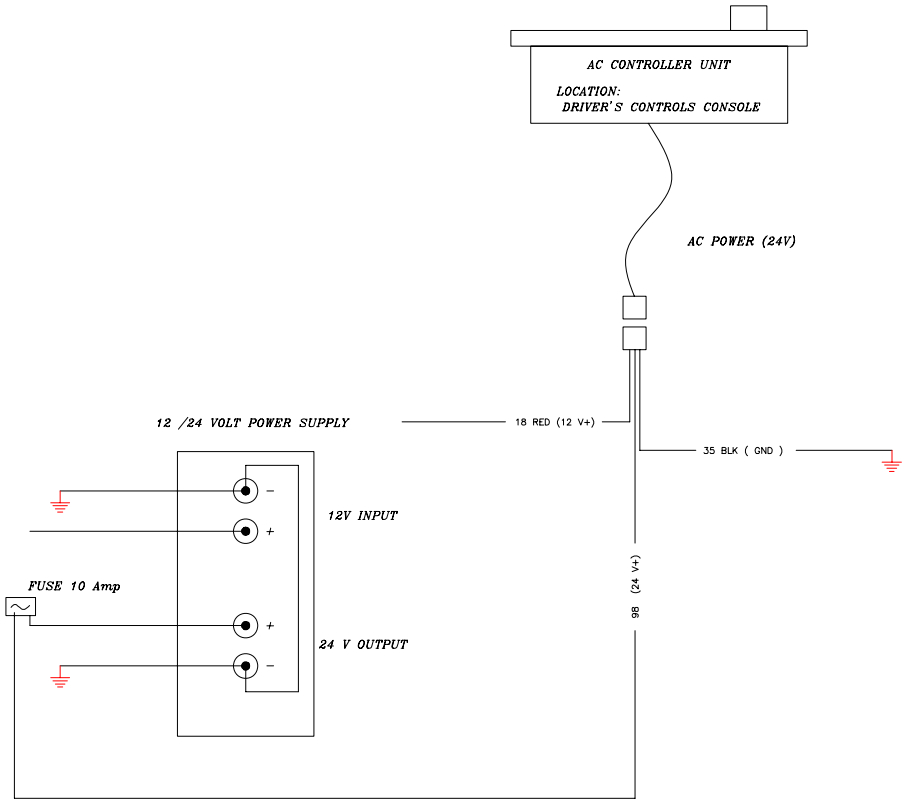
38		IGNITION SWITCH	
39		REPOSITION OF WIPER	
40		REPOSITION	
41		INTERMISSION GEAR FOR WIPPER SWITCH	
42		CLEANER	
43		PARKING BRAKE LIGHT	
44		INDICATOR LIGHT FOR REAR DOOR OPENING	
45		LOW SPEED OF WIPER	
46		HIGH SPEED OF WIPER	
47		CONTROL FOR START RELAY	
48		OUTPUT OF STOP LIGHT SWITCH	
49		CONTROL FOR CLOSING FRONT DOOR	
50		POWER FOR FLAMEOUT	
51		FRONT RIGHT SPEAKER	
52		FRONT RIGHT SPEAKER	
53		REAR RIGHT SPEAKER	
54		REAR RIGHT SPEAKER	
55		FRONT LEFT SPEAKER	
56		FRONT LEFT SPEAKER	
57		REAR LEFT SPEAKER	
58		REAR LEFT SPEAKER	
59		CONTROL FOR MAIN SWITCH OF POWER SUPPLY	
60		STARTER	
61		BRAKE AIR PRESSURE WARNING 1	
62		WATER TEMPERATURE METER	
63		FUEL METER	
64		ODOMETER SENSOR 1	
65		ODOMETER SENSOR 2	
66		OVERHEAD LIGHT 2 L	
67		LEFT LOW HEADLIGHT	
68		BUTTON OF ELECTRIC HORN	
69		BACKUP LIGHT	
74		EXHAUST BRAKE SWITCH	
75		OVERHEAD LIGHT 2 R	
76		RIGHT LOW HEADLIGHT	
77		ELECTROVALVE FOR EXHAUST BRAKE	
78		OVERHEAD LIGHT 1 L	
79		SWITCH FOR ACCELERATE PEDAL	
80		OVERHEAD LIGHT 1 R	
81		INDICATOR OF FRONT DOOR OPENING	
82		REAR FOG LIGHT	
90		A/C CONTROLLER POWER SUPLY 24 V	

92A		FLOOR HEATER FAN REAR	
92B		POWER SUPPLY WEBASTO	
92C		POWER SUPPLY WEBASTO	
92D		FLOOR HEATER FAN FRONT	
115		POWER SUPPLY FOR LUGGAGE HATCH LIGHT	
116		CLOCK	
118		POWER SUPPLY OVERHEAD LIGHT R.	
119		POWER SUPPLY DEFROSTER	
120		SPARE	
121		LUGGAGE HATCH LOCK LIGHT	
122		LUGGAGE COMPARTMENT LIGHT	
123		SPARE	
124		CONTROLLED FRONT STEP LIGHT	
125		CONTROLLED REAR STEP LIGHT	
126		SPARE	
127		POWER SUPPLY RETARDER CONTROL	
128		ABS SITUATION CONTROL	
129		SPARE	
130		ELECTRIC HORN	
132		WARM-UP CONTROL AND POWER SUPPLY FOR VENTILATOR	
133		LOW SPEED CONTROL OF WIPER SWITCH	
134		HIGH SPEED CONTROL OF WIPER SWITCH	
135		SPARE	
136		LEFT READING LIGTH	
137		RIGHT READING LIGHT	
138		READING LIGHT CONTROL	
139		POWER FOR READING LIGHT	
140		POWER SUPPLY ECAS CONTROL	
141		POWER SUPPLY ECAS CONTROL	
142		CONNECTOR OF WIPER RELAY	
146		ABS INDICATOR	
181	Y	DEFROST FAN HIGH	
182	B	DEFROST FAN LOW	
189		SPARE 12V – A/C CONTROLLER	
318C		TV / DVD POWER SPLITER BOX	
501		TV POWER	
501A		TV1 POWER	
501B		TV2 POWER	
501C		TV POWER	
502		SPARE	
503		SPARE	
504		12V POWER OUTPUT	

505		12V POWER OUTPUT	
506		12V POWER OUTPUT	
507		SPARE	
508		RELAY CONTROL	
509		CAPACITOR GROUND	
510		EXHAUST FAN DRIVER	

EV90-408 1000

AIR CONDITIONER CONTROLLER CONFIGURATION
DIRECT POWER FROM POWER SUPPLY (24v dc)



NOTE: THIS STANDARD SETUP COULD ALLOW IN SOME CIRCUNSTANCES, THE A/C CONTROLLER TO LOOSE IT PROGRAM. THE A/C UNIT WILL NOT WORK UNTIL REPROGRAMED BY A THERMOKING .

CIRCUNSTANCES: STARTING ENGINE WITH A LOW CHARGE BATERRY.

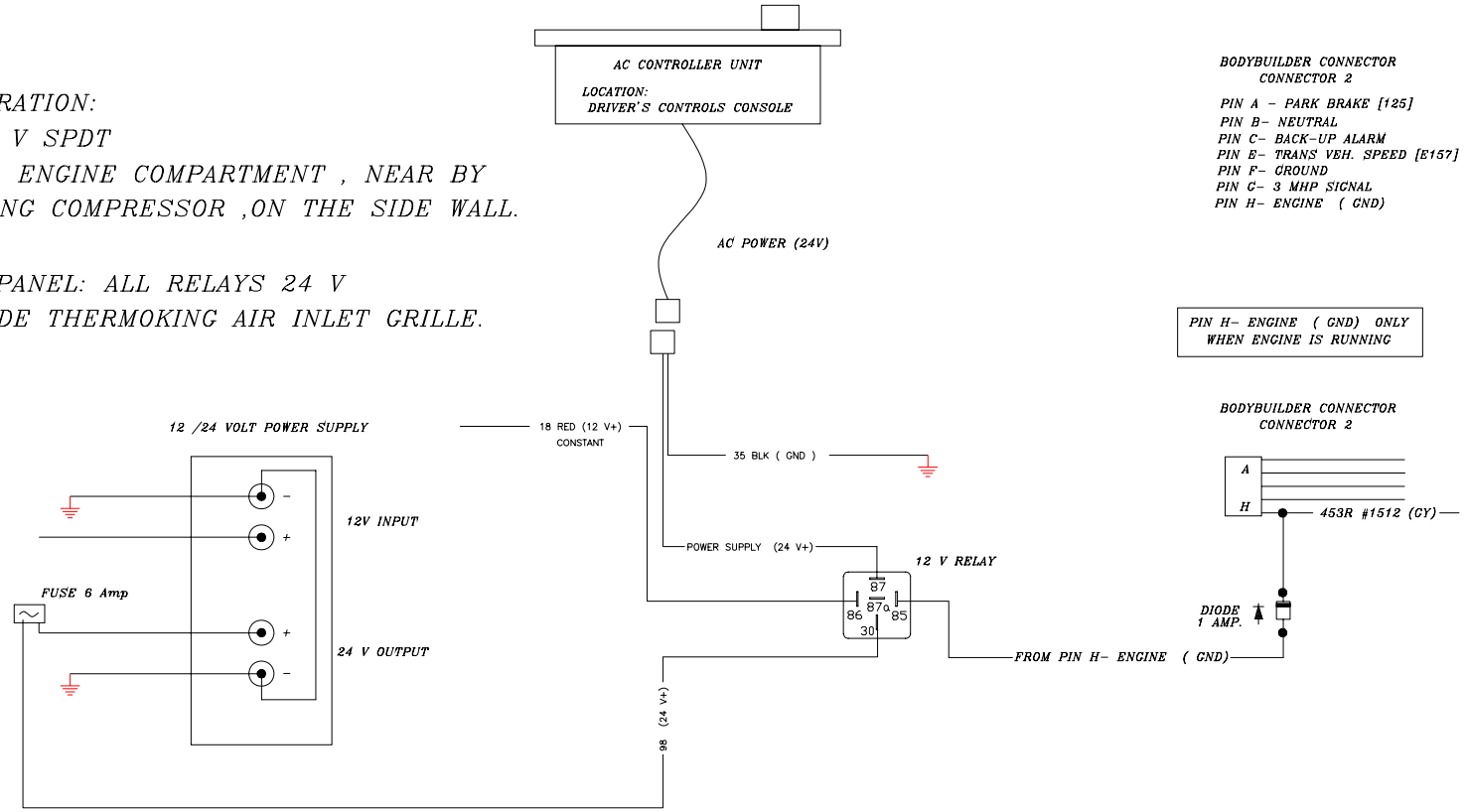
DRAWN BY GS	DATE 5/1/08	SUNLINER COACH A STALLION BUS INDUSTRIES COMPANY	223 Wall St, Suite 290 New York, New York 11743 Phone (1-800) 949 4673
APPROVED JAS	DATE 5/10/08		
SCALE N/A DO NOT SCALE THIS DWG.	DIMENSIONS INCHES	TITLE THERMOKING CLIMAAIRE II POWER SUPPLY OPTION #1 (24V DC)	
CAD FILE E015	SIZE B	MODEL V90 / DWG NO. EV90-408 100 / SHEET 1 OF 3	REV N/A

EV90-408 1000

AIR CONDITIONER CONTROLLER CONFIGURATION
WITH 24V DC EXCITATION ALTERNATOR, 24 VDC OUT PUT.

RELAY CONFGURATION:
EXC. RELAY 24 V SPDT
LOCATION: ENGINE COMPARTMENT , NEAR BY
THERMOKING COMPRESSOR ,ON THE SIDE WALL.

PCB CONTROL PANEL: ALL RELAYS 24 V
LOCATION: INSIDE THERMOKING AIR INLET GRILLE.



NOTE: WITH THIS SETUP THE A/C CONTROLLER CAN ONLY
BE POWERED WHEN THE ENGINE IS RUNNING.

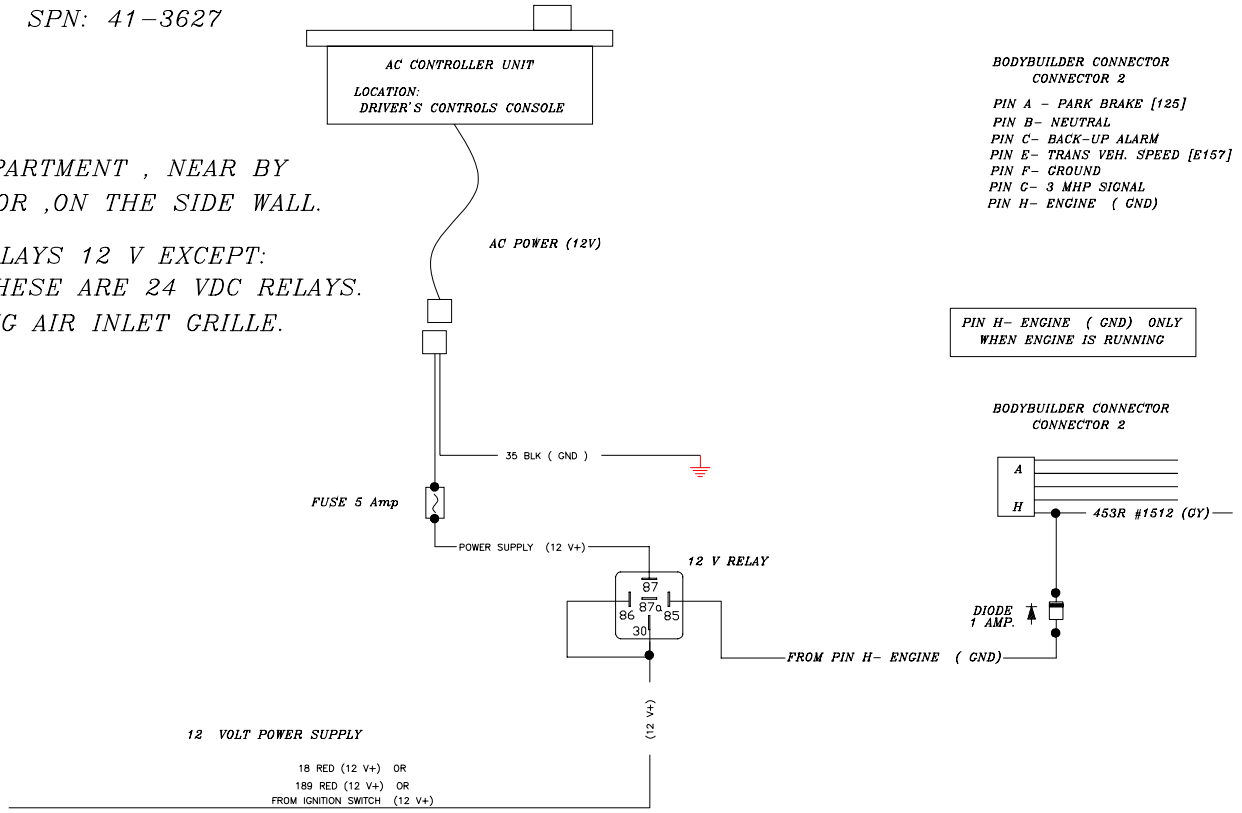
DRAWN BY GS	DATE 5/1/08	SUNLINER COACH A STALLION BUS INDUSTRIES COMPANY	223 Wall St, Suite 290 New York, New York 11743 Phone (1-800) 949 4673
APPROVED JAS	DATE 5/10/08		
SCALE N/A DO NOT SCALE THIS DWG.	DIMENSIONS INCHES	TITLE THERMOKING CLIMAAIRE II POWER SUPPLY OPTION #2 (24V DC)	
CAD FILE E015	SIZE B	MODEL V90	DWG NO. EV90-408 100
		SHEET 2 OF 3	REV N/A

EV90-408 1000

AIR CONDITIONER CONTROLLER CONFIGURATION
WITH 12V DC EXCITATION ALTERNATOR, 24 VDC OUT PUT.
THERMO KING ALTERNATOR SPN: 41-3627

RELAY CONFGURATION:
EXC. RELAY 12 V
LOCATION: ENGINE COMPARTMENT , NEAR BY
THERMOKING COMPRESSOR ,ON THE SIDE WALL.

PCB CONTROL PANEL: ALL RELAYS 12 V EXCEPT:
CSR1,CFR2,CFR1 AND CFR THESE ARE 24 VDC RELAYS.
LOCATION: INSIDE THERMOKING AIR INLET GRILLE.



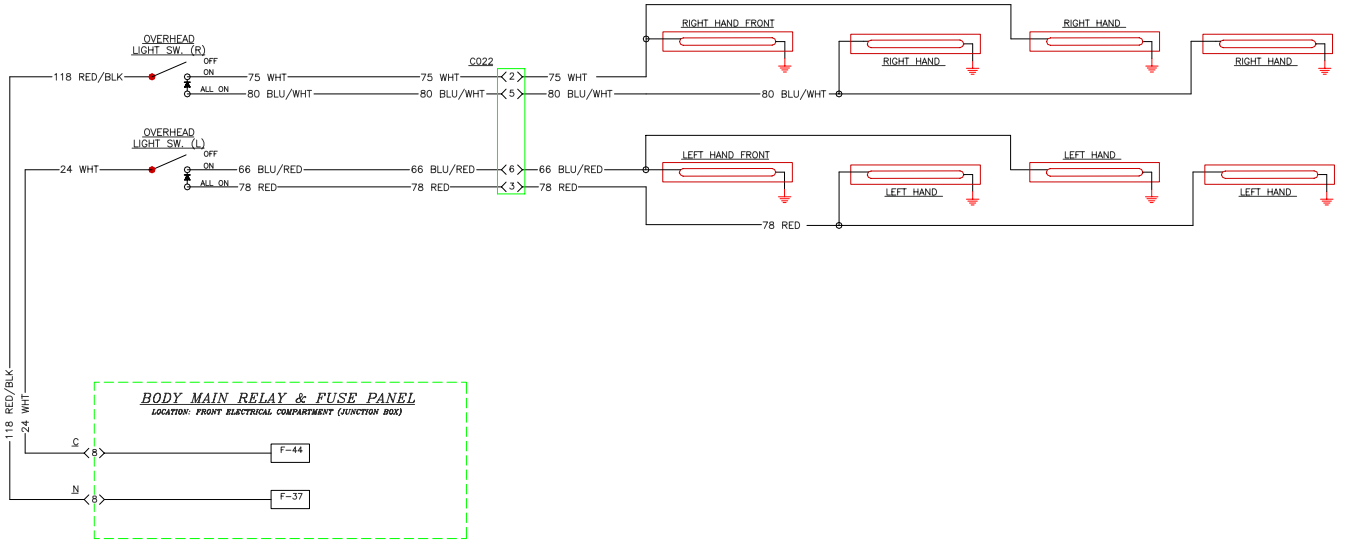
NOTE: WITH THIS SETUP THE A/C CONTROLLER CAN ONLY BE POWERED WHEN THE ENGINE IS RUNNING.

TO BE USE ONLY WITH 12V DC EXCITATION ALTERNATOR - 24V DC OUTPUT

12V RELAYS AND 24V RELAYS MUST BE CHECK FOR PROPER LOCATION.

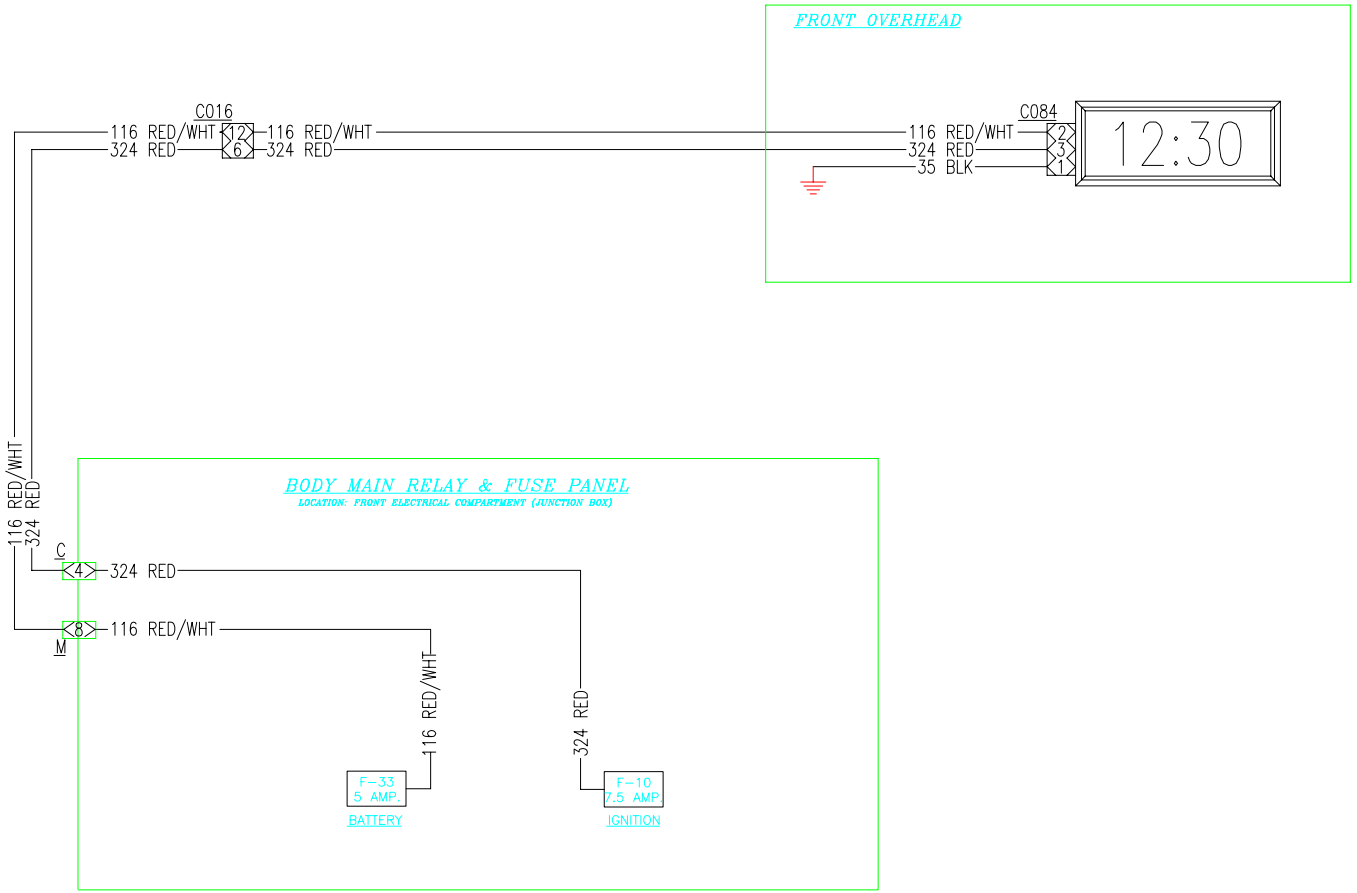
DRAWN BY GS	DATE 5/1/08	SUNLINER COACH A STALLION BUS INDUSTRIES COMPANY	223 Wall St, Suite 290 New York, New York 11743 Phone (1-800) 949 4673
APPROVED JAS	DATE 5/10/08		
SCALE N/A DO NOT SCALE THIS DWG.	DIMENSIONS INCHES	TITLE THERMOKING CLIMAAIRE II POWER SUPPLY OPTION #3 (12V DC)	
CAD FILE E015	SIZE B	MODEL V90 / DWG NO. EV90-408 100 / SHEET 3 OF 3	REV N/A

EV90-408 110



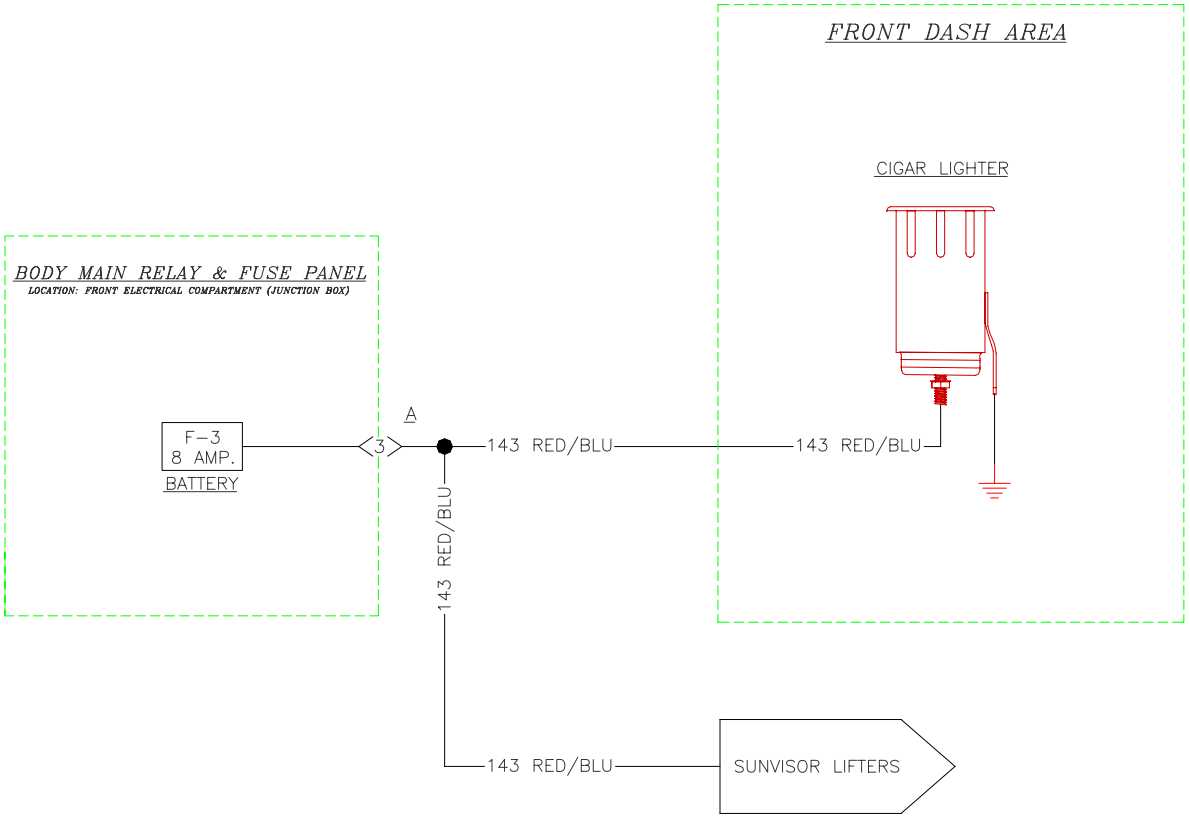
DRAWN BY GS	DATE 3/2/08	SUNLINER COACH A STALLION BUS INDUSTRIES COMPANY	223 Wall St, Suite 290 New York, New York 11743 Phone (1-800) 949 4673
APPROVED JAS	DATE 4/8/08		
SCALE N/A DO NOT SCALE THIS DWG.	DIMENSIONS N/A	TITLE INTERIOR OVERHEAD LIGHTS FLUORESCENT LIGHT	
CAD FILE E018	SIZE B	MODEL V90	DWG NO. EV90-408 110 / SHEET 1 OF 1 / REV N/A

EV90-408 120



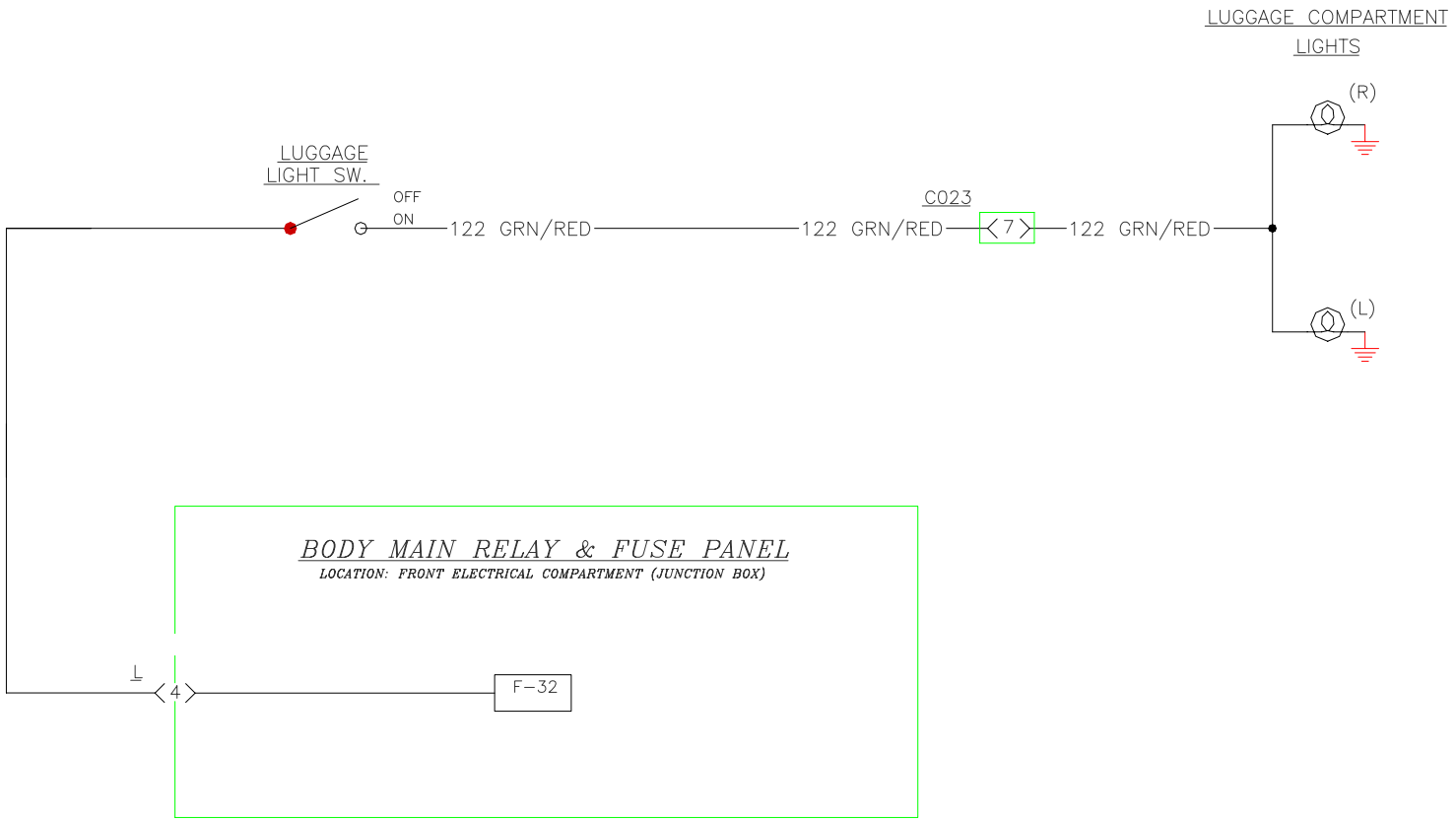
DRAWN BY GS	DATE 3/2/08	SUNLINER COACH A STALLION BUS INDUSTRIES COMPANY	223 Wall St, Suite 290 New York, New York 11743 Phone (1-800) 949 4673
APPROVED JAS	DATE 4/8/08		
SCALE N/A DO NOT SCALE THIS DWG.	DIMENSIONS N/A	TITLE DIGITAL CLOCK FLUORESCENT LIGHT	
CAD FILE E021	SIZE B	MODEL V90	DWG NO. EV90-408 120
		SHEET 1 OF 1	REV N/A

EV90-408 125



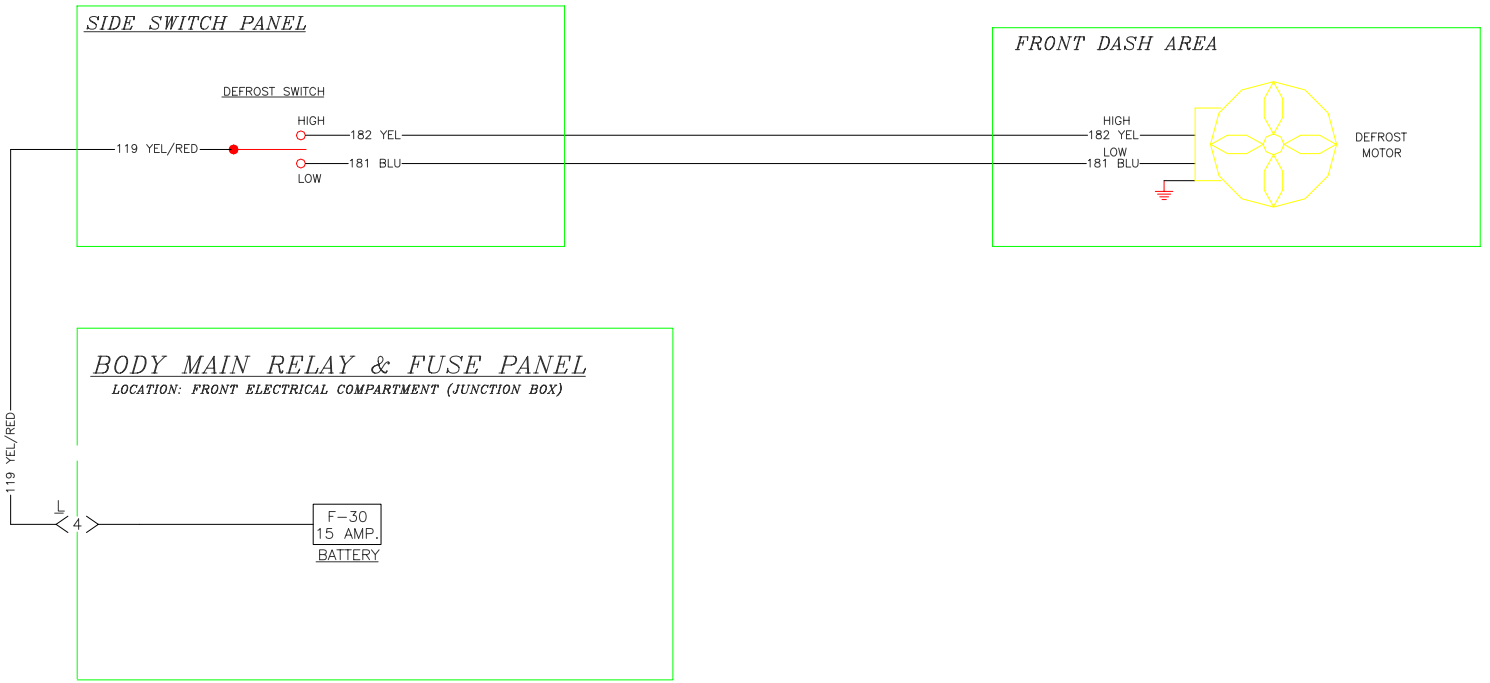
DRAWN BY GS	DATE 5/2/08	SUNLINER COACH A STALLION BUS INDUSTRIES COMPANY	223 Wall St, Suite 290 New York, New York 11743 Phone (1-800) 949 4673
APPROVED JAS	DATE 5/4/08		
SCALE N/A DO NOT SCALE THIS DWG.	DIMENSIONS N/A	TITLE CIGAR LIGHTER	
CAD FILE E022	SIZE B	MODEL V90 / DWG NO. EV90-408 125 / SHEET 1 OF 1	REV N/A

EV90-408 130



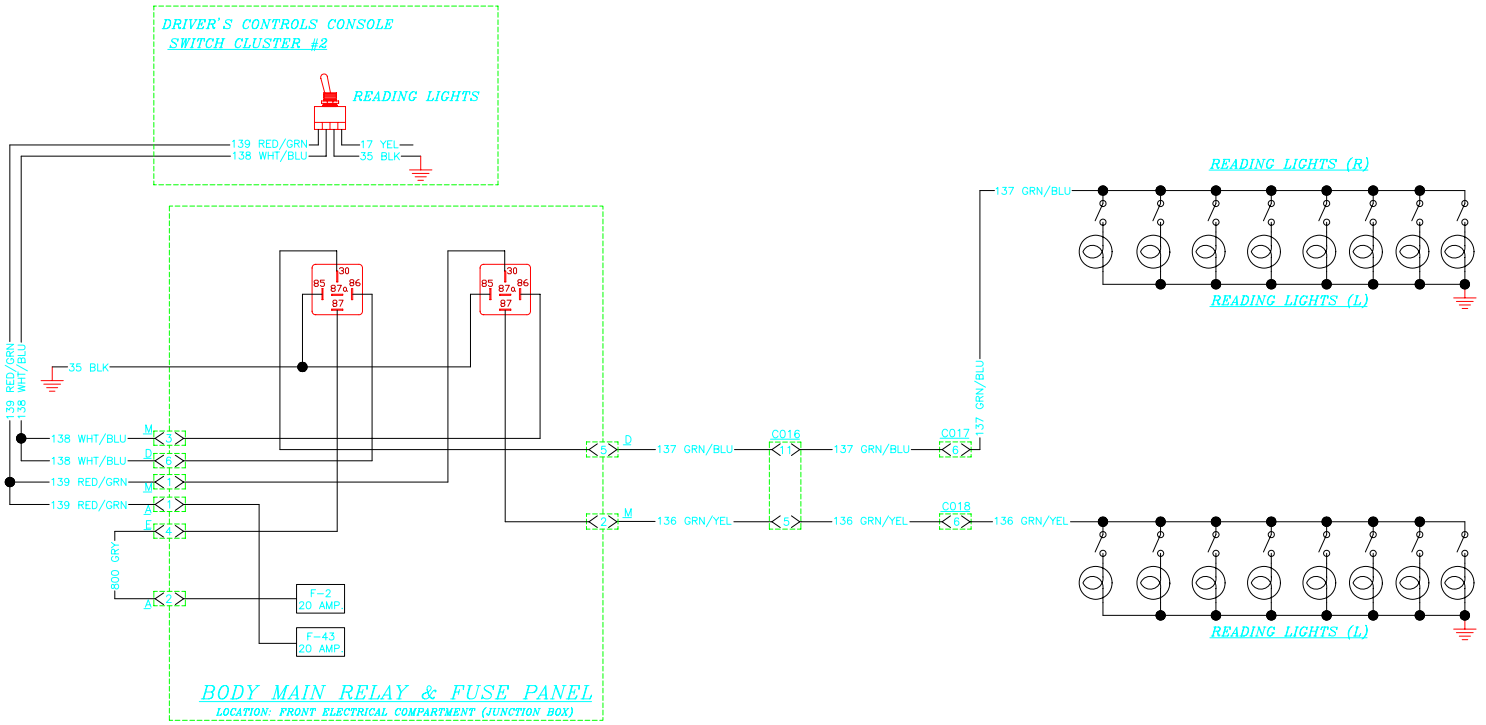
DRAWN BY GS	DATE 4/2/08	SUNLINER COACH A STALLION BUS INDUSTRIES COMPANY	223 Wall St, Suite 290 New York, New York 11743 Phone (1-800) 949 4673
APPROVED JAS	DATE 4/10/08		
SCALE N/A DO NOT SCALE THIS DWG.	DIMENSIONS N/A	TITLE LUGGAGE COMPARTMENT LIGHT FLUORESCENT LIGHT	
CAD FILE E023	SIZE B		
MODEL V90	DWG NO. EV90-408 130	SHEET 1 OF 1	REV N/A

EV90-408 140



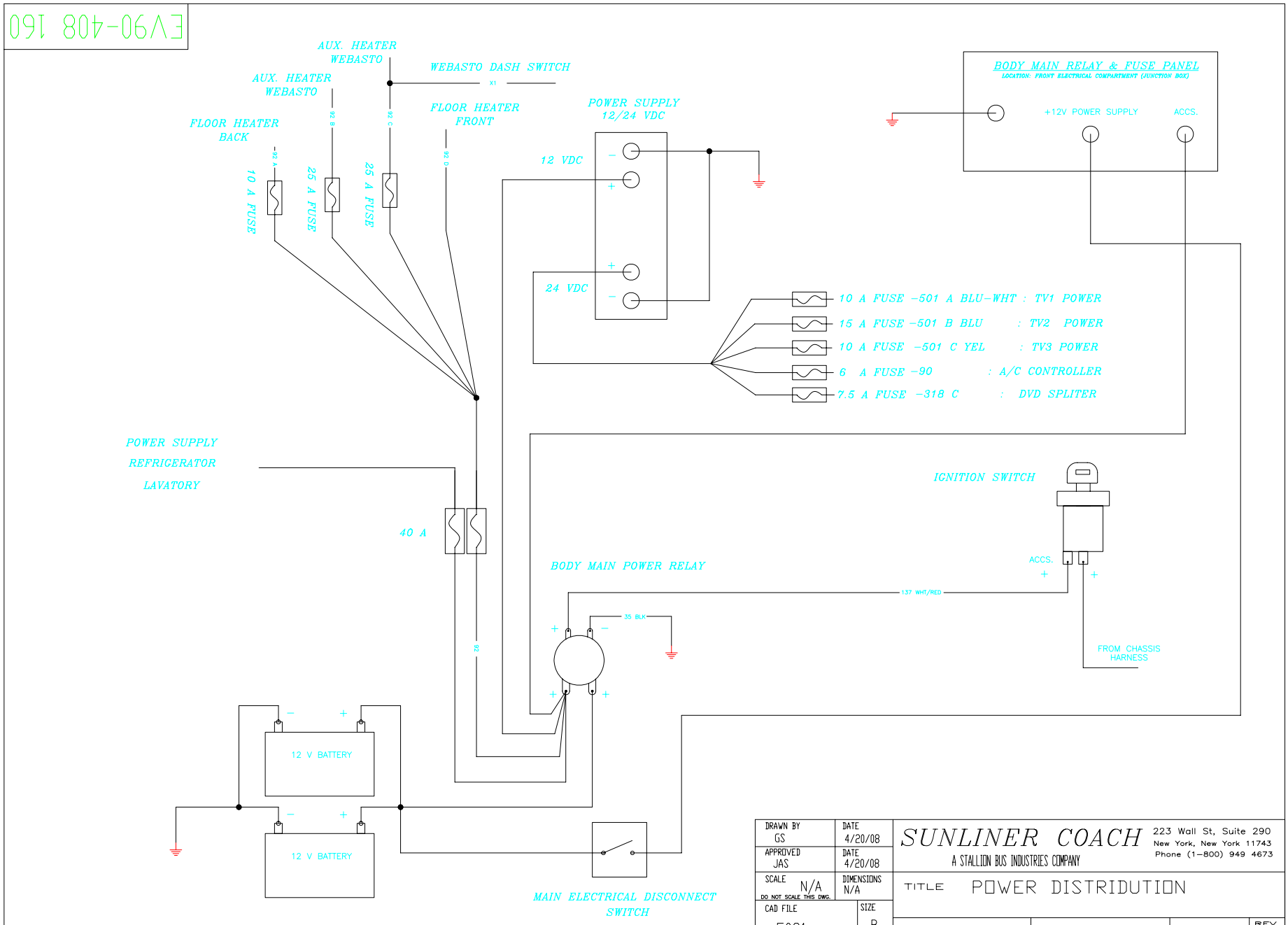
DRAWN BY GS	DATE 4/2/08	SUNLINER COACH A STALLION BUS INDUSTRIES COMPANY	223 Wall St, Suite 290 New York, New York 11743 Phone (1-800) 949 4673
APPROVED JAS	DATE 4/10/08		
SCALE N/A DO NOT SCALE THIS DWG.	DIMENSIONS N/A	TITLE WINDSHIEL DEFROST BLOWER	
CAD FILE E025	SIZE B	MODEL V90 / DWG NO. EV90-408 140 / SHEET 1 OF 1	REV N/A

EV90-408 150



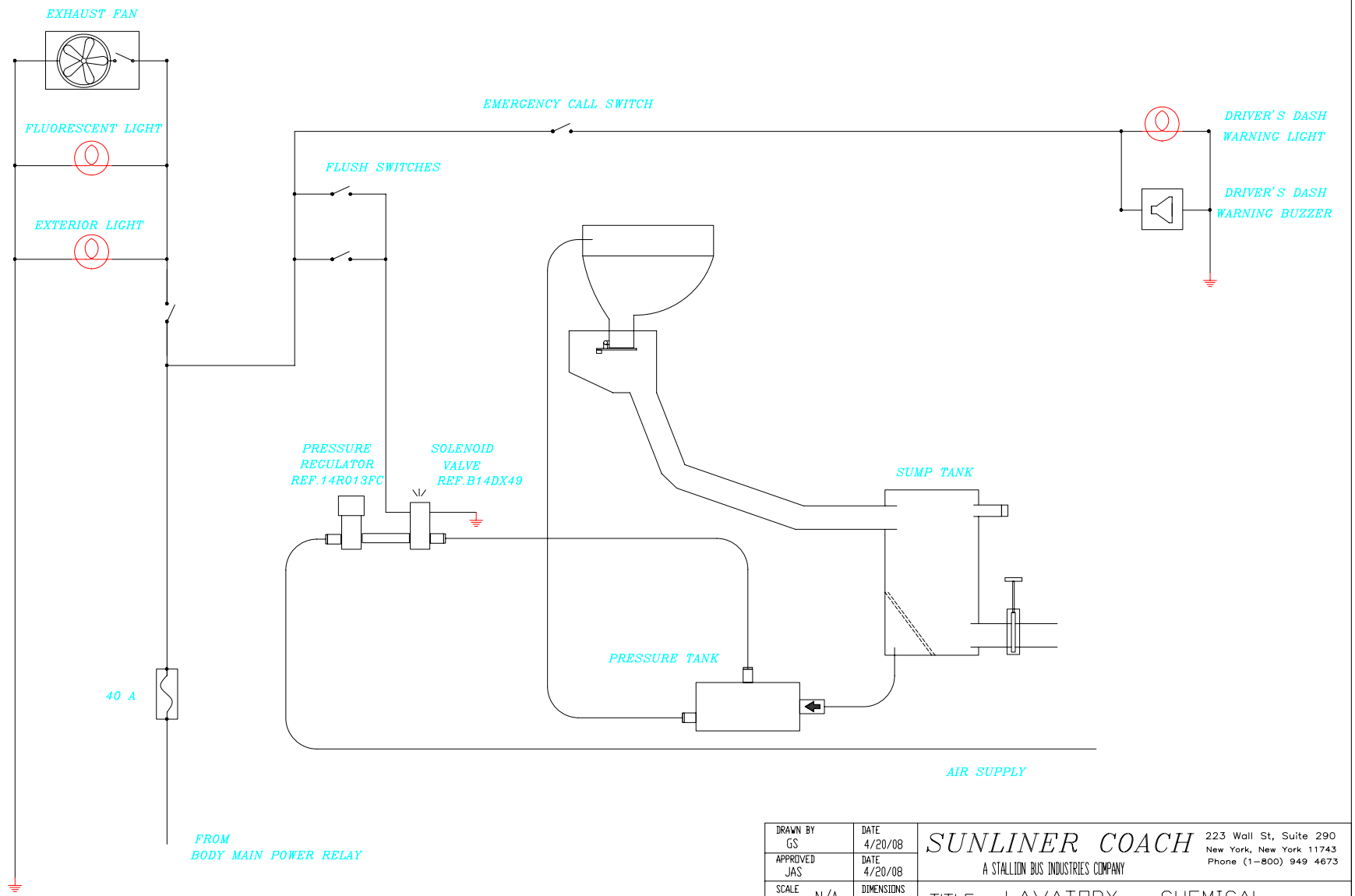
DRAWN BY GS	DATE 4/6/08	SUNLINER COACH A STALLION BUS INDUSTRIES COMPANY	223 Wall St, Suite 290 New York, New York 11743 Phone (1-800) 949 4673
APPROVED JAS	DATE 4/10/08		
SCALE N/A DO NOT SCALE THIS DWG.	DIMENSIONS N/A	TITLE READING LAMPS	
CAD FILE E027	SIZE B	MODEL V90 / DWG NO. EV90-408 150 / SHEET 1 OF 1	REV N/A

EV90-408 160



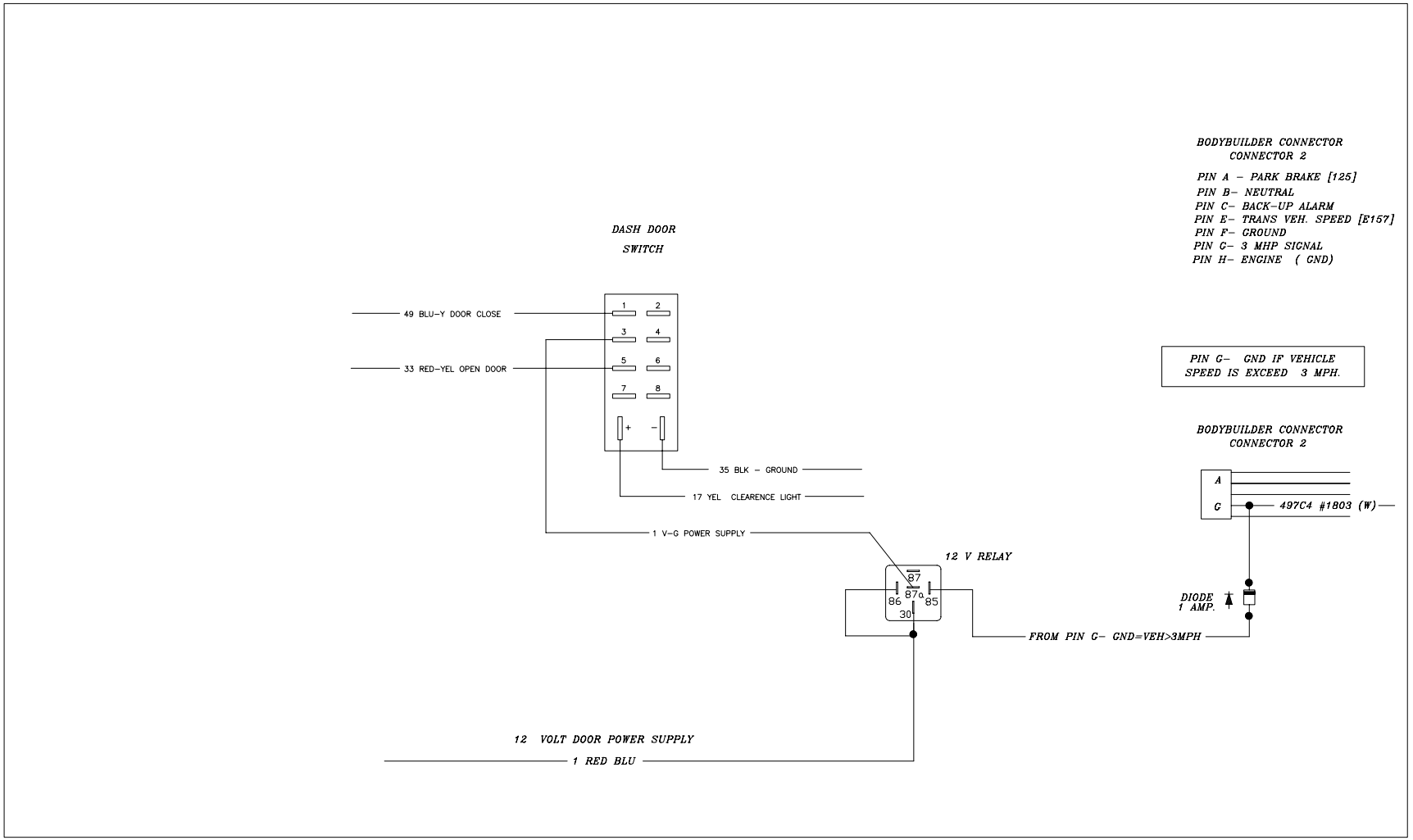
DRAWN BY GS	DATE 4/20/08	SUNLINER COACH	223 Wall St, Suite 290 New York, New York 11743 Phone (1-800) 949 4673
APPROVED JAS	DATE 4/20/08	A STALLION BUS INDUSTRIES COMPANY	
SCALE N/A DO NOT SCALE THIS DWG.	DIMENSIONS N/A	TITLE POWER DISTRIDUTION	
CAD FILE E031	SIZE B	MODEL V90	DWG NO. EV90-408 160 SHEET 1 OF 1 REV N/A

EV90-408 170



DRAWN BY: GS	DATE: 4/20/08	SUNLINER COACH A STALLION BUS INDUSTRIES COMPANY	223 Wall St, Suite 290 New York, New York 11743 Phone (1-800) 949 4673
APPROVED: JAS	DATE: 4/20/08		
SCALE: N/A DO NOT SCALE THIS DWG.	DIMENSIONS: N/A	TITLE: LAVATORY - CHEMICAL ELECTRICAL & PNEUMATIC	
CAD FILE: E033	SIZE: B	MODEL: V90	DWG NO.: EV90-408 170
		SHEET: 1 OF 1	REV: N/A

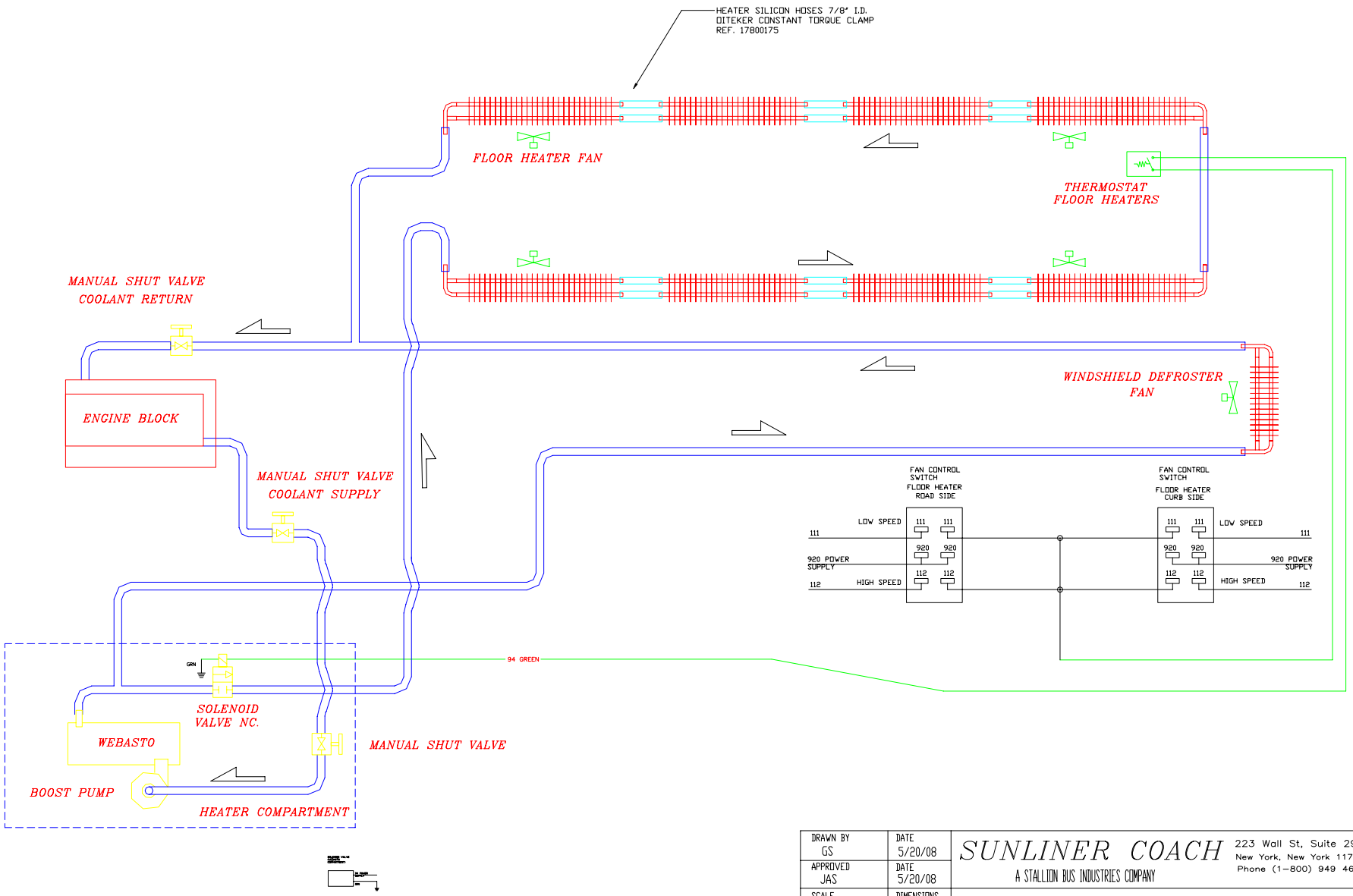
EV90-408 0180



NOTE: WITH THIS SETUP DISABLES DOOR DASH SWITCH
IF VEHICLE SPEED IS MORE THAN 3 MPH.

DRAWN BY GS	DATE 3/19/08	SUNLINER COACH A STALLION BUS INDUSTRIES COMPANY	223 Wall St, Suite 290 New York, New York 11743 Phone (1–800) 949 4673
APPROVED JAS	DATE 4/10/08		
SCALE N/A DO NOT SCALE THIS DWG.	DIMENSIONS INCHES	TITLE DASH DOOR SWITCH DISABLE AFTER 3 MHP	
CAD FILE E035	SIZE B	MODEL V90 / DWG NO. EV90-408 180 / SHEET 1 OF 1	REV N/A

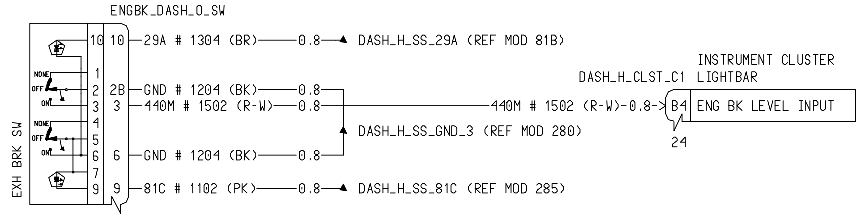
EV90-408 190



DRAWN BY GS	DATE 5/20/08	SUNLINER COACH A STALLION BUS INDUSTRIES COMPANY	223 Wall St, Suite 290 New York, New York 11743 Phone (1-800) 949 4673
APPROVED JAS	DATE 5/20/08		
SCALE N/A DO NOT SCALE THIS DWG.	DIMENSIONS N/A	TITLE HEATER DIAGRAM W/ FLOOR HEATER THERMOSTAT CONTROL	
CAD FILE E037	SIZE B	MODEL V90	DWG NO. EV90-408 190
		SHEET 1 OF 1	REV N/A

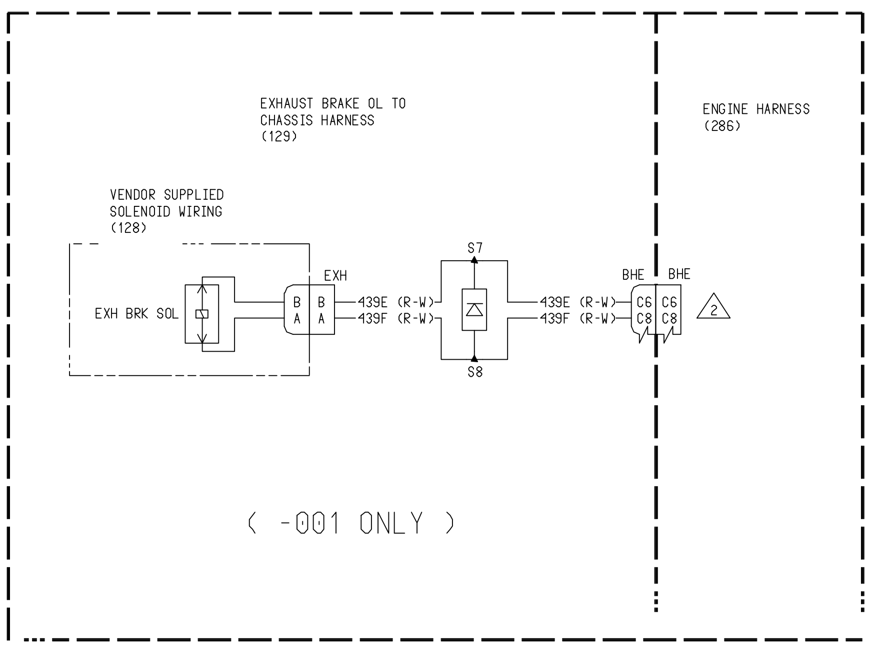
RELEASE NUMBER	REV LTR	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P28626-01	-	--	INITIAL RELEASE	TAA	12/06/05	JMD
P30147-01	A	--	ADDED REF MOD TO SPLICES	TAA	03/02/06	JMD

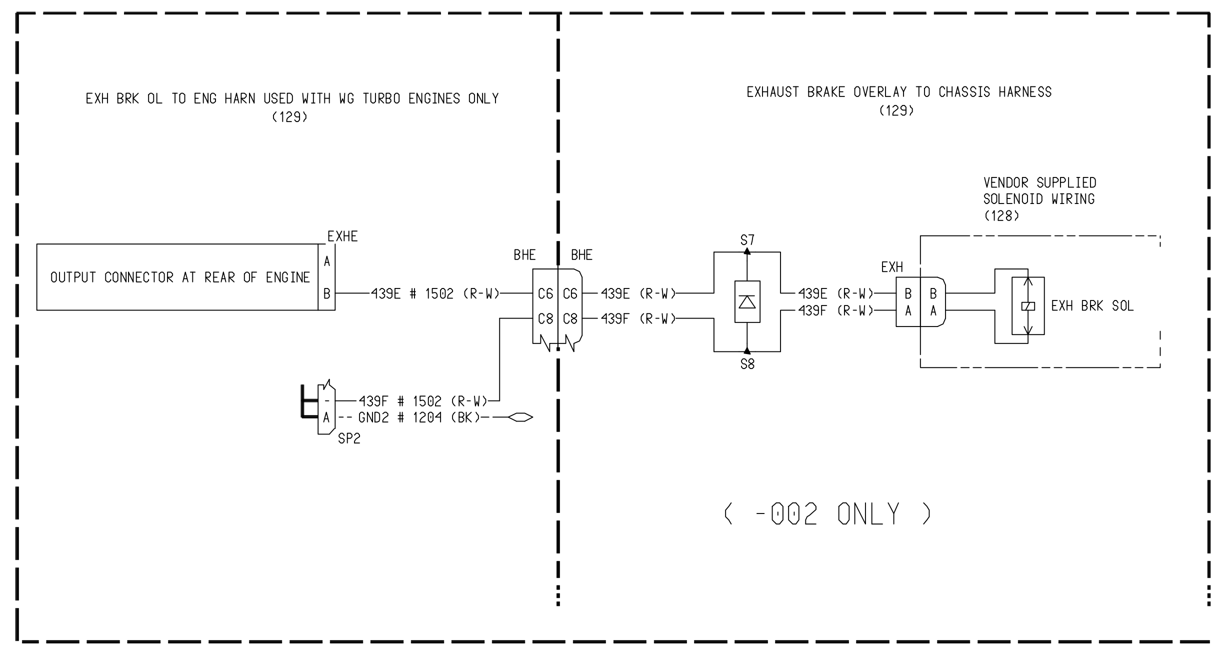
EXHAUST BRAKE OVERLAY TO DASH HARNESS



INPUT 1 IS GROUNDED TO REQUEST EXHAUST BRAKE. IP BROADCASTS SWITCH STATUS VIA J1939 TO ENGINE ECM.

(-000, -001, -002)





WIRE SIZE SHOWN IN mm^2

METRIC mm^2	AWG/GA
0.5	20
0.8	18
1	16
2	14
3	12
5	10
8	8
13	6
19	4
32	2
40	1
50	0
62	2/0

ENGINE BRAKE CONTROLS/WIRING: XLINE (ENG BK)

1. HARNESSES FOUND IN MODULE 129 (ENG BK)

⚠2 REFERENCE MODULE 283 FOR ENGINE CONTROL SCHEMATIC.

DO NOT SCALE COPIES OF THIS DRAWING

ITEM NUMBER	DESCRIPTION
G06-58439-002	WRG-ENG BRK,EXH,BRK,CUM,X
G06-58439-001	WRG-ENG BRK,EXH BRK,CAT,X
G06-58439-000	WRG-ENG BRK,EXH BRK,X

FREIGHTLINER LLC

MATERIAL APPROVAL: DATE:

DRAWN BY: T.ALCORN DATE: 10/25/05

CHECKED BY: E.REYNOLDS DATE: 12/06/05

RESPONSIBLE ENGINEER: T.ALCORN DATE: 12/06/05

APPROVED BY: J.DEMEZA DATE: 12/06/05

UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.

THIRD ANGLE PROJECTION

UNITS OF MEASURE: MM

RESPONSIBLE MFG. ENGR: DATE:

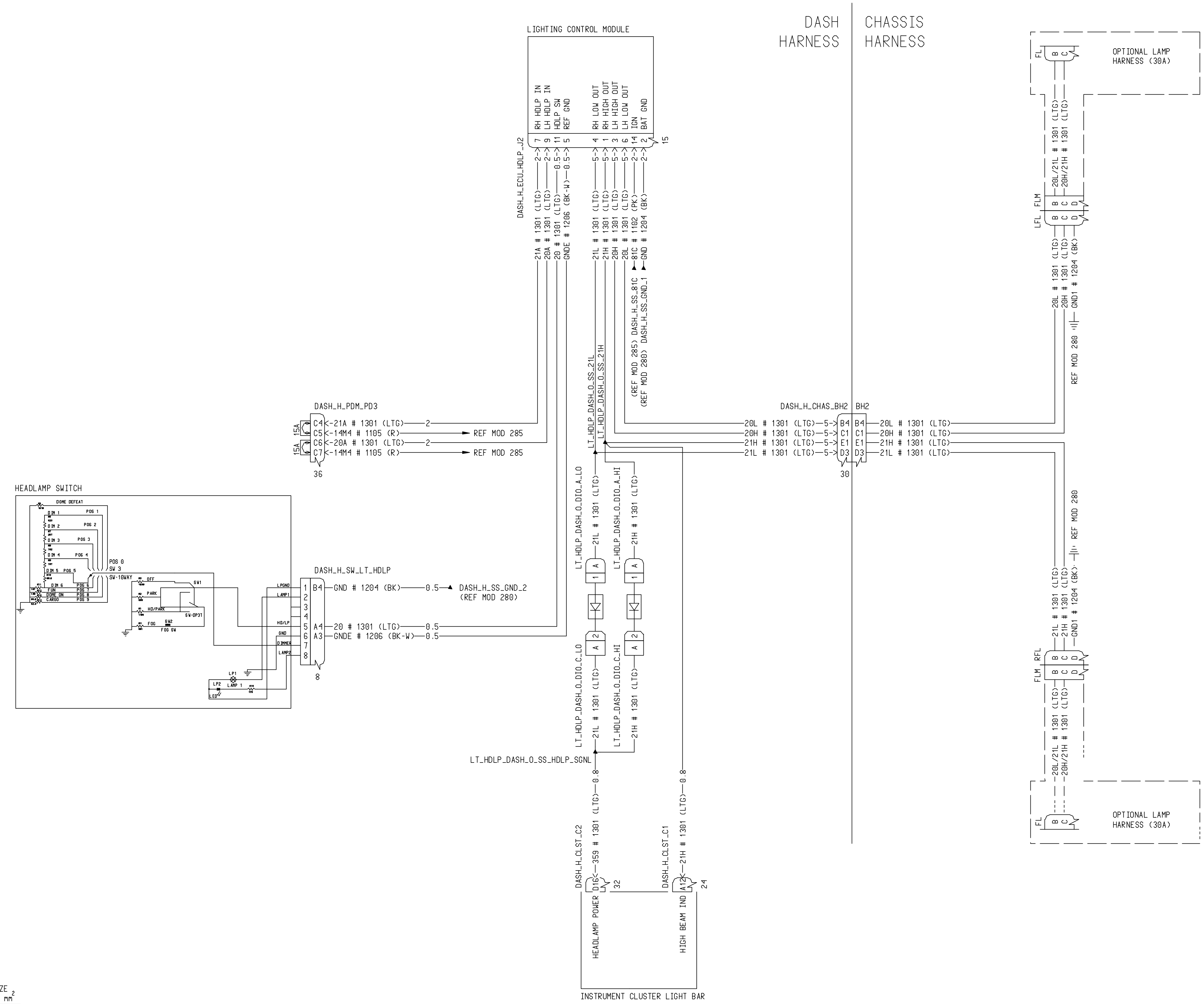
DESCRIPTION: WRG-ENG BRK,EXH BRK,X

SUPPLEMENTARY DESCRIPTION: 129B3

ITEM/DRAWING NUMBER: G06-58439 | REVISION LETTER: A | SHEET_NUMBER: 1 OF 1

E-SIZE

FILE PATH = $FTL/ftl_data/Product/FCCC/Wiring_Diagrams/ENG_BK/G06-58439.A.FCCC.WRG_ENG_BRK_EXH_BRK_X schematic sheet1
DWG FILE LOC PDX MENTOR
LAST FILE = Thu Mar 2 12:07:53 2006
PLOT DATE = Thursday, Mar 2, 2006, 12:09:06 pm.



WIRE SIZE SHOWN IN mm^2

METRIC mm^2	AWG/GA
0.5	20
0.8	18
1	16
2	14
3	12
5	10
8	8
13	6
19	4
32	2
40	1
50	0
62	2/0

HEADLAMP CONTROLS/WIRING: XLINE (LT_HDLP)

1. HARNESSES FOUND IN MODULE 311 (LT HDLP)

RELEASE NUMBER	REV	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P20626-18	-	--	INITIAL RELEASE	TAA	11/08/05	EPR
P38147-01	A	--	ADDED REF MOD TO SPLICES	TAA	03/06/06	JMD

FREIGHTLINER LLC

THE INFORMATION CONTAINED HEREIN IS PROPRIETARY DATA, AND IS NOT FOR DISSEMINATION OR DISCLOSURE, IN WHOLE OR IN PART, FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SUBMITTED, EXCEPT AS AUTHORIZED IN WRITING BY FREIGHTLINER CORPORATION.

ITEM NUMBER: G06-58452-000
DESCRIPTION: WRG-LT HDLP,X

DRAWN BY: T.ALCORN 06/17/05
CHECKED BY: E.REYNOLDS 11/08/05
RESPONSIBLE ENGINEER: T.ALCORN 11/08/05
APPROVED BY: E.REYNOLDS 11/08/05

UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EDGM 99C8-K17.

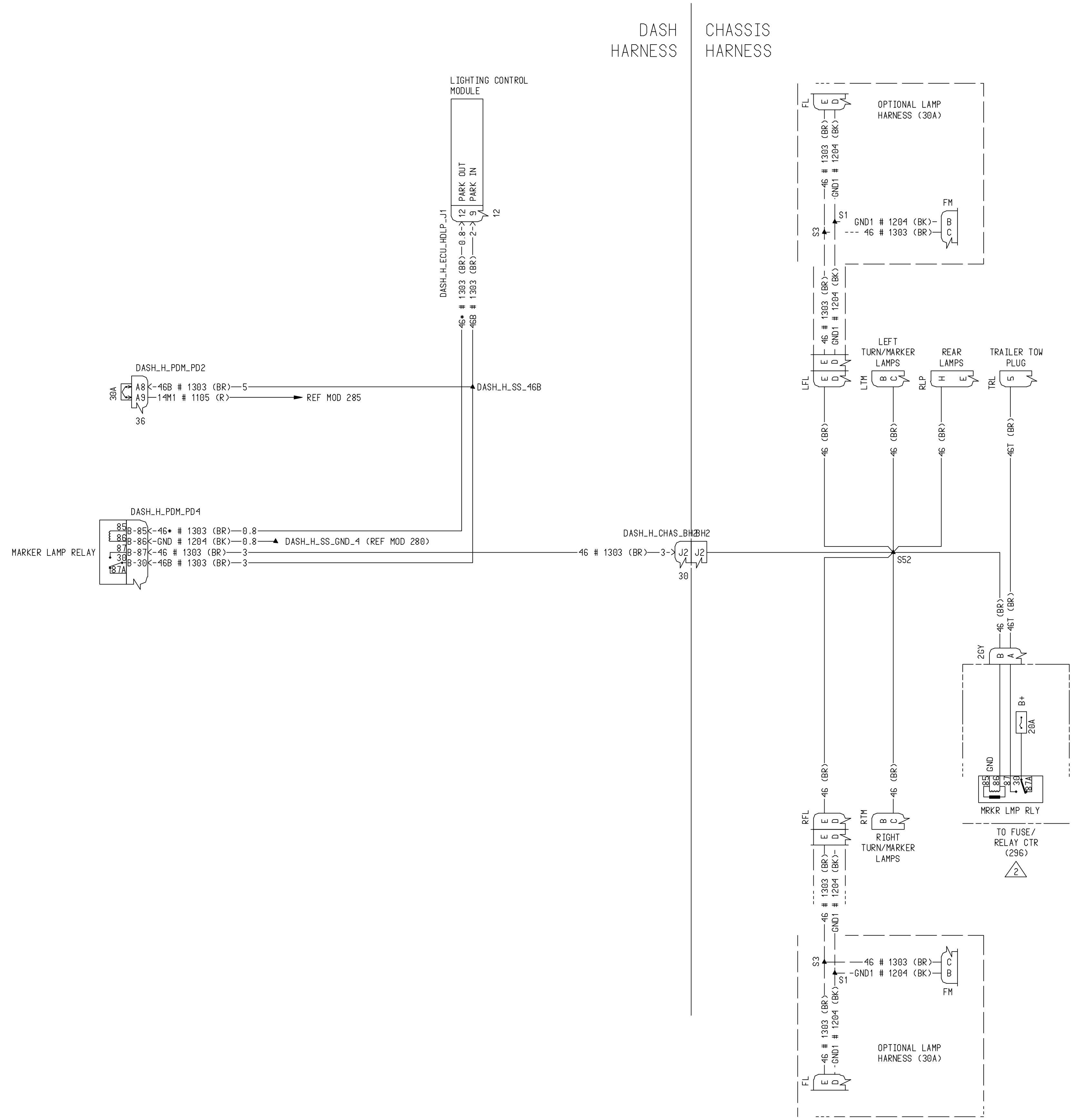
THIRD ANGLE PROJECTION — UNITS OF MEASURE: MM

DESCRIPTION: WRG-LT HDLP,X
SUPPLEMENTARY DESCRIPTION: 311B4
ITEM/DRAWING NUMBER: G06-58452 — REVISION LETTER: A — SHEET NUMBER: 1 OF 1

DO NOT SCALE COPIES OF THIS DRAWING

E-SIZE

FILE PATH = $FTL/ftl.data/Product/FCCC/Wiring_Diagrams/LT_HDLP/G06-58452.A.FCCC.WRG.LT_HDLP_X schematic sheet1
DWG FILE LOC PDX MENTOR
LAST FILE = Mon Mar 6 05:50:48 2006
PLOT DATE = Mon, Mar 6, 2006 5:55:57 am.



RELEASE NUMBER	REV	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P28626-10	-	--	INITIAL RELEASE	TAA	11/08/05	EPR
P38147-01	A	--	ADDED REF MOD TO SPLICE	TAA	03/06/06	JMD

WIRE SIZE SHOWN IN mm^2

METRIC mm^2	AWG/GA
0.5	20
0.8	18
1	16
2	14
3	12
5	10
8	8
13	6
19	4
32	2
40	1
50	0
62	2/0

WIRING - MARKER LAMPS: XLINE (LT_MKR)

1. HARNESSES FOUND IN MODULE 320 (DASH)
2. REFERENCE VEC SCHEMATIC IN MODULE 296.

DO NOT SCALE COPIES OF THIS DRAWING

FREIGHTLINER LLC

ITEM NUMBER: G06-58474-000
DESCRIPTION: WRG-LT MKR,X

MATERIAL APPROVAL: DATE:
DRAWN BY: T.ALCORN DATE: 08/29/05
CHECKED BY: E.REYNOLDS DATE: 11/08/05
RESPONSIBLE ENGINEER: T.ALCORN DATE: 11/08/05
APPROVED BY: E.REYNOLDS DATE: 11/08/05
RESPONSIBLE MFG. ENGR: DATE:

UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.

THIRD ANGLE PROJECTION — UNITS OF MEASURE: MM

DESCRIPTION: WRG-LT MRK,X
SUPPLEMENTARY DESCRIPTION: 30AB3

ITEM/DRAWING NUMBER: G06-58474 | REVISION LETTER: A | SHEET NUMBER: 1 OF 1

E-SIZE

FILE PATH = $FTL/ftl.data/Product/FCCC/Wiring_Diagrams/LT_MKR/G06-58474.A.FCCC.WRG.LT_MKR_X schematic sheet1
DWG FILE LOC #DX MENTOR
LAST FILE = Mon Mar 6 05:51:25 2006
PLOT DATE = Mon, Mar 6, 2006, 5:51:59 am.

RELEASE NUMBER	REV LTR	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P28626-07	-	--	INITIAL RELEASE	TAA	10/26/05	JMD

DASH HARNESS

CHASSIS HARNESS

BODYBUILDER CONNECTOR

BODYBUILDER REV SIG — C — 8

DASH_H_BODY_BB2

120B # 1322 (DKBL) — 0.8

DASH_H_CHAS_BH1 BH1

D1 — 38

120B # 1322 (DKBL) — 0.8

D1

S59

REAR LAMPS

RLP: D, E

120B (DKBL)

GND2 (BK)

REF MOD 280

SPLICE PACK

SP2: A, -, -, J

GND2 (BK)

GND2 (BK)

120B (DKBL)

120B (DKBL)

REF MOD 280

TRAILER TOW PLUG

TRL: 3

120BT (DKBL)

(DKBL)

120B

2

1BK: A

1GY: D

IGN

15A

IGN

85, 86, 87, 30, 87A

B-UP RELAY

4

3

GND2 (BK)

120B (DKBL)

B, A

B, A

BA1BUP

BA3

GND (BK)

120B (DKBL)

BA2

BACK-UP ALARM (721)

(DKBL)

120B

120BT (DKBL)

2GY: D, C

10A

GND

IGN

85, 86, 87, 30, 87A

B-UP RELAY

FUSE/RELAY CENTER (296)

5

WIRE SIZE SHOWN IN mm^2

METRIC mm^2	AWG/GA
0.5	20
0.8	18
1	16
2	14
3	12
5	10
8	8
13	6
19	4
32	2
40	1
50	0
62	2/0

WIRING BACKUP/REVERSE: XLINE (LT_BKUP)

1. HARNESSES FOUND IN MODULE 288 (CHASSIS) AND MODULE 35H (BACKUP)
2. GROUND IF IN REVERSE WARNING SIGNAL FROM TRANSMISSION TCM. SEE MODULE 34B.
3. OPTIONAL BACKUP ALARM OVERLAY AND JUMPER HARNESS.
4. REFERENCE VEC SCHEMATIC IN MODULE 335.
5. REFERENCE VEC SCHEMATIC IN MODULE 296.

ITEM NUMBER: G06-58482-000

DESCRIPTION: WRG-LT BKUP,X

FREIGHTLINER LLC

MATERIAL APPROVAL: DATE:

DRAWN BY: T.ALCORN DATE: 05/21/05

CHECKED BY: E.REYNOLDS DATE: 10/26/05

RESPONSIBLE ENGINEER: T.ALCORN DATE: 10/26/05

APPROVED BY: J.DEMEZA DATE: 10/26/05

UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.

THIRD ANGLE PROJECTION

UNITS OF MEASURE: MM

RESPONSIBLE MFG. ENGR: DATE:

DESCRIPTION: WRG-LT BKUP,X

SUPPLEMENTARY DESCRIPTION: 35HB4

ITEM/DRAWING NUMBER: G06-58482

REVISION LETTER: -

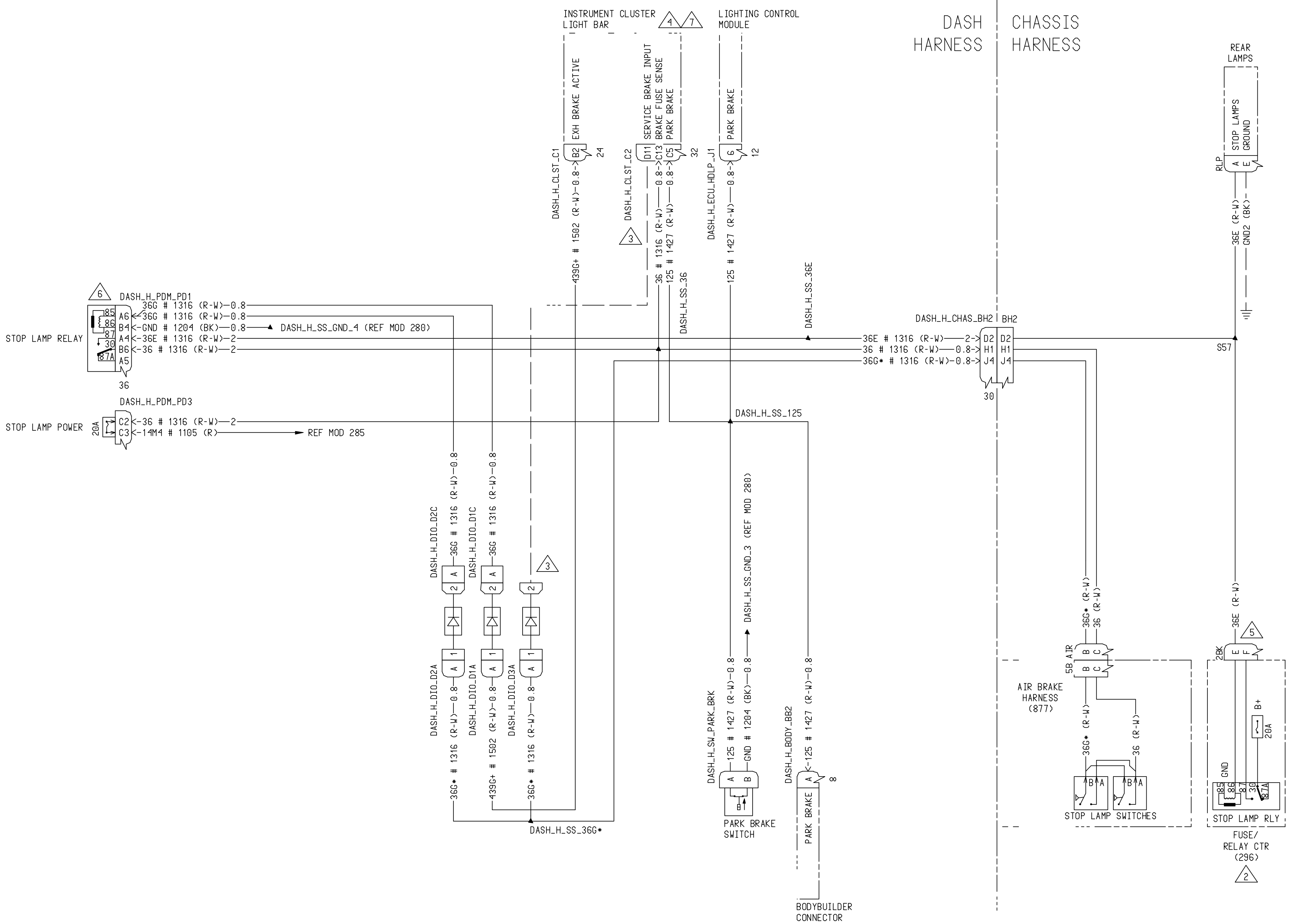
SHEET_NUMBER: 1 OF 1

LAST FILE = Mon Oct 3 11:06:49 2005 FILE PATH = $FTL/ftl_data/Product/FCCC/Wiring_Diagrams/LT_BKUP/G06-58482-- FCCC.WRG_LT_BKUP_X schematic sheet1

PLOT DATE = Thursday, Oct 13, 2005, 9:55:17 an. DWG FILE LOC = PDX MENTOR

D-SIZE

RELEASE NUMBER	REV LTR	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P28626-04	-	--	INITIAL RELEASE	TAA	01/18/06	JMD
P30147-01	A	--	ADDED REF MOD TO SPLICES	TAA	03/06/06	JMD



WIRING SERVICE/PARK BRAKE: XLINE (BK_SVCE)

1. HARNESSES FOUND IN MODULE 877 (SERVICE BRAKE)
2. REFERENCE VEC SCHEMATIC IN MODULE 296.
3. REFERENCE EITHER MODULE 54C OR 149 FOR SCHEMATIC.
4. INSTRUMENTATION BROADCASTS SERVICE BRAKE STATUS VIA J1939 WHEN SOURCED HIGH. REF MOD 149 OR 54C FOR INPUT CIRCUIT.
5. STOP LAMP CIRCUIT NOT USED. TRAILER TOW PLUG ONLY CONTAINS COMBINATION STOP/TURN SIGNAL.
6. INSTRUMENTATION OUTPUTS 12V WHEN ENGINE BRAKE IS ACTIVE TO ACTIVATE STOP LAMP RELAY. OR DEPRESSING SERVICE BRAKE ACTIVATES STOP LAMP RELAY.
7. IF BRAKE FUSE SENSE INPUT IS LESS THAN 9V THEN INSTRUMENTATION SENDS J1939 MESSAGE TO DISABLE CRUISE CONTROL.

WIRE SIZE SHOWN IN mm^2

METRIC mm^2	AWG/GA
0.5	20
0.8	18
1	16
2	14
3	12
5	10
8	8
13	6
19	4
32	2
40	1
50	0
62	2/0

FREIGHTLINER LLC

ITEM NUMBER: G06-59044-000
DESCRIPTION: WRG-BK SVCE,X

MATERIAL APPROVAL:	DATE:	UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5N-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.
DRAWN BY: T.ALCORN	DATE: 08/22/05	
CHECKED BY: E.REYNOLDS	DATE: 01/18/06	
RESPONSIBLE ENGINEER: T.ALCORN	DATE: 01/18/06	THIRD ANGLE PROJECTION — UNITS OF MEASURE: MM
APPROVED BY: J.DEMEZA	DATE: 01/18/06	RESPONSIBLE MFG. ENGR: — DATE:

DESCRIPTION: WRG-BK SVCE,X
SUPPLEMENTARY DESCRIPTION: 877B3

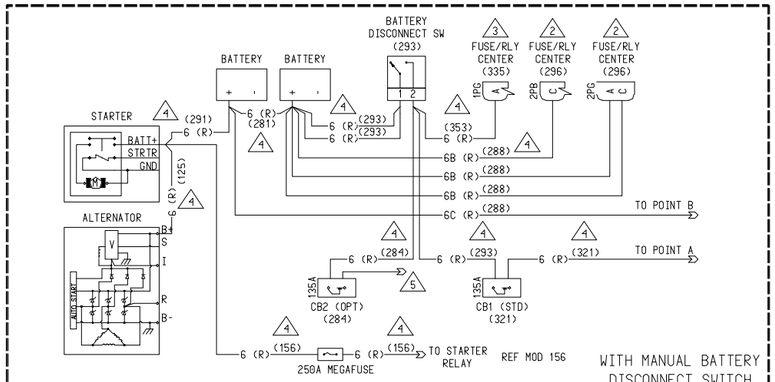
ITEM/DRAWING NUMBER:	REVISION LETTER:	SHEET_NUMBER:
G06-59044	A	1 OF 1

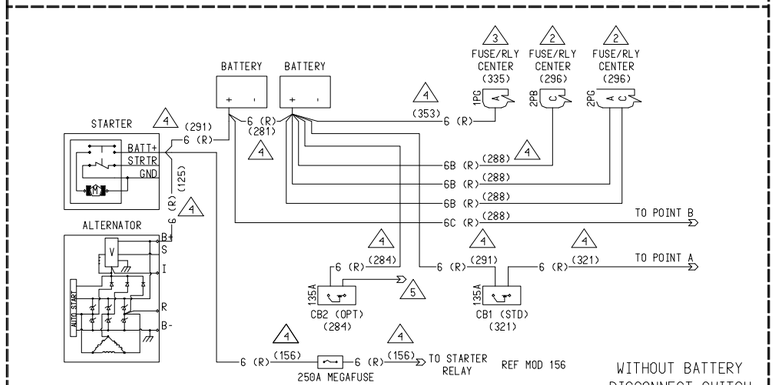
DO NOT SCALE COPIES OF THIS DRAWING

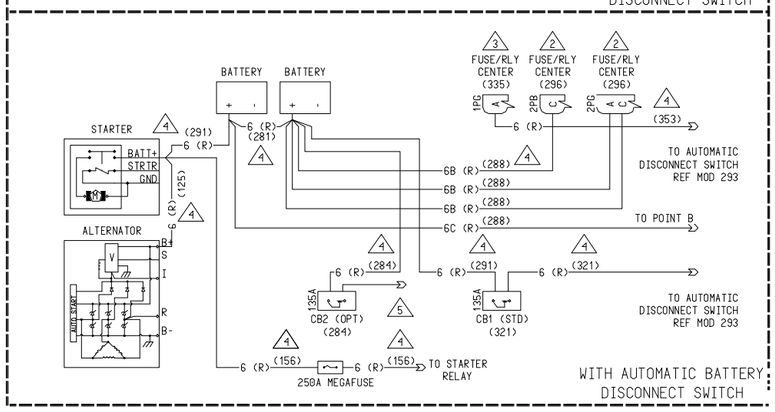
E-SIZE

FILE PATH = $FTL/ftl.data/Product/FCCC/Wiring_Diagrams/BK_SVCE/G06-59044.A.FCCC.WRG_BK_SVCE_X schematic sheet1
DWG FILE LOC PDX MENTOR
LAST FILE = Mon Mar 6 07:20:40 2006
PLOT DATE = Mon, Mar 6, 2006 7:23:27 am

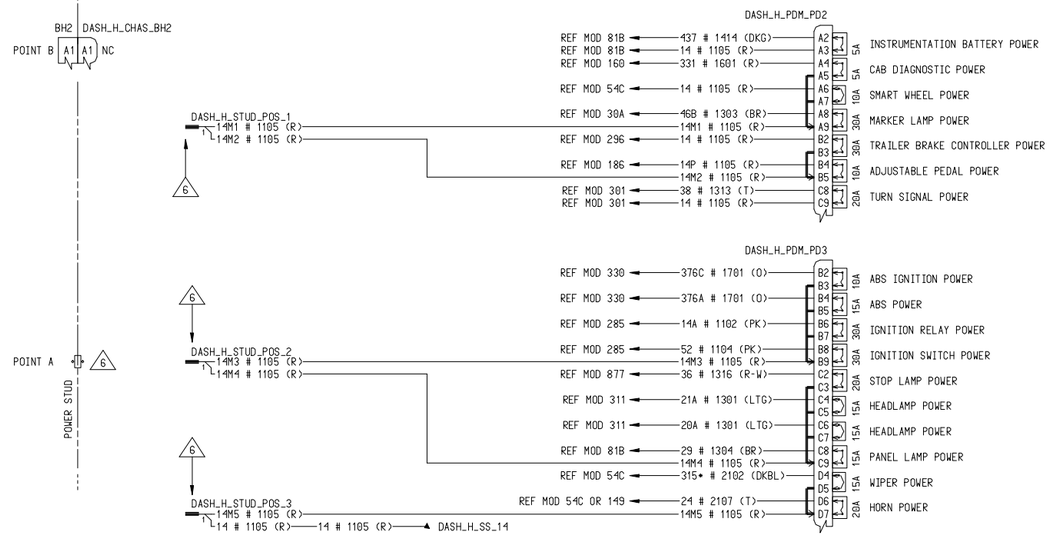
RELEASE NUMBER	ITEM	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P2062C-04	-	--	INITIAL RELEASE	TAA	01/18/06	JMD







DASH HARNESS



WIRING - CIRCUIT PROTECTION/BATTERY: XLINE (PWR)

1. HARNESSES FOUND IN MODULE 285 (PWR)
2. REFERENCE VEC SCHEMATIC IN MODULE 296.
3. REFERENCE VEC SCHEMATIC IN MODULE 335.
4. THE MODULE WHERE THE CABLE IS FOUND IS LISTED IN PARENTHESIS.
5. BODYBUILDER POWER.
6. RING TERMINALS CONNECT TO POWER STUD.

WIRE SIZE SHOWN IN mm^2

METRIC mm^2	AWG/GA
0.5	20
0.8	18
1	16
2	14
3	12
5	10
8	8
13	6
19	4
32	2
40	1
50	0
62	2/0

FREIGHTLINER LLC

MATERIAL APPROVAL: - DATE: -
DRAWN BY: P.ALCORN DATE: 08/17/06
CHECKED BY: E.REYNOLDS DATE: 01/18/06
RESPONSIBLE ENGINEER: T.ALCORN DATE: 01/18/06
APPROVED BY: J.DEMEZA DATE: 01/18/06
UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EDCN 0969-E17.
THIRD ANGLE PROJECTION
UNITS OF MEASURE: MM
RESPONSIBLE MFG. ENGR: - DATE: -

ITEM NUMBER: G06-59067-000
DESCRIPTION: WRG-POWER DIST,BAT,X
DESCRIPTION: WRG-POWER DIST,BAT,X
SUPPLEMENTARY DESCRIPTION: 285B3
ITEM/DRAWING NUMBER: G06-59067
REVISION LETTER: -
SHEET NUMBER: 1 OF 1

DO NOT SCALE COPIES OF THIS DRAWING

E-SIZE

FILE PATH = $FIL/FIL_data/Product/FCCC/Wiring_Diagrams/PWR/G06-59067_-_FCCC_WRG-POWER_DIST_BAT_X_schematic_sheet1
DWG FILE LOC = PDX MENTOR
LAST FILE = Tue Jan 17 07:04:36 2006
PLOT DATE = Tues, Jan 17, 2006, 7:06:19 am.

RELEASE NUMBER	REV LTR	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P28626-07	-	--	INITIAL RELEASE	TAA	10/25/05	JMD
P30147-01	A	--	ADDED REF MOD TO SPLICES	TAA	03/06/06	JMD

DASH HARNESS | CHASSIS HARNESS

INSTRUMENT CLUSTER LIGHTBAR

DASH_H_CLST_C2 — 0.8 — D12 ABS LAMP L1 — 32

376L # 1701 (O) — 0.8 → DASH_H_CHAS_BH1 B1 B1 — 38

DASH_H_PDM_PD3

15A 10A
- B2 ← 376C # 1701 (O) — 2
- B3 ← 14M3 # 1105 (R) → REF MOD 285
- B4 ← 376A # 1701 (O) — 2 → DASH_H_CHAS_BH2 B2 B2
- B5 ← 14M3 # 1105 (R) → REF MOD 285

36

376A # 1701 (O) — 2 → B1 B1 — 30

376C1 # 1701 (O) — 2 →

DASH_H_PDM_PD1

ABS IGN RELAY (87A, 30, 87, 86, 85)
- B8
- B9 ← 376C # 1701 (O) — 2
- A7 ← 376C1 # 1701 (O) — 2
- B7 ← 52D # 1102 (PK) — 0.8 → DASH_H_SS_52D (REF MOD 285)
- A9 ← GND # 1204 (BK) — 0.8 → DASH_H_SS_GND_4 (REF MOD 280)

36

DASH_H_CHAS_BH2 BH2

376A (O)
376C1 (O)
REF MOD 160: 1587+A (DKG), 1939-A (DKG), 1939+A (Y), 1587-A (O)
376L (O)
REF MOD 280: GND2 (BK), GND2 (BK)

X1 | X1 — GRAY

1	1	BAT PWR
2	2	IGN PWR
3	3	ATC
4	4	J1587+
5	5	RETARDER
6	6	J1939-
7	7	J1939+
8	8	
9	9	J1587-
10	10	LAMP
11	11	GND
12	12	GND

RH SENSOR, LH SENSOR, RH VALVE (OV, GND, IV), LH VALVE (OV, GND, IV)

377RF+ (BR), 377RF- (BK), 377LF- (BK), 377LF+ (BR), 378RFO (BL), 378RF- (G/Y), 378RFI (BR), 378LFO (BL), 378LF- (G/Y), 378LFI (BR)

X2 | X2 — BLACK

1	1	AXLE LOCK
5	5	LH SNSR
6	6	LH SNSR
7	7	RH SNSR
8	8	RH SNSR
3	3	RH VLV OUT
9	9	RH VLV COM
4	4	RH VLV IN
10	10	LH VLV OUT
11	11	LH VLV COM
2	2	LH VLV IN
12	12	AXLE LOCK

WABCO ABS ECU (49A)

X3 | X3 — GREEN

1	1	LH SNSR
2	2	LH SNSR
3	3	RH SNSR
4	4	RH SNSR
5	5	ATC
6	6	ATC COM
7	7	RH VLV OUT
8	8	RH VLV COM
9	9	RH VLV IN
10	10	LH VLV OUT
11	11	LH VLV COM
12	12	LH VLV IN

X4 | X4 — BROWN

OFF-ROAD	1	1
RH SNSR	5	5 — 377RF+ (BR)
RH SNSR	6	6 — 377RF- (BK)
LH SNSR	4	4 — 377LF- (BK)
LH SNSR	3	3 — 377LF+ (BR)
RH VLV OUT	7	7 — 378RFO (BL)
	8	8 — 378RF- (G/Y)
RH VLV IN	9	9 — 378RFI (BR)
LH VLV OUT	10	10 — 378LFO (BL)
LH VLV COM	11	11 — 378LF- (G/Y)
LH VLV IN	12	12 — 378LFI (BR)
NOT USED	2	2

RH SENSOR, LH SENSOR, RH VALVE, LH VALVE

2

377LR+ (BR), 377LR- (BK), 377RR+ (BR), 377RR- (BK)

378RRO (BL), 378RR- (G/Y), 378RRI (BR), 378LRO (BL), 378LR- (G/Y), 378LRI (BR)

LH SENSOR, RH SENSOR, RH VALVE, LH VALVE

WIRE SIZE SHOWN IN mm^2

METRIC mm^2	AWG/GA
0.5	20
0.8	18
1	16
2	14
3	12
5	10
8	8
13	6
19	4
32	2
40	1
50	0
62	2/0

WIRING - ABS: XLINE (ABS)

1. HARNESSES FOUND IN MODULE 330 (ABS), 332 (FRONT ABS), 333 (REAR ABS)
2. OPTIONAL TAG AXLE WIRING SHOWN IN CONNECTOR X4.

DO NOT SCALE COPIES OF THIS DRAWING

FREIGHTLINER LLC

MATERIAL APPROVAL:	DATE:
DRAWN BY: D.SNYDER	DATE: 08/19/05
CHECKED BY: E.REYNOLDS	DATE: 10/26/05
RESPONSIBLE ENGINEER: T.ALCORN	DATE: 10/26/05
APPROVED BY: J.DEMEZA	DATE: 10/26/05
RESPONSIBLE MFG. ENGR:	DATE:

UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.

THIRD ANGLE PROJECTION — UNITS OF MEASURE: MM

ITEM NUMBER: G06-59114-000

DESCRIPTION: DWG-WRG,ABS,X

DESCRIPTION: DWG-WRG,ABS,X

SUPPLEMENTARY DESCRIPTION: 330B3

ITEM/DRAWING NUMBER: G06-59114 | REVISION LETTER: A | SHEET_NUMBER: 1 OF 1

FILE PATH = $FTL/ftl_data/Product/FCCC/Wiring_Diagrams/ABS/G06-59114-A.FCCC.WRG_ABS_X schemat.ic sheet 1

DWG FILE LOC = PDX MENTOR

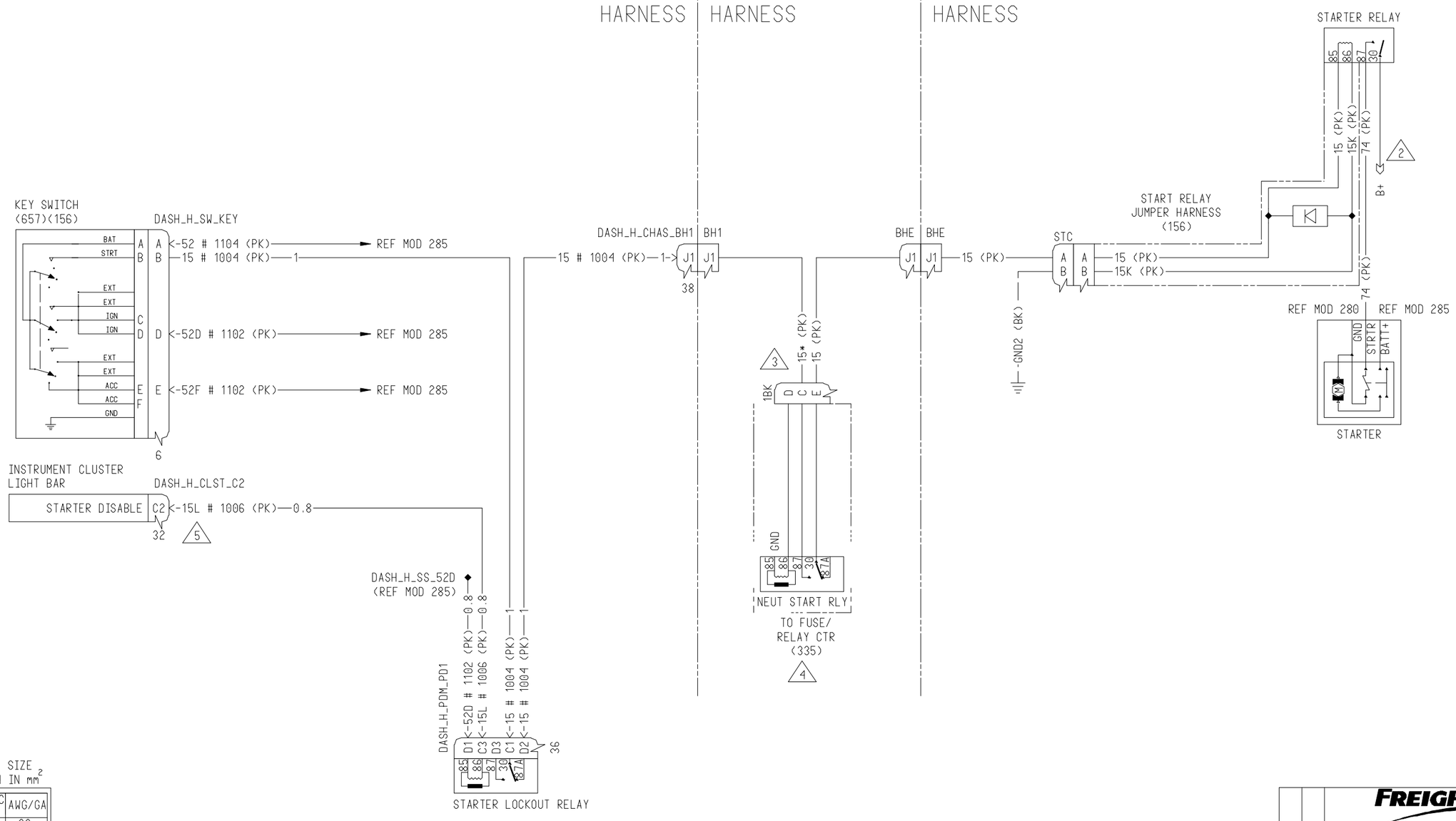
PLOT DATE = Mon, Mar 6, 2006 6:07:22 am.

LAST FILE = Mon Mar 6 06:05:29 2006

D-SIZE

RELEASE NUMBER	REV LTR	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P28626-07	-	-	INITIAL RELEASE	TAA	10/26/05	JMD
P30147-01	A	--	ADDED REF MOD TO SPLICES	TAA	03/02/06	JMD

DASH HARNESS | CHASSIS HARNESS | ENGINE HARNESS



WIRE SIZE SHOWN IN mm^2

METRIC mm^2	AWG/GA
0.5	20
0.8	18
1	16
2	14
3	12
5	10
8	8
13	6
19	4
32	2
40	1
50	0
62	2/0

WIRING - STARTER CONTROL: XLINE (ST_SP)

1. HARNESSES FOUND IN MODULE 156 (STARTER CONTROL).
2. FROM 250A MEGAFUSE.
3. 12V IF TRANSMISSION IS IN NEUTRAL. REF MOD 34B.
4. REFERENCE VEC SCHEMATIC IN MODULE 335.
5. STARTER DISABLE OUTPUT IS ACTIVE LOW WHEN ENGINE RPM >500.

ITEM NUMBER: G06-59162-000
DESCRIPTION: WRG-ST SP,X

FREIGHTLINER LLC

MATERIAL APPROVAL: . DATE: .	UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.
DRAWN BY: T.ALCORN DATE: 08/24/05	
CHECKED BY: E.REYNOLDS DATE: 10/26/05	UNITS OF MEASURE: MM
RESPONSIBLE ENGINEER: T.ALCORN DATE: 10/26/05	THIRD ANGLE PROJECTION
APPROVED BY: J.DEMEZA DATE: 10/26/05	RESPONSIBLE MFG. ENGR: . DATE: .

DESCRIPTION: WRG-ST SP,X

SUPPLEMENTARY DESCRIPTION: 156B3

ITEM/DRAWING NUMBER:	REVISION LETTER:	SHEET_NUMBER:
G06-59162	A	1 OF 1

DO NOT SCALE COPIES OF THIS DRAWING

D-SIZE

FILE PATH = $FTL/ftl_data/Product/FCCC/Wiring_Diagrams/ST_SP/G06-59162.A.FCCC.WRG.ST_SP_X schematic sheet 1
DWG FILE LOC = PDX MENTOR
LAST FILE = Thu Mar 2 12:44:11 2006
PLOT DATE = Thursday, Mar 2, 2006. 12:45:03 pm.

RELEASE NUMBER	REV LTR	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P28626-08	-	-	INITIAL RELEASE	TAA	10/14/05	JMD
P28626-14	A	--	ADDED A06 PROPERTIES	TAA	12/21/05	JMD

BODYBUILDER INTERFACE
CONNECTOR 1 DASH_H_BODY_BB1

ACCESSORY	A	<—52F # 1106 (PK)——►	REF MOD 285
IGNITION	B	<—52J # 1102 (PK)——►	REF MOD 285
DOME LAMP	C	<—41 # 1311 (PRP-W)——►	REF MOD 32B
FRONT LEFT TURN	D	<—38E # 1313 (Y)——►	REF MOD 301
HORN OUTPUT	E	<—24B # 2107 (T)——►	REF MOD 264 OR 54C
FRONT RIGHT TURN	F	<—38F # 1313 (DKG)——►	REF MOD 301
PANEL LAMP	G	<—29A # 1304 (BR)——►	REF MOD 81B
A/C CLUTCH	H	<—97C # 2301 (LTBL)——►	REF MOD 70C
MARKER LAMP FLASH	J	<—23D # 1303 (BR)——►	REF MOD 30A
CARGO LAMP	K	<—113A # 1318 (PRP-W)——►	REF MOD 32B
LEFT FOG LAMP	L	<—27L # 1308 (LTG)——►	REF MOD 313
RIGHT FOG LAMP	M	<—27R # 1308 (LTG)——►	REF MOD 313

BODYBUILDER ICU INTERFACE CONNECTOR DIM_DASH_O_BODY_ICU

GEN ON IND LP SIG	A	214L # 2025 (GY-W)—0.8	214L # 2025 (GY-W)—0.8->	A4	GEN ON IND LP SIG
OPT IND #2	B	399L # 1424 (T)——0.8	399L # 1424 (T)——0.8->	A6	OPT IND #2
OPT IND #3	C	399M # 1424 (T)——0.8	399M # 1424 (T)——0.8->	A7	OPT IND #3
ICU BUZZER	D	437Z # 1414 (DKG)—0.8	437Z # 1414 (DKG)—0.8->	B12	ICU BUZZER
OPT IND #4	E	399N # 1424 (T)——0.8	399N # 1424 (T)——0.8->	A8	OPT IND #4
OPT IND #5	F	399P # 1424 (T)——0.8	399P # 1424 (T)——0.8->	B1	OPT IND #5
OPT IND #6	G	399R # 1424 (T)——0.8	399R # 1424 (T)——0.8->	B8	OPT IND #6
OPT IND #1	H	399K # 1424 (T)——0.8			
UNUSED	J				
UNUSED	K				
OPT IND #8	L	399U # 1424 (T)——0.8	399U # 1424 (T)——0.8->	D4	OPT IND #8
OPT IND #7	M	399T # 1424 (T)——0.8	399T # 1424 (T)——0.8->	C11	OPT IND #7
UNUSED	N		399K # 1424 (T)——0.8->	C14	OPT IND #1
UNUSED	P		453R # 1512 (GY)——0.8->	C3	GND = ENG RUNNING
UNUSED	R				
UNUSED	S				

INSTRUMENT CLUSTER LIGHT BAR

DASH_H_CLST_C1

DASH_H_CLST_C2

BODYBUILDER INTERFACE
CONNECTOR 2 DASH_H_BODY_BB2

GND = PB SET	A	<-125 # 1427 (R-W)——►	REF MOD 877
GND = NEUTRAL	B	<-497C3 # 1803 (W)——►	REF MOD 34B
VBAT = REVERSE	C	<-120B # 1322 (DKBL)——►	REF MOD 35H
UNUSED	D		
VEHICLE SPEED	E	<-497K # 1803 (W)——►	REF MOD 34B
GROUND	F	<-GND # 1204 (BK)——►	REF MOD 280
GND = VEH SPD > 3MPH	G	<-497C4 # 1803 (W)——►	REF MOD 34B
GND = ENG RUNNING	H	453R # 1512 (GY)——0.8	

WIRING - VEHICLE/BODYBUILDER: XLINE (VEH_INTFC)

1. HARNESSES FOUND IN MODULE MODULE 353 (VEHICLE INTERFACE)

ITEM NUMBER: G06-59179-000
DESCRIPTION: WRG-VEH INTFC,X

FREIGHTLINER LLC

MATERIAL APPROVAL: . DATE: .	UNLESS OTHERWISE NOTED. DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.
DRAWN BY: T.ALCORN DATE: 08/24/05	
CHECKED BY: E.REYNOLDS DATE: 10/14/05	
RESPONSIBLE ENGINEER: T.ALCORN DATE: 10/14/05	THIRD ANGLE PROJECTION — UNITS OF MEASURE: MM
APPROVED BY: J.DEMEZA DATE: 10/14/05	RESPONSIBLE MFG. ENGR: . DATE: .

DESCRIPTION: WRG-VEH INTFC,X
SUPPLEMENTARY DESCRIPTION: 353B4

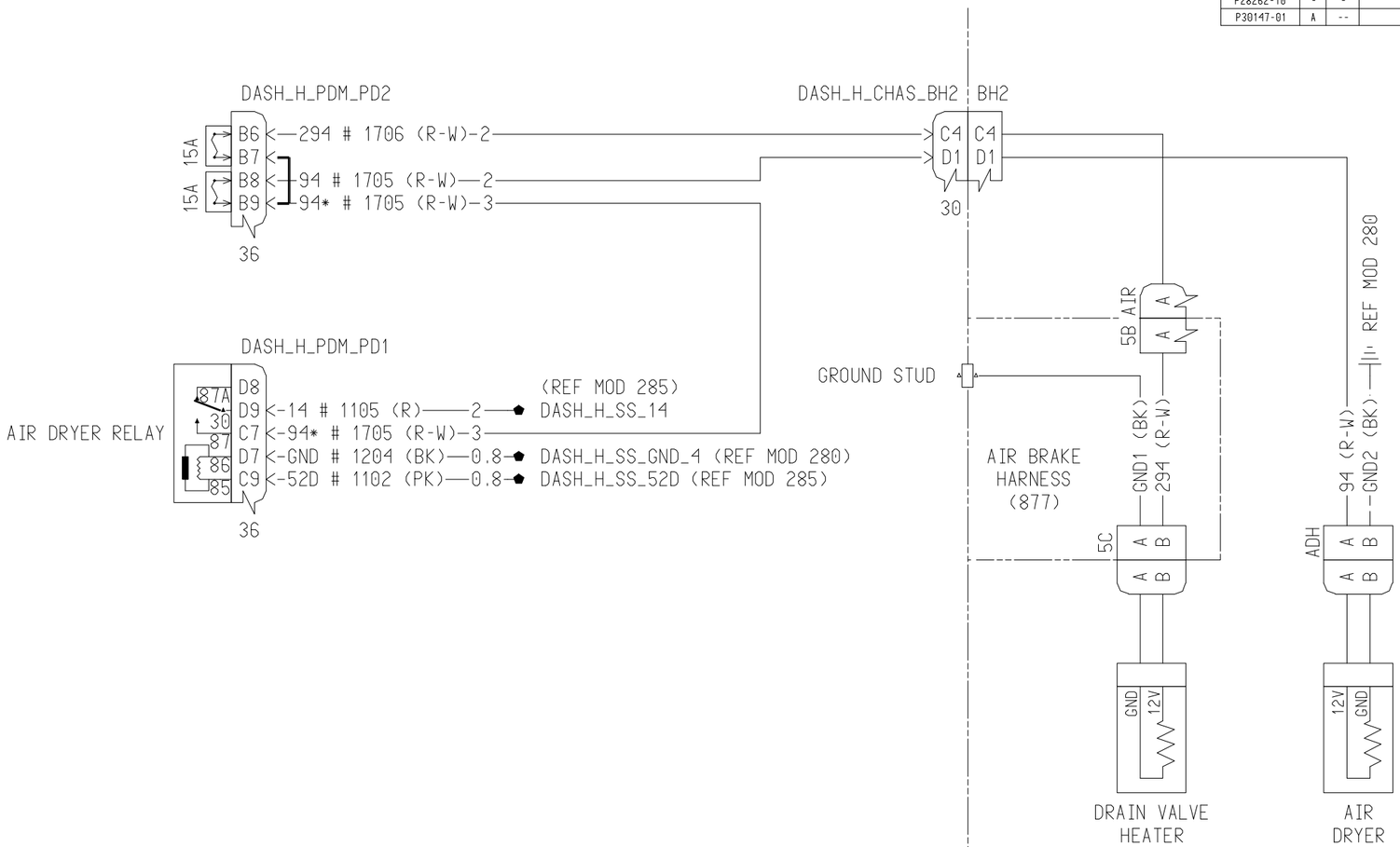
ITEM/DRAWING NUMBER	REVISION LETTER	SHEET_NUMBER
G06-59179	A	1 OF 1

DO NOT SCALE COPIES OF THIS DRAWING

C_SIZE

sheet1 schematic
FILE PATH = $FTL/ftl_data/Product/FCCC/Wiring_Diagrams/VEH_INTFC/G06-59179.A.FCCC.WRG_VEH_INTFC_X
DWG FILE LOC =PDX MENTOR
LAST FILE = Thu Dec 22 05:37:43 2005
PLOT DATE = Thursday, December 22, 2005 5:38:04 am.

RELEASE NUMBER	REV LTR	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P28262-10	-	-	INITIAL RELEASE	D9S	11/08/05	EPR
P30147-01	A	--	ADDED REF MOD TO SPLICES	TAA	03/06/06	JMD



WIRING - AIR DRYER: XLINE (AIR_DRY)

1. HARNESSES FOUND IN MODULE 48A (AIR DRY)

ITEM NUMBER: G06-59183-000

DESCRIPTION: WRG-AIR DRY,X

FREIGHTLINER LLC

MATERIAL APPROVAL: . DATE: .	UNLESS OTHERWISE NOTED. DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.
DRAWN BY: D.SNYDER DATE: 08/26/05	
CHECKED BY: E.REYNOLDS DATE: 11/08/05	
RESPONSIBLE ENGINEER: T.ALCORN DATE: 11/08/05	THIRD ANGLE PROJECTION; UNITS OF MEASURE: MM
APPROVED BY: E.REYNOLDS DATE: 11/08/05	RESPONSIBLE MFG. ENGR: . DATE: .

DESCRIPTION: WRG-AIR DRY,X

SUPPLEMENTARY DESCRIPTION: 48AB3

ITEM/DRAWING NUMBER:	REVISION LETTER	SHEET_NUMBER
G06-59183	A	1 OF 1

DO NOT SCALE COPIES OF THIS DRAWING

C_SIZE

sheet1 schematic

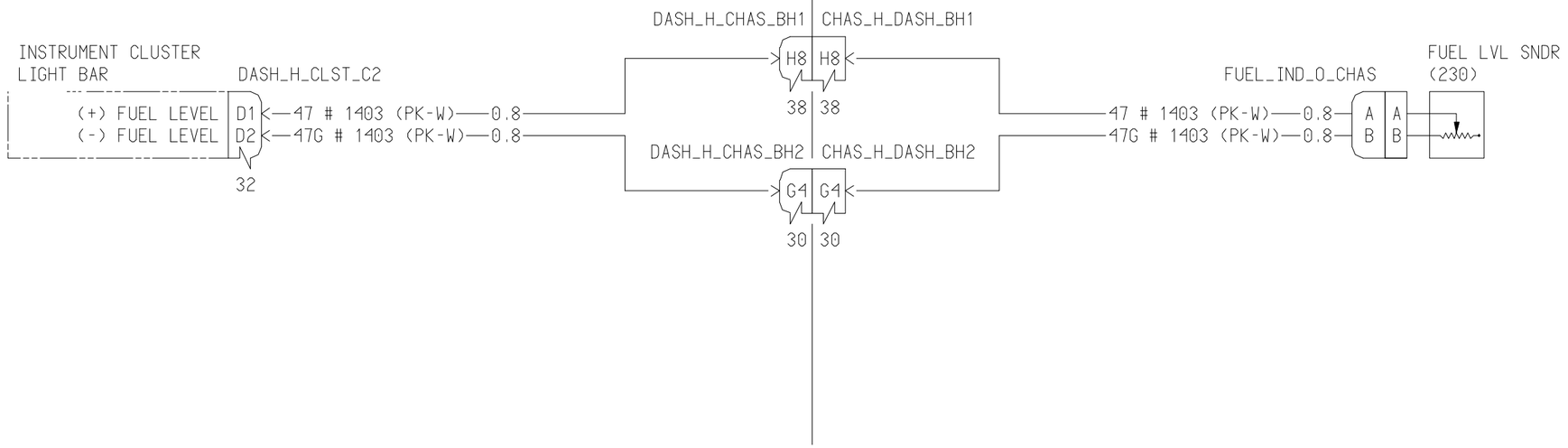
FILE PATH = $FTL/ftl_data/Product/FCCC/Wiring_Diagrams/AIR_DRY/G06-59183.A.FCCC_WRG_AIR_DRY_X

DWG FILE LOC =PDX MENTOR

LAST FILE = Mon Mar 6 06:30:17 2006

PLOT DATE = Mon, Mar 6, 2006. 6:33:08 am.

RELEASE NUMBER	REV LTR	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P28626-08	-	--	INITIAL RELEASE	TAA	10/17/05	JMD
P28626-14	A	--	ADDED A06 PROPERTIES	TAA	12/21/05	JMD



SENDER/WIRING - FUEL LEVEL: XLINE (FUEL_IND)

1. HARNESSES FOUND IN MODULE MODULE 847 (FUEL INDICATOR)

ITEM NUMBER: G06-59190-000
DESCRIPTION: WRG-FUEL IND,X

FREIGHTLINER LLC

MATERIAL APPROVAL: . DATE: .	UNLESS OTHERWISE NOTED. DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994. WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.
DRAWN BY: T.ALCORN DATE: 08/26/05	
CHECKED BY: E.REYNOLDS DATE: 10/17/05	THIRD ANGLE PROJECTION; UNITS OF MEASURE: MM
RESPONSIBLE ENGINEER: T.ALCORN DATE: 10/17/05	
APPROVED BY: J.DEMEZA DATE: 10/17/05	RESPONSIBLE MFG. ENGR: . DATE: .

DESCRIPTION: WRG-FUEL IND,X
SUPPLEMENTARY DESCRIPTION: 847B4

ITEM/DRAWING NUMBER	REVISION LETTER	SHEET_NUMBER
G06-59190	A	1 OF 1

DO NOT SCALE COPIES OF THIS DRAWING

C_SIZE

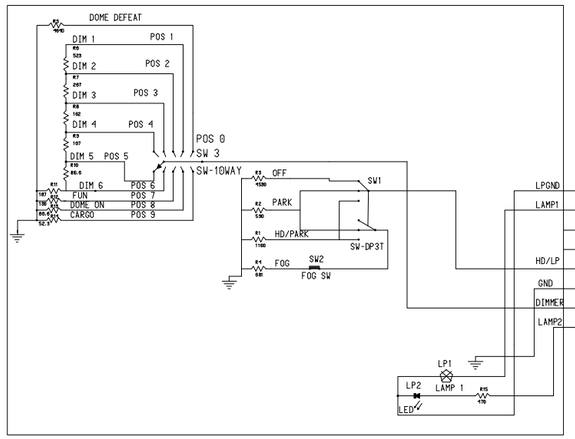
sheet1 schematic
FILE PATH = $FTL/Ftl_data/Product/FCCC/Wiring_Diagrams/FUEL_IND/G06-59190.A.FCCC.WRG-FUEL_IND_X
DWG FILE LOC =PDX MENTOR
PLOT DATE = Thursday, December 22, 2005. 5:35:25 am.
LAST FILE = Thu Dec 22 05:35:04 2005

RELEASE NUMBER	REV LTR	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P28626-09	-	--	INITIAL RELEASE	TAA	10/20/05	JMD

DASH HARNESS

CHASSIS HARNESS

HEADLAMP SWITCH



LIGHTING CONTROL MODULE

DASH_H_ECU_HDLP_J2

11	HDLP SW	20 # 1301 (LTG)
5	REF GND	GNDE # 1206 (BK-W)
10	RIGHT FOG LAMP	27R # 1308 (LTG) — 2
12	LEFT FOG LAMP	27L # 1308 (LTG) — 2

15

DASH_H_SW_LT_HDLP

LPGND	1		
LAMP1	2		
	3		
	4		
HD/LP	5	A4	20 # 1301 (LTG)
GND	6	A3	GNDE # 1206 (BK-W)
DIMMER	7		
LAMP2	8	A1	27L # 1308 (LTG) — 0.5

8

DASH_H_SS_27L

DASH_H_SS_27R

DASH_H_CHAS_BH2 | BH2

27L # 1308 (LTG) — 2	K1	K1
27R # 1308 (LTG) — 2	K2	K2

30

LEFT FOG LAMPS

LFG: A, B

28L (LTG) — GND1 (BK) — REF MOD 280

RFG: A, B

28R (LTG) — GND1 (BK) — REF MOD 280

RIGHT FOG LAMPS

DASH_H_BODY_BB1

M	27R # 1308 (LTG)	2
L	27L # 1308 (LTG)	2

12

RIGHT FOG LAMP

LEFT FOG LAMP

BODYBUILDER CONNECTOR

WIRE SIZE SHOWN IN mm^2

METRIC mm^2	AWG/GA
0.5	20
0.8	18
1	16
2	14
3	12
5	10
8	8
13	6
19	4
32	2
40	1
50	0
62	2/0

WIRING ROAD/FOGLAMP: XLINE (LT_RDLP)

1. HARNESSES FOUND IN MODULE 313 (LT ROADLAMP)

ITEM NUMBER:	G06-59194-000
DESCRIPTION:	WRG-LT RDLP,X

MATERIAL APPROVAL: . DATE: .

DRAWN BY: T.ALCORN DATE: 08/29/05

CHECKED BY: E.REYNOLDS DATE: 10/20/05

RESPONSIBLE ENGINEER: T.ALCORN DATE: 10/20/05

APPROVED BY: J.DEMEZA DATE: 10/20/05

UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.

THIRD ANGLE PROJECTION

UNITS OF MEASURE: MM

RESPONSIBLE MFG. ENGR: . DATE: .

DESCRIPTION: WRG-LT RDLP,X

SUPPLEMENTARY DESCRIPTION: 313B3

ITEM/DRAWING NUMBER: G06-59194

REVISION LETTER: -

SHEET_NUMBER: 1 OF 1

DO NOT SCALE COPIES OF THIS DRAWING

D-SIZE

sheet 1

schematic

\$FTL/ftl_data/Product/FCCC/Wiring_Diagrams/LT_RDLP/G06-59194-.-FCCC.WRG_LT_RDLP_X

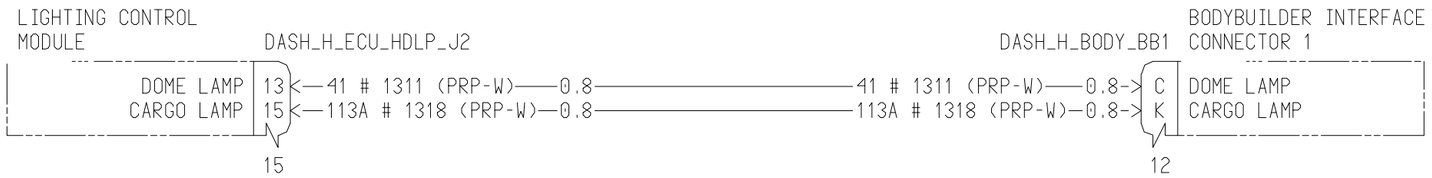
FILE PATH = \$FTL/ftl_data/Product/FCCC/Wiring_Diagrams/LT_RDLP/G06-59194-.-FCCC.WRG_LT_RDLP_X

DWG FILE LOC = PDX MENTOR

PLOT DATE = Tues, December 6, 2005. 5:31:20 am.

LAST FILE = Tue Dec 6 05:29:57 2005

RELEASE NUMBER	REV LTR	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P28626-09	-	--	INITIAL RELEASE	TAA	10/20/05	JMD



WIRING - LAMP, INT, FWD: XLINE (LT_DOME)

1. HARNESSES FOUND IN MODULE 32B (LT DOME)
2. CARGO AND DOME LAMP OUTPUTS ARE 100mA EACH. THESE OUTPUTS ARE INTENDED TO DRIVE RELAYS ONLY.

ITEM NUMBER: G06-59195-000
DESCRIPTION: WRG-LT DOME,X

FREIGHTLINER LLC

MATERIAL APPROVAL: . DATE: .	UNLESS OTHERWISE NOTED. DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.
DRAWN BY: T.ALCORN DATE: 08/29/05	
CHECKED BY: E.REYNOLDS DATE: 10/20/05	THIRD ANGLE PROJECTION; UNITS OF MEASURE: MM
RESPONSIBLE ENGINEER: T.ALCORN DATE: 10/20/05	
APPROVED BY: J.DEMEZA DATE: 10/20/05	RESPONSIBLE MFG. ENGR: . DATE: .

DESCRIPTION: WRG-LT DOME,X

SUPPLEMENTARY DESCRIPTION: 32BB4

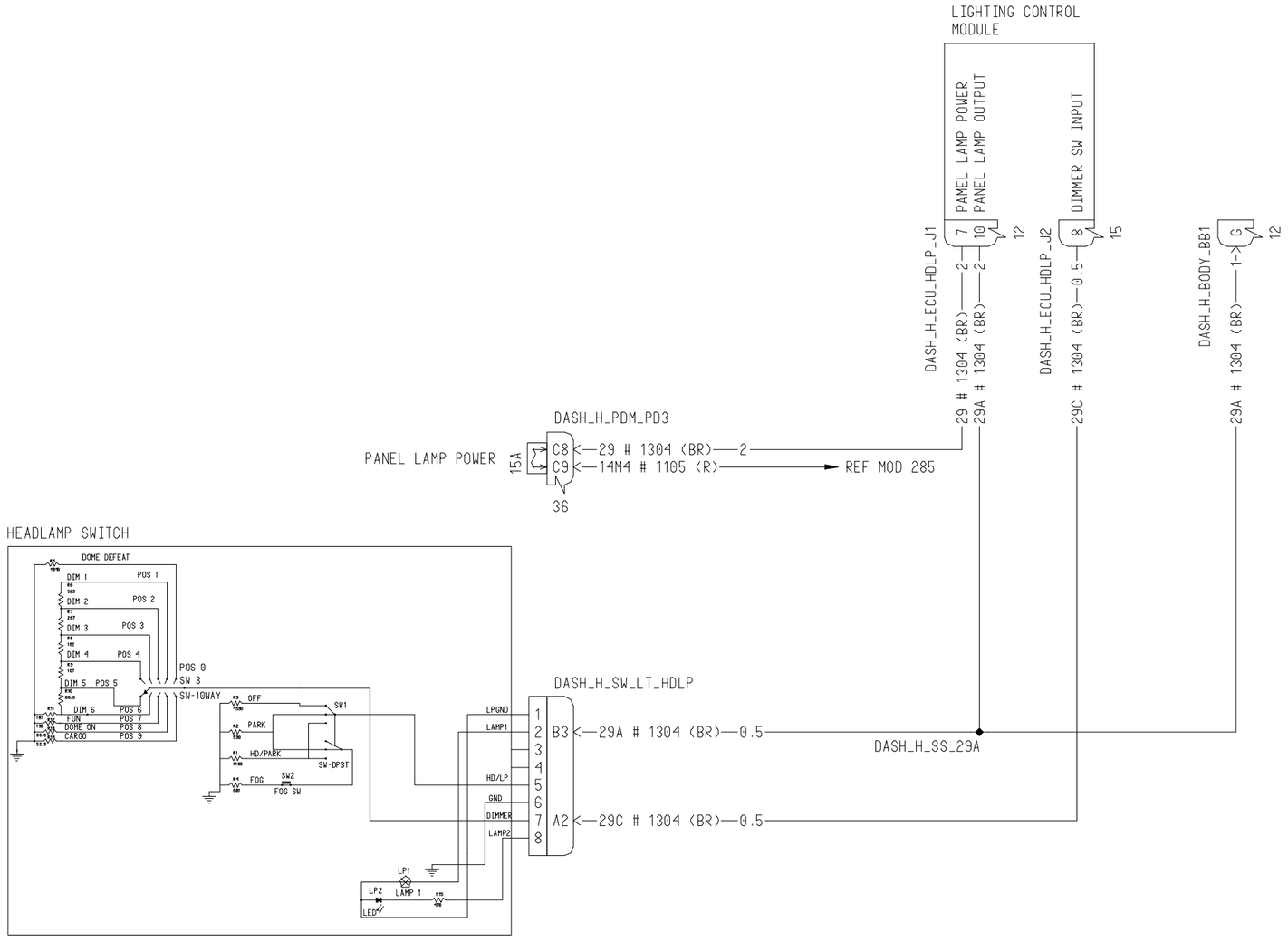
ITEM/DRAWING NUMBER	REVISION LETTER	SHEET_NUMBER
G06-59195	-	1 OF 1

DO NOT SCALE COPIES OF THIS DRAWING

C_SIZE

FILE PATH = $FTL/ftl_data/Product/FCCC/Wiring_Diagrams/LT_DOME/G06-59195-.FCCC.WRG_LT_DOME_X schematic sheet1
DWG FILE LOC =PDX MENTOR
LAST FILE = Fri Dec 2 13:45:51 2005
PLOT DATE = Fri, December 2, 2005. 1:46:53 pm.

RELEASE NUMBER	REV LTR	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P28626-02	-	--	INITIAL RELEASE	TAA	01/13/06	JMD



WIRE SIZE SHOWN IN mm^2

METRIC mm^2	AWG/GA
0.5	20
0.8	18
1	16
2	14
3	12
5	10
8	8
13	6
19	4
32	2
40	1
50	0
62	2/0

WIRING - DASH PANEL LAMP: XLINE (DIM)

1. HARNESSES FOUND IN MODULE 81B (DASH PANEL LAMP)

ITEM NUMBER: G06-59196-000
DESCRIPTION: WRG-DASH PANEL LAMPS,X

FREIGHTLINER® LLC

MATERIAL APPROVAL: . DATE: .	UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.
DRAWN BY: T.ALCORN DATE: 08/29/05	
CHECKED BY: E.REYNOLDS DATE: 12/20/05	THIRD ANGLE PROJECTION
RESPONSIBLE ENGINEER: T.ALCORN DATE: 01/13/06	UNITS OF MEASURE: MM
APPROVED BY: J.DEMEZA DATE: 01/13/06	RESPONSIBLE MFG. ENGR: . DATE: .

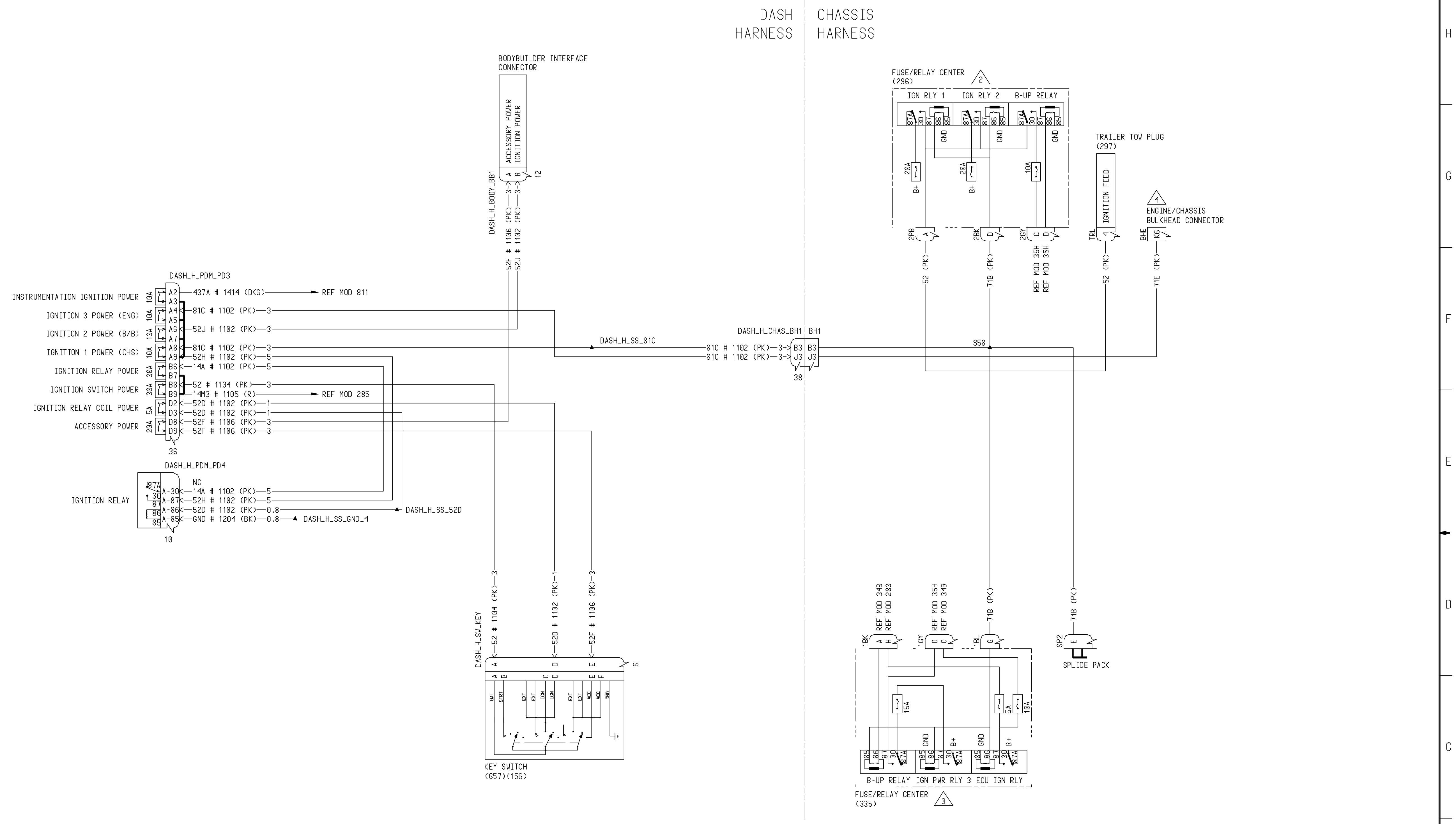
DESCRIPTION: WRG-DASH PANEL LAMPS,X
SUPPLEMENTARY DESCRIPTION: 81BB4

ITEM/DRAWING NUMBER:	REVISION LETTER:	SHEET NUMBER:
G06-59196	-	1 OF 1

DO NOT SCALE COPIES OF THIS DRAWING

FILE PATH = $FTL/fil_data/Product/FCCC/Wiring_Diagrams/DIM/G06-59196-..FCCC.WRG.DIM_X schematic sheet1
DWG FILE LOC = PDX MENTOR
LAST FILE = Fri Sep 16 08:02:17 2005
PLOT DATE = Fri, Sept 16, 2005, 8:04:11 am.

D-SIZE



DASH HARNESS
CHASSIS HARNESS
BODYBUILDER INTERFACE CONNECTOR
ACCESSORY POWER
IGNITION POWER
DASH_H_BODY_BB1
52F # 1106 (PK)
52J # 1102 (PK)
DASH_H_PDM_PD3
INSTRUMENTATION IGNITION POWER
IGNITION 3 POWER (ENG)
IGNITION 2 POWER (B/B)
IGNITION 1 POWER (CHS)
IGNITION RELAY POWER
IGNITION SWITCH POWER
IGNITION RELAY COIL POWER
ACCESSORY POWER
437A # 1414 (DKG)
REF MOD 811
81C # 1102 (PK)
52J # 1102 (PK)
52H # 1102 (PK)
14A # 1102 (PK)
52 # 1104 (PK)
14M3 # 1105 (R)
REF MOD 285
52D # 1102 (PK)
52F # 1106 (PK)
DASH_H_SS_81C
DASH_H_CHAS_BH1
BH1
DASH_H_PDM_PD4
IGNITION RELAY
NC
GND # 1204 (BK)
DASH_H_SS_52D
DASH_H_SS_GND_4
DASH_H_SW_KEY
KEY SWITCH
(657)(156)
FUSE/RELAY CENTER
(296)
IGN RLY 1
IGN RLY 2
B-UP RELAY
TRAILER TOW PLUG
(297)
IGNITION FEED
ENGINE/CHASSIS BULKHEAD CONNECTOR
52 (PK)
71B (PK)
71E (PK)
REF MOD 35H
S58
REF MOD 34B
REF MOD 283
SPLICE PACK
B-UP RELAY
IGN PWR RLY 3
ECU IGN RLY
FUSE/RELAY CENTER
(335)

WIRING - CIRCUIT PROTECTION/IGNITION: XLINE (PWR)

1. HARNESSES FOUND IN MODULE 285 (PWR).
2. REFERENCE VEC SCHEMATIC IN MODULE 296.
3. REFERENCE VEC SCHEMATIC IN MODULE 335.
4. REF MOD 283.

WIRE SIZE SHOWN IN mm^2

METRIC mm^2	AWG/GA
0.5	20
0.8	18
1	16
2	14
3	12
5	10
8	8
13	6
19	4
32	2
40	1
50	0
62	2/0

FREIGHTLINER LLC

DRAWN BY: T.ALCORN 08/31/05
CHECKED BY: E.REYNOLDS 01/18/06
RESPONSIBLE ENGINEER: T.ALCORN 01/18/06
APPROVED BY: J.DEMEZA 01/18/06

UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EDOM 99E8-K17.

THIRD ANGLE PROJECTION — MM

DESCRIPTION: WRG-POWER DIST,IGN,X
SUPPLEMENTARY DESCRIPTION: 285B3
ITEM/DRAWING NUMBER: G06-59235 — REVISION LETTER: - — SHEET NUMBER: 1 OF 1

ITEM NUMBER: G06-59235-000
DESCRIPTION: WRG-POWER DIST,IGN,X

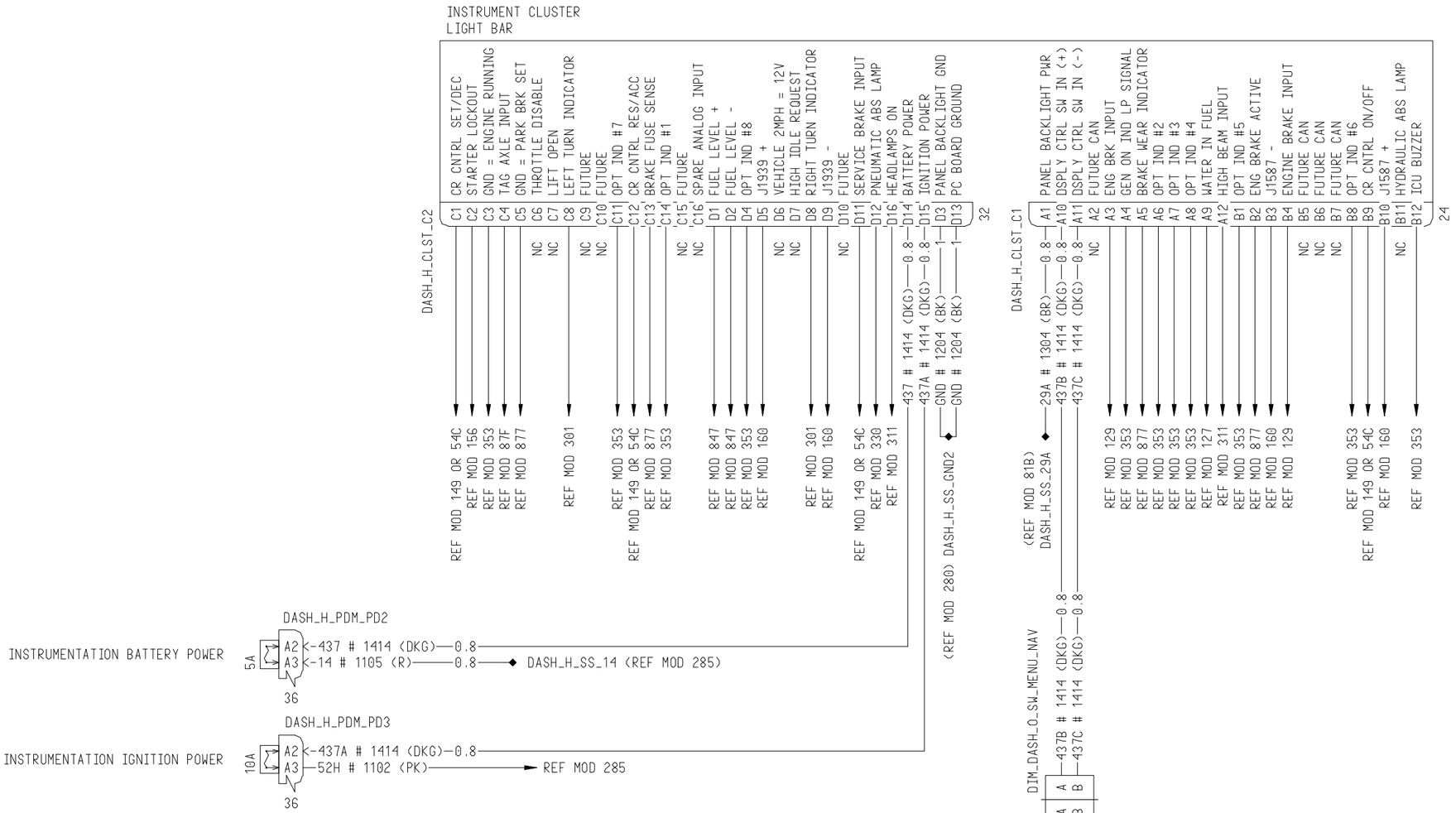
RELEASE NUMBER	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P28626-04	-	INITIAL RELEASE	TAA	01/18/06	JMD

DO NOT SCALE COPIES OF THIS DRAWING

E-SIZE

LAST FILE = Tue Jan 24 12:20:39 2006 — PLOT DATE = Tues, Jan 24, 2006 12:21:07 pm

RELEASE NUMBER	REV LTR	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P28626-02	-	--	INITIAL RELEASE	TAA	01/13/06	JMD
P30147-01	A	--	ADDED REF MOD TO SPLICES	TAA	03/06/06	JMD



WIRE SIZE SHOWN IN mm^2

METRIC mm^2	AWG/GA
0.5	20
0.8	18
1	16
2	14
3	12
5	10
8	8
13	6
19	4
32	2
40	1
50	0
62	2/0

WIRING - DRIVERS INFORMATION MODULE: XLINE (DIM)

1. HARNESSES FOUND IN MODULE 811 (DRIVERS INFORMATION MODULE)

DO NOT SCALE COPIES OF THIS DRAWING

FREIGHTLINER LLC

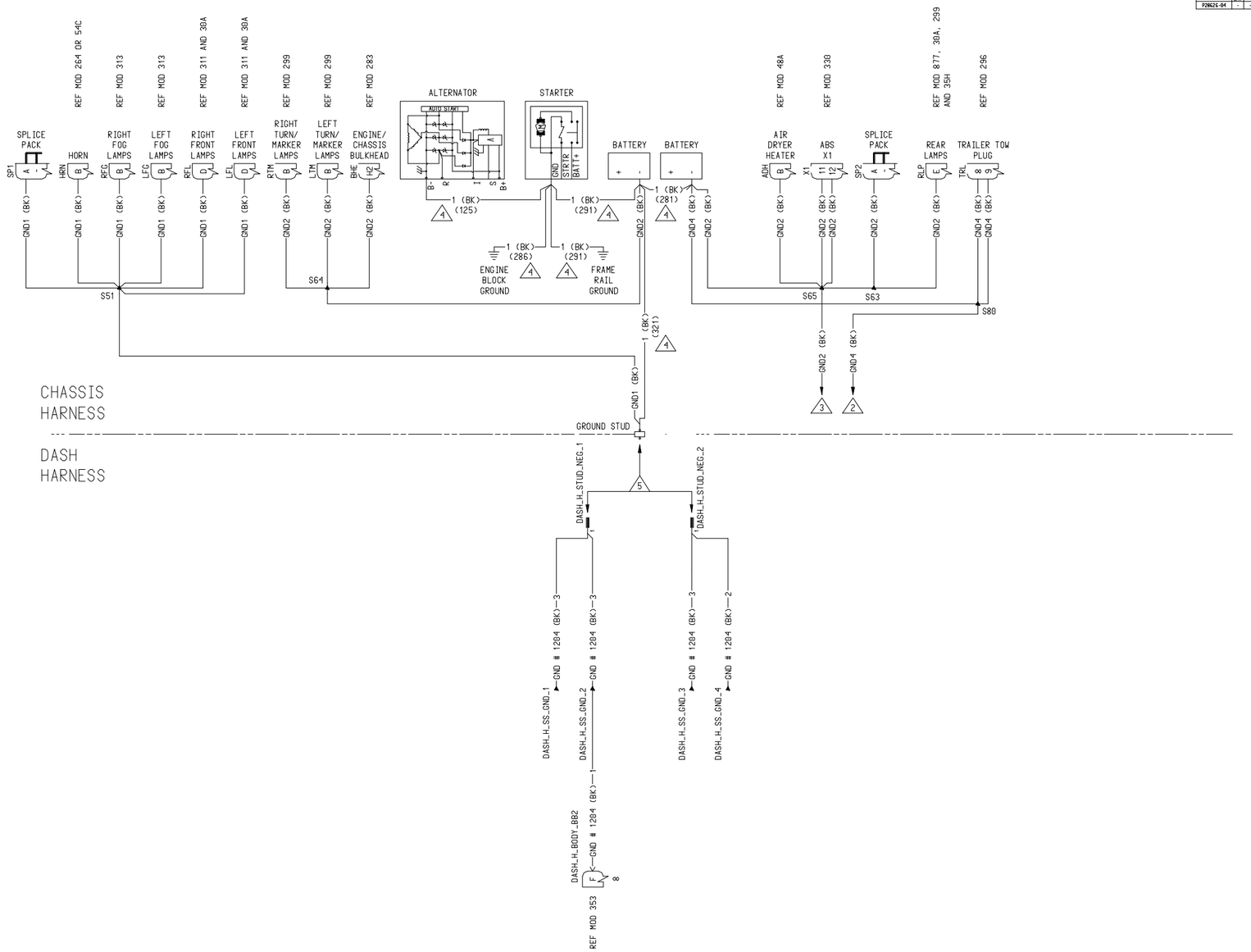
MATERIAL APPROVAL: / DATE:	UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.
DRAWN BY: T.ALCORN / DATE: 09/06/05	
CHECKED BY: E.REYNOLDS / DATE: 12/20/05	
RESPONSIBLE ENGINEER: T.ALCORN / DATE: 01/13/06	THIRD ANGLE PROJECTION; UNITS OF MEASURE: MM
APPROVED BY: J.DEMEZA / DATE: 01/13/06	RESPONSIBLE MFG. ENGR: / DATE:

ITEM NUMBER: G06-59272-000
DESCRIPTION: WRG-DRIVER INFO MODULE,X
DESCRIPTION: WRG-DRIVER INFO MODULE,X
SUPPLEMENTARY DESCRIPTION: 81BB4
ITEM/DRAWING NUMBER: G06-59272 | REVISION LETTER: A | SHEET_NUMBER: 1 OF 1

FILE PATH = $FTL/fil_data/Product/FCCC/Wiring_Diagrams/DIM/G06-59272.A.FCCC.WRG_DRIVER_INFO_MODULE_X schemat1c sheet1
DWG FILE LOC = PDX MENTOR
LAST FILE = Mon Mar 6 07:14:51 2006
PLOT DATE = Mon, Mar 6, 2006. 7:18:07 am.

D-SIZE

RELEASE NUMBER	PC# LTR	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P2062G-04	-	--	INITIAL RELEASE	TAA	01/18/06	JMD



WIRE SIZE SHOWN IN mm^2

METRIC mm^2	AWG/GA
0.5	20
0.8	18
1	16
2	14
3	12
5	10
8	8
13	6
19	4
32	2
40	1
50	0
62	2/0

WIRING - GROUND; XLINE (GND)

1. HARNESSES FOUND IN MODULE 280 (GND)

2. REFERENCE VEC SCHEMATIC IN MODULE 296.

3. REFERENCE VEC SCHEMATIC IN MODULE 335.

4. THE MODULE WHERE THE CABLE IS FOUND IS LISTED IN PARENTHESIS.

5. BOTH RING TERMINALS CONNECT TO THE GROUND STUD.

ITEM NUMBER: G06-59291-000
DESCRIPTION: WRG-GND,X

FREIGHTLINER LLC

MATERIAL APPROVAL: - DATE: -	UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER CORP DSDB-E17.
DRAWN BY: T.ALCORN DATE: 09/07/05	
CHECKED BY: E.REYNOLDS DATE: 01/18/06	THIRD ANGLE PROJECTION
RESPONSIBLE ENGINEER: T.ALCORN DATE: 01/18/06	WEIGHT: N/A LB
APPROVED BY: J.DEMEZA DATE: 01/18/06	RESPONSIBLE MFG. ENGR: - DATE: -

DESCRIPTION: WRG-GND,X

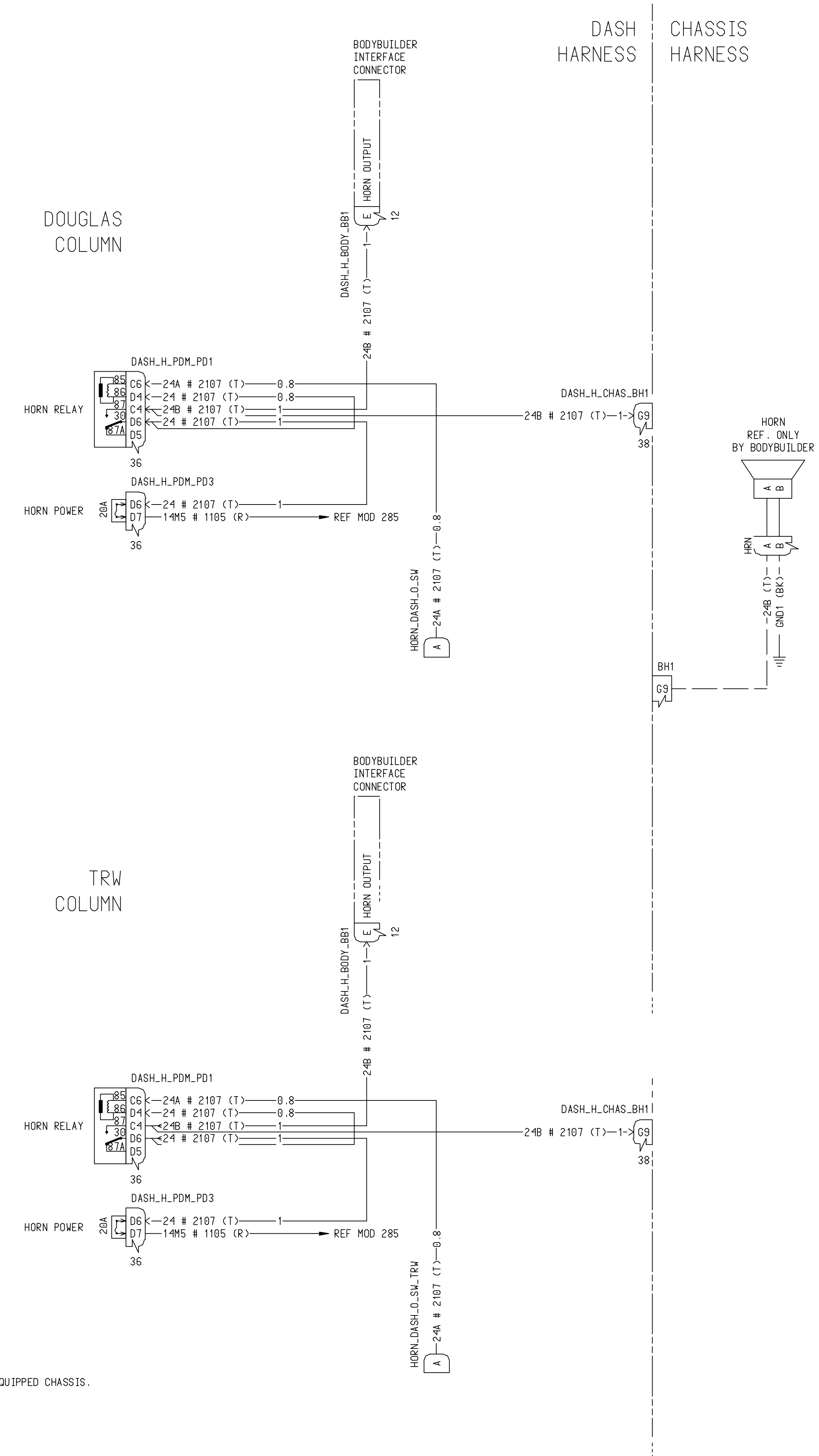
SUPPLEMENTARY DESCRIPTION: 280B3

ITEM/DRAWING NUMBER:	REVISION LETTER:	SHEET NUMBER:
G06-59291	-	1 OF 1

E-SIZE

LAST FILE = Sat Jan 14 07:49:46 2006
PLOT DATE = Tues, Jan 17, 2006, 6:55:54 am.
FILE PATH = $FTL/ftl.dat/Product/FCCC/Wiring_Diagrams/GND/G06-59291-FCCC_WRG-GND_X sheet1
DWG FILE LOC #DX MENTOR
schematic sheet1

RELEASE NUMBER		ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P28626-02	-	--	INITIAL RELEASE	TAA	01/13/06	JMD



METRIC mm^2	AWG/GA
0.5	20
0.8	18
1	16
2	14
3	12
5	10
8	8
13	6
19	4
32	2
40	1
50	0
62	2/0

WIRE SIZE SHOWN IN mm^2

WIRING - HORN: XLINE (HORN)

1. HARNESSES FOUND IN MODULE 264 (HORN)
2. REFERENCE MODULE 54C FOR HORN WIRING FOR SMARTWHEEL EQUIPPED CHASSIS.

FREIGHTLINER LLC

MATERIAL APPROVAL:	DATE:
DRAWN BY: T.ALCORN	DATE: 12/22/05
CHECKED BY: E.REYNOLDS	DATE: 12/22/05
RESPONSIBLE ENGINEER: T.ALCORN	DATE: 01/13/06
APPROVED BY: J.DEMEZA	DATE: 01/13/06
RESPONSIBLE MFG. ENGR:	DATE:

UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.

THIRD ANGLE PROJECTION — UNITS OF MEASURE: MM

DESCRIPTION: WRG-HORN,X

SUPPLEMENTARY DESCRIPTION: 264B3

ITEM/DRAWING NUMBER: G06-59316 — REVISION LETTER: - — SHEET_NUMBER: 1 OF 1

ITEM NUMBER: G06-59316-000 — DESCRIPTION: WRG-HORN,X

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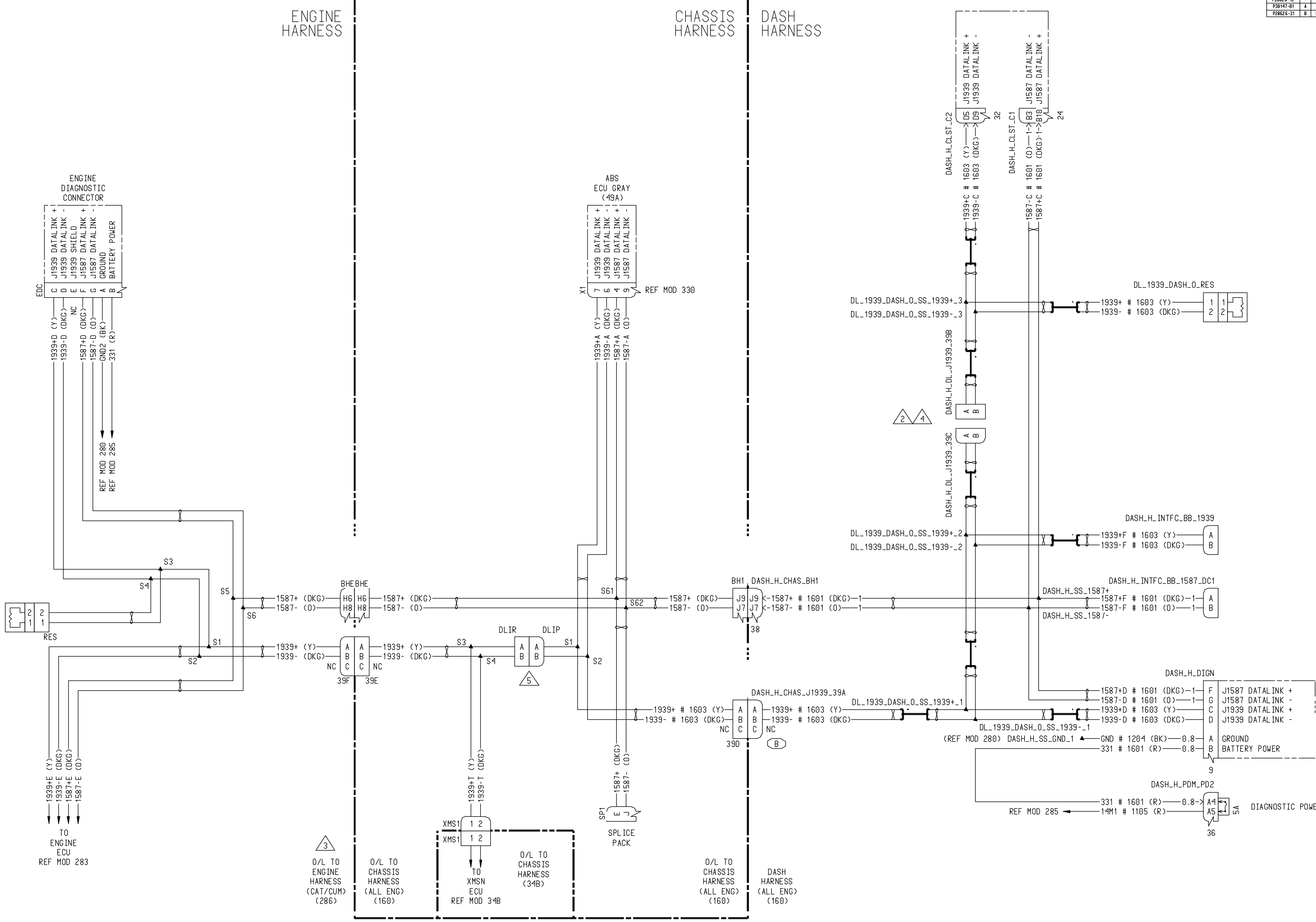
E-SIZE

LAST FILE = Thu Dec 22 08:30:53 2005
PLOT DATE = Thursday, December 22, 2005, 9:45:04 am.
FILE PATH = $FTL/ftl_data/Product/FCCC/Wiring_Diagrams/HORN/G06-59316_-_FCCC_WRG-HORN_X schematic sheet1
DWG FILE LOC @DX MENTOR

RELEASE NUMBER	REV LTR	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P28626-15	-	--	INITIAL RELEASE	TAA	02/13/06	JMD
P30147-01	A	--	ADDED REF MOD TO SPLICES	TAA	03/02/06	JMD
P28626-31	B	D4	ADDED ADD-ON TERMINAL SEC LOCK	TAA	04/25/06	JMD



WIRING - DATALINK & DIAGNOSTIC: XLINE (DL)

1. HARNESSES FOUND IN MODULE 320 (DASH), 288 (CHASSIS) AND 286 (ENGINE).

2. IF MERCEDES ENGINE, 39B AND 39C WILL BE DISCONNECTED AND MATED TO MODULE 283 DASH OVERLAY HARNESS

3. CAT/CUMMINS SHOWN. IF MERCEDES ENGINE, SEE DETAIL A, SHEET 2.

4. FOR 3K OR 2K TRANSMISSION, 39B AND 39C WILL BE DISCONNECTED AND MATED TO MODULE 34B DASH OVERLAY HARNESS

5. IF TAG AXLE, DLIP AND DLIR WILL BE DISCONNECTED AND MATED TO DLIP AND DLIR FROM DETAIL D, SHEET 2.

WIRE SIZE SHOWN IN mm^2

METRIC mm^2	AWG/GA
0.5	20
0.8	18
1	16
2	14
3	12
5	10
8	8
13	6
19	4
32	2
40	1
50	0
62	2/0

FREIGHTLINER LLC

ITEM NUMBER: G06-59334-000
DESCRIPTION: WRG-DL,X

MATERIAL APPROVAL:	DATE:
DRAWN BY: T.ALCORN	DATE: 09/13/05
CHECKED BY: E.REYNOLDS	DATE: 02/13/06
RESPONSIBLE ENGINEER: T.ALCORN	DATE: 02/13/06
APPROVED BY: J.DEMEZA	DATE: 02/13/06

UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.

THIRD ANGLE PROJECTION — UNITS OF MEASURE: MM

RESPONSIBLE MFG. ENGR: DATE:

DESCRIPTION: WRG-DL,X
SUPPLEMENTARY DESCRIPTION: 160B3

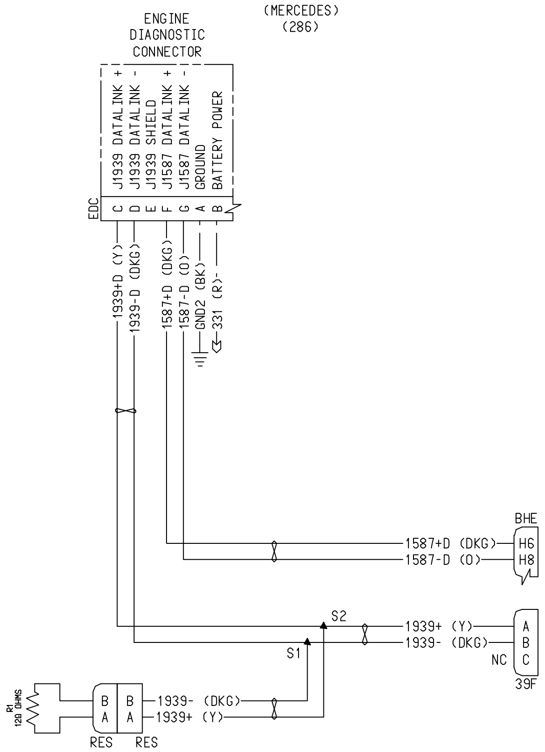
ITEM/DRAWING NUMBER: G06-59334 — REVISION LETTER: B — SHEET_NUMBER: 1 OF 2

DO NOT SCALE COPIES OF THIS DRAWING

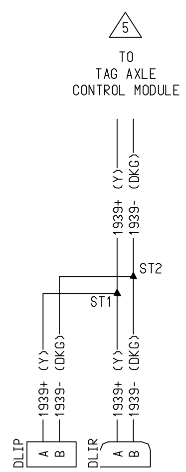
E-SIZE

RELEASE NUMBER	REV LTR	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P28626-15	-	--	INITIAL RELEASE	TAA	02/13/06	JMD
P30147-01	A	--	SEE SHEET 1	TAA	03/02/06	JMD
P28626-31	B	--	SEE SHEET 1	TAA	04/25/06	JMD

DETAIL A
O/L TO
ENGINE
HARNESS
(MERCEDES)
(286)



DETAIL B
O/L TO
CHASSIS
HARNESS
(TAG AXLE)
(87F)



WIRE SIZE
SHOWN IN mm^2

METRIC mm^2	AWG/GA
0.5	20
0.8	18
1	16
2	14
3	12
5	10
8	8
13	6
19	4
32	2
40	1
50	0
62	2/0

FREIGHTLINER LLC

MATERIAL APPROVAL: DATE:	UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.
DRAWN BY: T.ALCORN DATE: 09/14/05	
CHECKED BY: E.REYNOLDS DATE: 02/13/06	THIRD ANGLE PROJECTION
RESPONSIBLE ENGINEER: T.ALCORN DATE: 02/13/06	UNITS OF MEASURE: MM
APPROVED BY: J.DEMEZA DATE: 02/13/06	RESPONSIBLE MFG. ENGR: DATE:

ITEM NUMBER: G06-59334-000
DESCRIPTION: WRG-DL,X

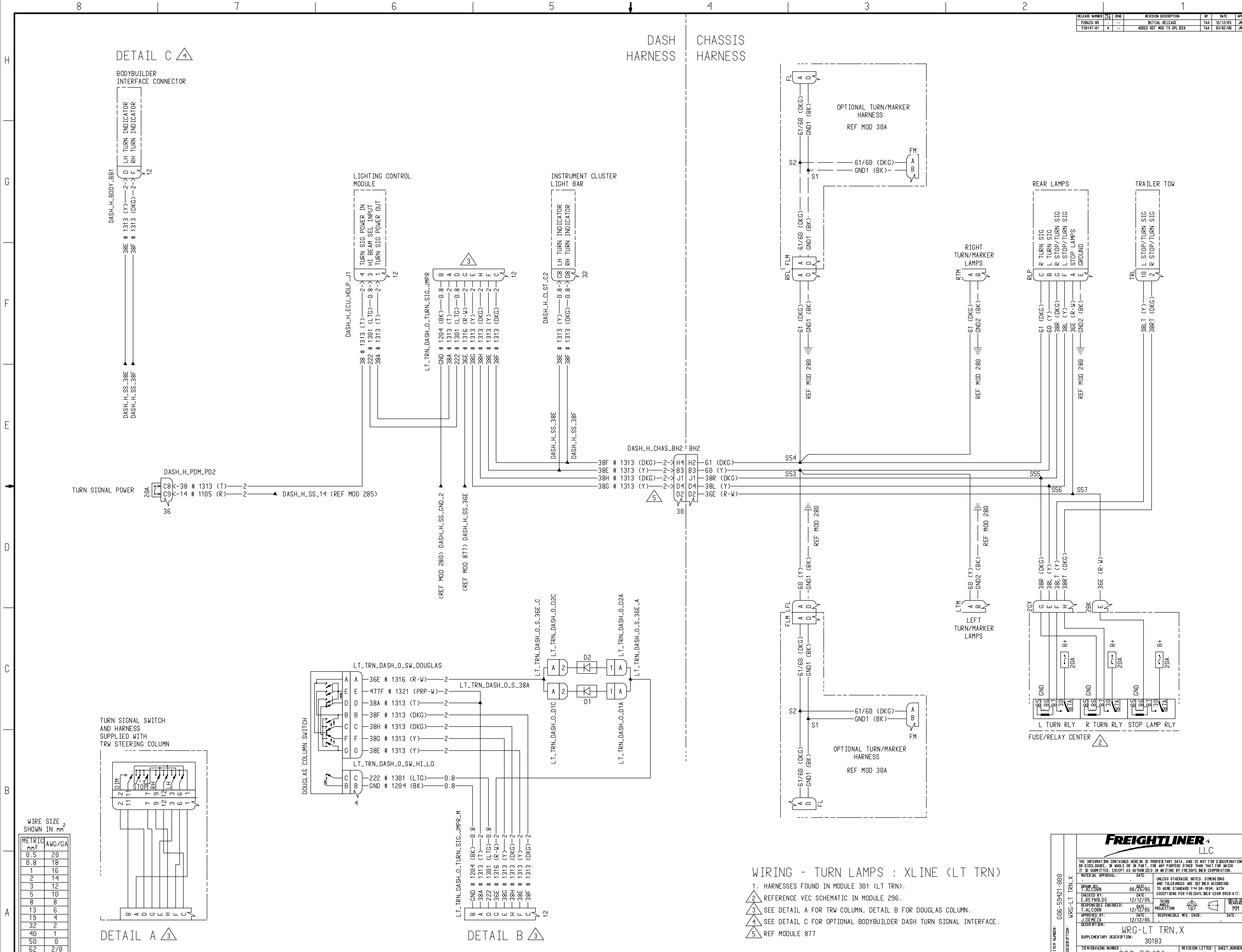
DESCRIPTION: WRG-DL,X
SUPPLEMENTARY DESCRIPTION: 160B3

ITEM/DRAWING NUMBER:	REVISION LETTER:	SHEET_NUMBER:
G06-59334	B	2 OF 2

DO NOT SCALE COPIES OF THIS DRAWING

E-SIZE

FILE PATH = $FTL/ftl.data/Product/FCCC/Wiring_Diagrams/DL/G06-59334.B.FCCC.WRG-DL.X schematic sheet2
DWG FILE LOC #DX MENTOR
LAST FILE = Tue Apr 25 10:57:20 2006
PLOT DATE = Tues, April 25, 2006, 10:59:01 am.



WIRE SIZE SHOWN IN mm^2

METRIC mm^2	AWG/GA
0.5	20
0.8	18
1	16
2	14
3	12
5	10
8	8
13	6
19	4
32	2
40	1
50	0
62	2/0

WIRING - TURN LAMPS : XLINE (LT TRN)

1. HARNESSES FOUND IN MODULE 301 (LT TRN).
2. REFERENCE VEC SCHEMATIC IN MODULE 296.
3. SEE DETAIL A FOR TRW COLUMN, DETAIL B FOR DOUGLAS COLUMN.
4. SEE DETAIL C FOR OPTIONAL BODYBUILDER DASH TURN SIGNAL INTERFACE.
5. REF MODULE 877

RELEASE NUMBER	REV	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P28626-05	-	--	INITIAL RELEASE	TAA	12/12/05	JMD
P28147-01	A	--	ADDED REF MOD TO SPLICES	TAA	03/02/06	JMD

DRAWN BY: T.ALCORN 09/26/05
CHECKED BY: E.REYNOLDS 12/12/05
RESPONSIBLE ENGINEER: T.ALCORN 12/12/05
APPROVED BY: J.DEMEZA 12/12/05

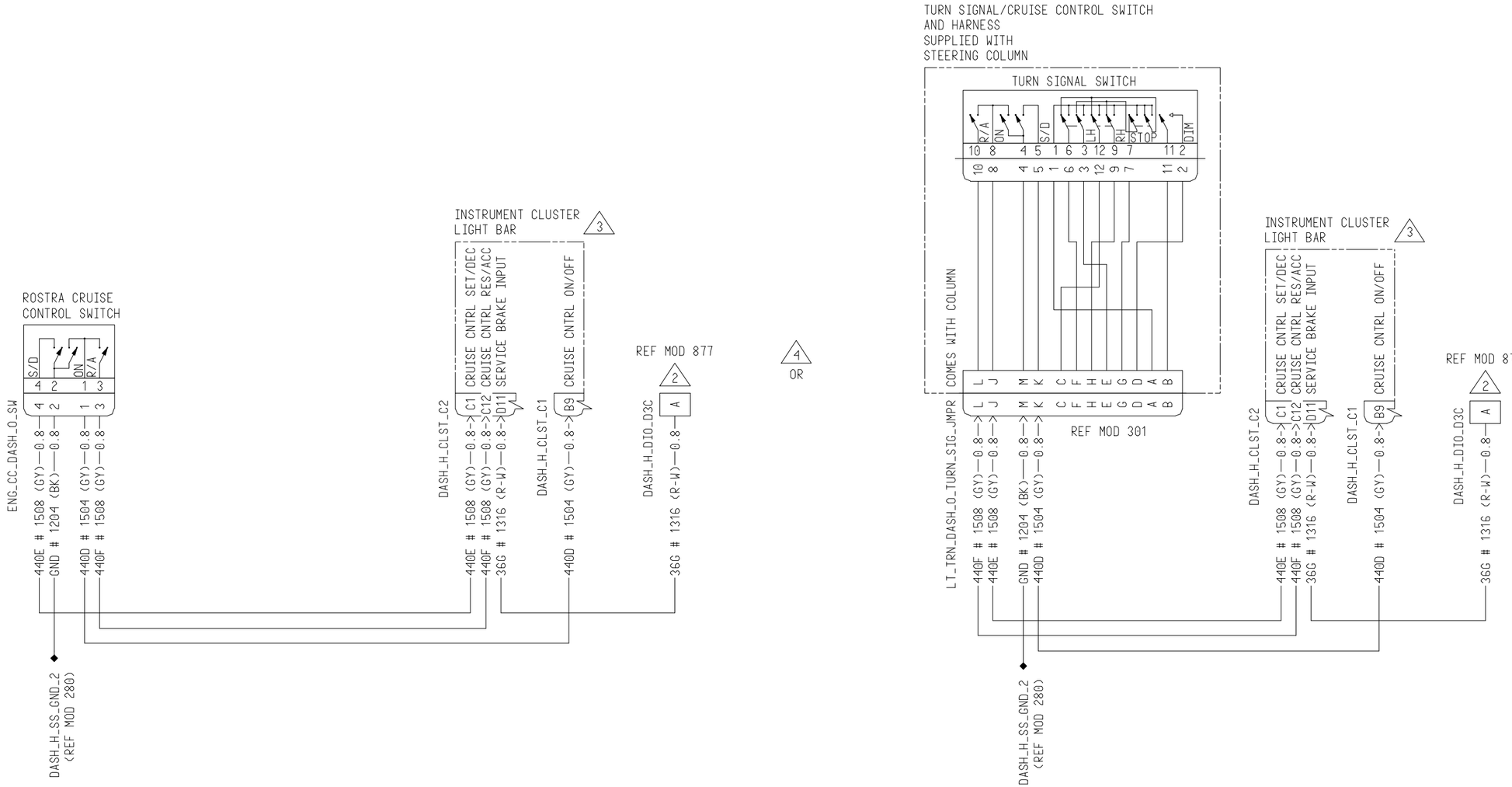
UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EDOM 8968-K17.

THIRD ANGLE PROJECTION — UNITS OF MEASURE: MM

DESCRIPTION: WRG-LT TRN,X
SUPPLEMENTARY DESCRIPTION: 301B3
ITEM NUMBER: G06-59421-000 — WRG-LT TRN,X
ITEM/DRAWING NUMBER: G06-59421 — REVISION LETTER: A — SHEET NUMBER: 1 OF 1

LAST FILE = Thu Mar 2 14:03:22 2006
PLOT DATE = Mon, Mar 6, 2006 5:23:31 am.

RELEASE NUMBER	REV LTR	ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P28626-05	-	--	INITIAL RELEASE	TAA	12/12/05	JMD
P30147-01	A	--	ADDED REF MOD TO SPLICES	TAA	03/02/06	JMD



WIRE SIZE SHOWN IN mm^2

METRIC mm^2	AWG/GA
0.5	20
0.8	18
1	16
2	14
3	12
5	10
8	8
13	6
19	4
32	2
40	1
50	0
62	2/0

WIRING - CRUISE CONTROL - VEHICLE SPEED : XLINE (ENG CC)

1. HARNESSES FOUND IN MODULE 149 (ENG CC).
2. SERVICE BRAKE SIGNALS INSTRUMENTATION TO CANCEL CRUISE CONTROL.
3. INSTRUMENTATION BROADCASTS CRUISE CONTROL SWITCH STATUS VIA J1939.
4. EITHER ROSTRA STICK CRUISE CONTROL SWITCH OR TRW SUPPLIED SWITCH WITH CRUISE CONTROL IN TURN SIGNAL LEVER.

ITEM NUMBER: G06-59436-000
DESCRIPTION: WRG-ENG CC,NO SMART WHL,X

FREIGHTLINER® LLC

MATERIAL APPROVAL: . DATE: .	UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.
DRAWN BY: T.ALCORN DATE: 09/21/05	
CHECKED BY: E.REYNOLDS DATE: 12/12/05	THIRD ANGLE PROJECTION; UNITS OF MEASURE: MM
RESPONSIBLE ENGINEER: T.ALCORN DATE: 12/12/05	
APPROVED BY: J.DEMEZA DATE: 12/12/05	RESPONSIBLE MFG. ENGR: . DATE: .

DESCRIPTION: WRG-ENG CC,NO SMART WHL,X
SUPPLEMENTARY DESCRIPTION: 149B4

ITEM/DRAWING NUMBER:	REVISION LETTER:	SHEET NUMBER:
G06-59436	A	1 OF 1

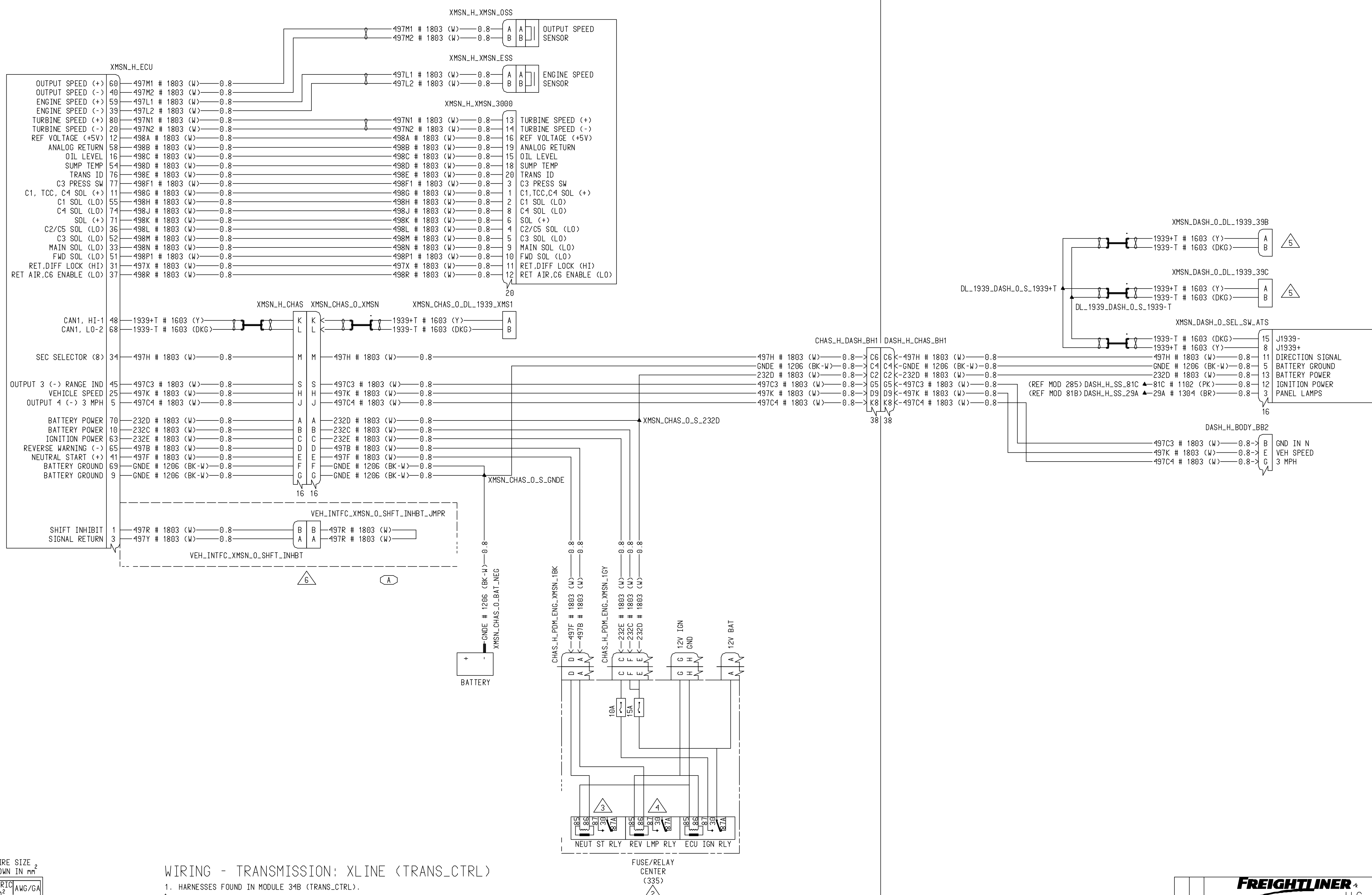
DO NOT SCALE COPIES OF THIS DRAWING

LAST FILE = Thu Mar 2 12:30:47 2006
PLOT DATE = Thursday, Mar 2, 2006. 12:31:28 pm.
FILE PATH = $FTL/fil_data/Product/FCCC/Wiring_Diagrams/ENG_CC/G06-59436.A.FCCC.WRG-ENG_CC_NO_SMART_WHL_X schematic sheet1
DWG FILE LOC = PDX MENTOR

D-SIZE

CHASSIS | DASH

RELEASE NUMBER		ZONE	REVISION DESCRIPTION	BY	DATE	APPD
P28626-15	-	--	INITIAL RELEASE	TAA	02/13/06	JMD
P38168-01	A	--	ADDED ADA CIRCUITS	TAA	02/22/06	JMD



XMSN_H_ECU
OUTPUT SPEED (+) 60 497M1 # 1803 (W) 0.8
OUTPUT SPEED (-) 40 497M2 # 1803 (W) 0.8
ENGINE SPEED (+) 59 497L1 # 1803 (W) 0.8
ENGINE SPEED (-) 39 497L2 # 1803 (W) 0.8
TURBINE SPEED (+) 80 497N1 # 1803 (W) 0.8
TURBINE SPEED (-) 20 497N2 # 1803 (W) 0.8
REF VOLTAGE (+5V) 12 498A # 1803 (W) 0.8
ANALOG RETURN 58 498B # 1803 (W) 0.8
OIL LEVEL 16 498C # 1803 (W) 0.8
SUMP TEMP 54 498D # 1803 (W) 0.8
TRANS ID 76 498E # 1803 (W) 0.8
C3 PRESS SW 77 498F1 # 1803 (W) 0.8
C1, TCC, C4 SOL (+) 11 498G # 1803 (W) 0.8
C1 SOL (LO) 55 498H # 1803 (W) 0.8
C4 SOL (LO) 74 498J # 1803 (W) 0.8
SOL (+) 71 498K # 1803 (W) 0.8
C2/C5 SOL (LO) 36 498L # 1803 (W) 0.8
C3 SOL (LO) 52 498M # 1803 (W) 0.8
MAIN SOL (LO) 33 498N # 1803 (W) 0.8
FWD SOL (LO) 51 498P1 # 1803 (W) 0.8
RET.DIFF LOCK (HI) 31 497X # 1803 (W) 0.8
RET AIR,C6 ENABLE (LO) 37 498R # 1803 (W) 0.8
CAN1, HI-1 48 1939+T # 1603 (Y)
CAN1, LO-2 68 1939-T # 1603 (DKG)
SEC SELECTOR (8) 34 497H # 1803 (W) 0.8
OUTPUT 3 (-) RANGE IND 45 497C3 # 1803 (W) 0.8
VEHICLE SPEED 25 497K # 1803 (W) 0.8
OUTPUT 4 (-) 3 MPH 5 497C4 # 1803 (W) 0.8
BATTERY POWER 70 232D # 1803 (W) 0.8
BATTERY POWER 10 232C # 1803 (W) 0.8
IGNITION POWER 63 232E # 1803 (W) 0.8
REVERSE WARNING (-) 65 497B # 1803 (W) 0.8
NEUTRAL START (+) 41 497F # 1803 (W) 0.8
BATTERY GROUND 69 GNDE # 1206 (BK-W) 0.8
BATTERY GROUND 9 GNDE # 1206 (BK-W) 0.8
SHIFT INHIBIT 1 497R # 1803 (W) 0.8
SIGNAL RETURN 3 497Y # 1803 (W) 0.8
XMSN_H_XMSN_OSS
OUTPUT SPEED SENSOR
XMSN_H_XMSN_ESS
ENGINE SPEED SENSOR
XMSN_H_XMSN_3000
13 TURBINE SPEED (+)
14 TURBINE SPEED (-)
16 REF VOLTAGE (+5V)
19 ANALOG RETURN
15 OIL LEVEL
18 SUMP TEMP
20 TRANS ID
3 C3 PRESS SW
1 C1,TCC,C4 SOL (+)
2 C1 SOL (LO)
8 C4 SOL (LO)
6 SOL (+)
4 C2/C5 SOL (LO)
5 C3 SOL (LO)
9 MAIN SOL (LO)
10 FWD SOL (LO)
11 RET.DIFF LOCK (HI)
12 RET AIR,C6 ENABLE (LO)
XMSN_H_CHAS
XMSN_CHAS_O_XMSN
XMSN_CHAS_O_DL_1939_XMS1
XMSN_CHAS_O_S_232D
XMSN_CHAS_O_S_GNDE
VEH_INTFC_XMSN_O_SHFT_INHBT_JMPR
VEH_INTFC_XMSN_O_SHFT_INHBT
CHAS_H_DASH_BH1
DASH_H_CHAS_BH1
XMSN_DASH_O_DL_1939_39B
XMSN_DASH_O_DL_1939_39C
DL_1939_DASH_O_S_1939+T
DL_1939_DASH_O_S_1939-T
XMSN_DASH_O_SEL_SW_ATS
15 J1939-
8 J1939+
11 DIRECTION SIGNAL
5 BATTERY GROUND
13 BATTERY POWER
12 IGNITION POWER
3 PANEL LAMPS
(REF MOD 285) DASH_H_SS_81C 81C # 1102 (PK)
(REF MOD 81B) DASH_H_SS_29A 29A # 1304 (BR)
DASH_H_BODY_BB2
B GND IN N
E VEH SPEED
G 3 MPH
GNDE # 1206 (BK-W)
XMSN_CHAS_O_BAT_NEG
BATTERY
CHAS_H_PDM_ENG_XMSN_1BK
CHAS_H_PDM_ENG_XMSN_1GY
12V IGN
GND
12V BAT
10A
15A
NEUT ST RLY
REV LMP RLY
ECU IGN RLY
FUSE/RELAY CENTER (335)

METRIC mm²	AWG/GA
0.5	20
0.8	18
1	16
2	14
3	12
5	10
8	8
13	6
19	4
32	2
40	1
50	0
62	2/0

WIRE SIZE SHOWN IN mm²

WIRING - TRANSMISSION: XLINE (TRANS_CTRL)

1. HARNESSES FOUND IN MODULE 34B (TRANS_CTRL).
2. REFERENCE VEC SCHEMATIC IN MODULE 335 FOR MORE DETAIL.
3. REFERENCE MODULE 156 FOR STARTING SCHEMATIC.
4. REFERENCE MODULE 35H FOR REVERSE LAMPS SCHEMATIC.
5. REFERENCE MODULE 160 FOR DATALINK SCHEMATIC.
6. REFERENCE MODULE 353 FOR VEHICLE INTERFACE SCHEMATIC. THIS WIRING PRESENT ONLY ON ADA EQUIPPED UNITS. BODYBUILDER TO DISCONNECT JUMPER AND INTERFACE THEIR OWN WIRING TO INHIBIT SHIFTING OUT OF NEUTRAL. OPEN THIS CIRCUIT TO INHIBIT SHIFTING.

FREIGHTLINER LLC

UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EDOM 99C8-K17.

DRAWN BY: T.ALCORN 02/02/06
CHECKED BY: E.REYNOLDS 02/13/06
RESPONSIBLE ENGINEER: T.ALCORN 02/13/06
APPROVED BY: J.DEMEZA 02/13/06
THIRD ANGLE PROJECTION — UNITS OF MEASURE: MM

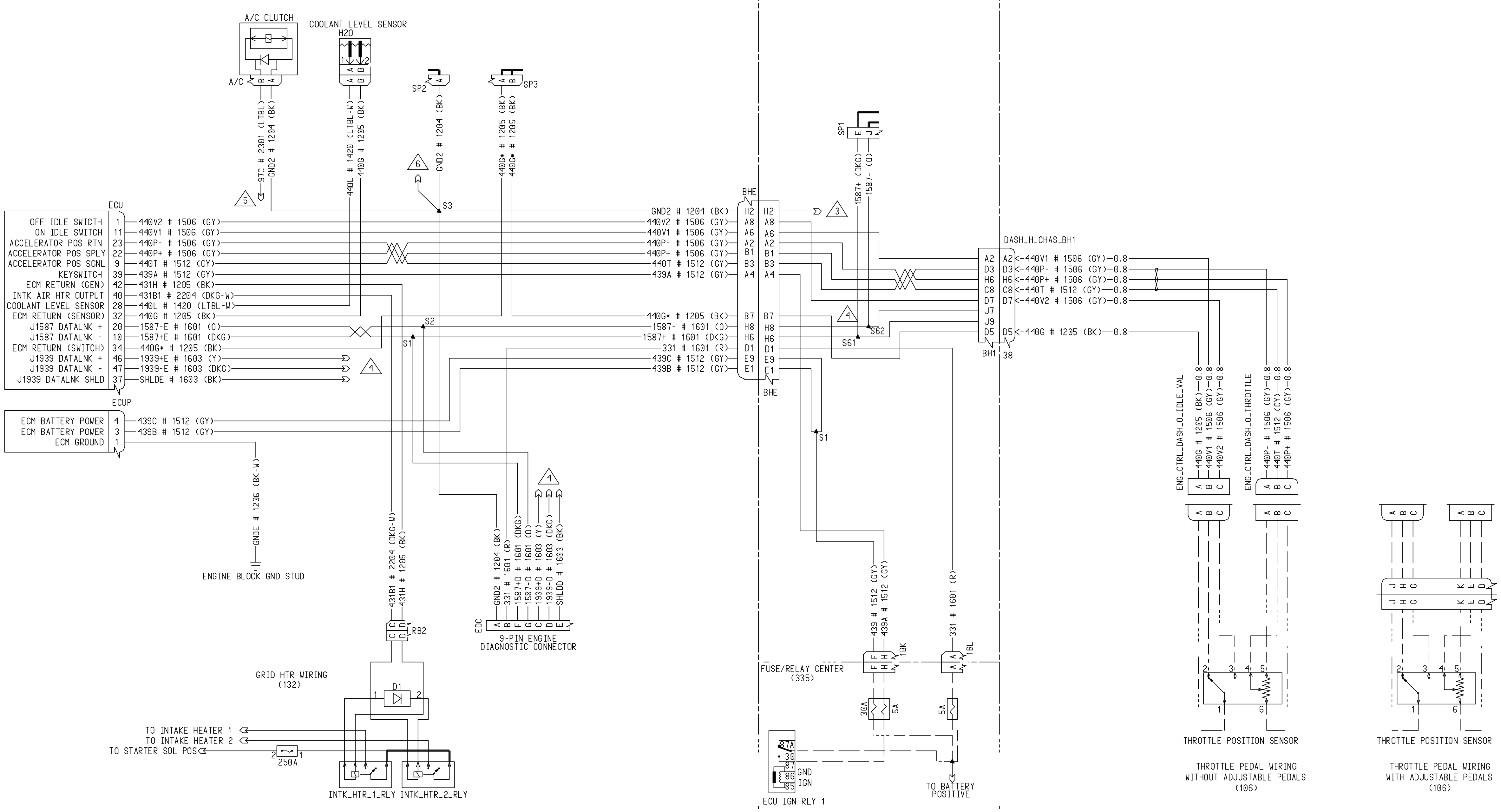
DESCRIPTION: WRG-TRANS CTRL,GEN4,3K,X
SUPPLEMENTARY DESCRIPTION: 34B84
ITEM/DRAWING NUMBER: G06-59922 — REVISION LETTER: A — SHEET NUMBER: 1 OF 1

ITEM NUMBER: G06-59922-000 — DESCRIPTION: WRG-TRANS CTRL,GEN4,3K,X

DO NOT SCALE COPIES OF THIS DRAWING

E-SIZE

FILE PATH = $FTL/fil.data/Product/FCCC/Wiring_Diagrams/TRANS_CTRL/G06-59922.A.FCCC.WRG-TRANS_CTRL_GEN4_3K_X schematic sheet1
DWG FILE LOC @DX MENTOR
LAST FILE = Thu Feb 23 11:33:48 2006
PLOT DATE = Thursday, Feb 23, 2006 2:14:08 pm.



WIRE SIZE SHOWN IN mm^2

METRIC mm^2	AWG/GA
0.5	20
0.8	18
1	16
2	14
3	12
5	10
8	8
13	6
19	4
32	2
40	1
50	0
62	2/0

WIRING ENGINE CONTROL: XLINE (ENG_CTRL)

1. HARNESSES FOUND IN MODULE 283 (ENG_CTRL)
2. NUMBERS IN PARENTHESIS INDICATE THE MODULE WHERE HARNESS OR PART IS LOCATED.

- 3 SEE GND SCHEMATIC (MOD 280)
- 4 SEE DATALINK SCHEMATIC (MOD 160)
- 5 SEE HVAC SCHEMATIC (MOD 70B)
- 6 SEE STARTING SCHEMATIC (MOD 156)

DO NOT SCALE COPIES OF THIS DRAWING

FREIGHTLINER LLC

ITEM NUMBER: G06-60422-000
DESCRIPTION: WRG-ENG CTRL,CUMMINS,X

MATERIAL APPROVAL:	DATE:
DRAWN BY: T.ALCORN	DATE: 01/16/06
CHECKED BY: E.REYNOLDS	DATE: 02/06/06
RESPONSIBLE ENGINEER: T.ALCORN	DATE: 02/06/06
APPROVED BY: J.DEMEZA	DATE: 02/06/06

UNLESS OTHERWISE NOTED, DIMENSIONS AND TOLERANCES ARE DEFINED ACCORDING TO ASME STANDARD Y14.5M-1994, WITH EXCEPTIONS PER FREIGHTLINER EOSM 09E0-K17.

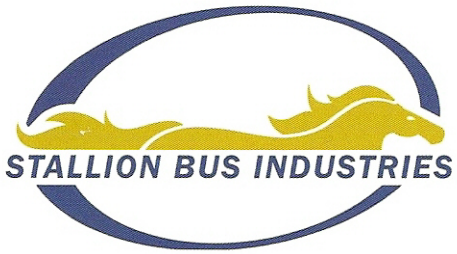
THIRD ANGLE PROJECTION — UNITS OF MEASURE: MM

RESPONSIBLE MFG. ENGR: DATE:

DESCRIPTION: WRG-ENG CTRL,CUMMINS,X
SUPPLEMENTARY DESCRIPTION: 283B3

ITEM/DRAWING NUMBER: G06-60422 — REVISION LETTER: - — SHEET_NUMBER: 1 OF 1

E-SIZE



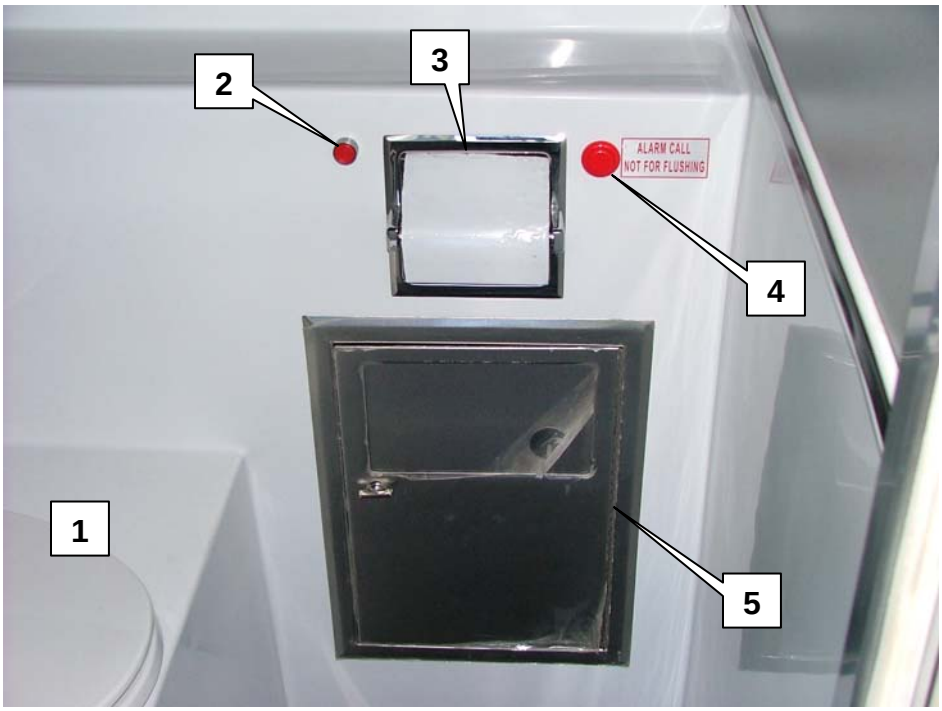
8- ACCESSORIES

LAVATORY

The lavatory is located in the rear corner of the passenger compartment streetside.

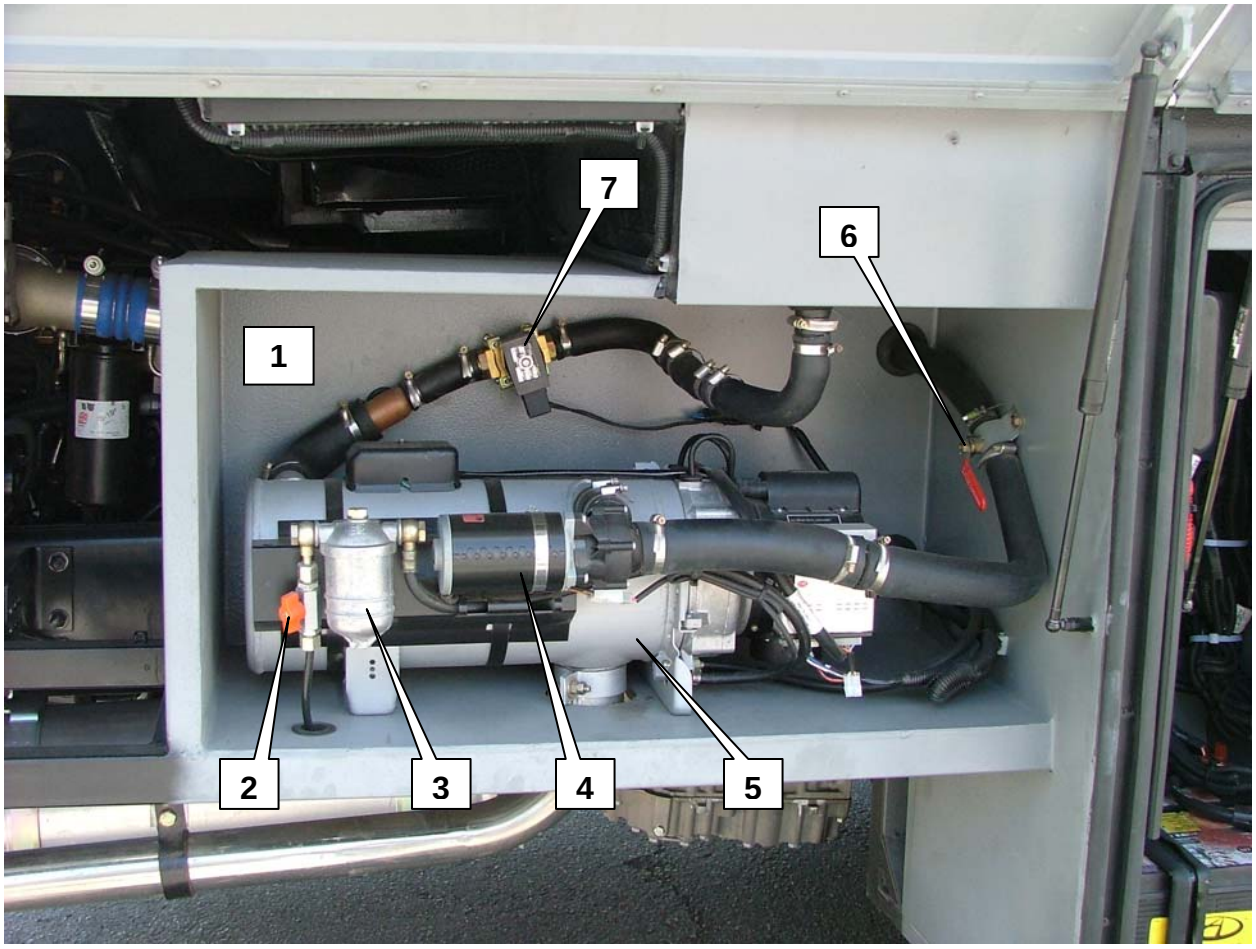
This service compartment is equipped with a chemical recirculated flush toilet or as option a nonrecirculated flush toilet , exhaust fan / fresh air intake, fluorescent lighting, mirror, toilet tissue dispenser and trash receptacle.

In the event of emergency, the occupant may press the emergency button that will alert the driver via a light and buzzer on the driver's console. The buzzer button and instructions for use are located on the inside wall of the lavatory.



1. Commode
2. Flush Button
3. Toilet Tissue Dispenser
4. Emergency Call Button
5. Trash Receptacle

COOLANT PREHEATER



WEBASTO™ COOLANT PREHEATER

The Webasto coolant preheater is used to maintain engine coolant temperature above 100°F in low temperature conditions. The preheater is located on the curb side of the vehicle in the engine compartment. To prepare for use, open the fuel supply valve (2).

Turn on the unit by pressing the auxiliary heater switch located on the side switch console inside the bus. The unit remains in operation until the power switch is turned OFF. Always turn off the fuel supply valve when the unit is not needed. Turn off the coolant line valves (6 & 7) when the unit requires service, to isolate it from the cooling system.

1. **Preheater Compartment**
2. **Fuel Shutoff**
3. **Fuel Filter**
4. **Coolant Pump**
5. **Preheater Unit, Combustion Chamber, and Heat Exchanger**
6. **Coolant Shutoff Valve (Inlet)**
7. **Coolant Shutoff Solenoid (Output) floor heaters.**

SUNLINER COACH

A STALLION BUS INDUSTRIES COMPANY

Corona , California

New York , New York

STALLION BUS INDUSTRIES