

# Unit C - Pre-Trip Responsibilities



## Unit C - Pre-Trip Responsibilities

### Learning Objectives

After completing this unit the trainee will be able to:

1. Inspect school bus warning devices.
2. Describe and identify school bus mechanical devices.
3. Identify defects.
4. Inspect interior and exterior items.

**Suggested Time: 3-4 hours**

### I. Introduction

#### C.1

**8VAC20-70-380. Pre-trip safety inspection.**

**Prior to the initial transporting of children each day, the drivers of school and activity buses shall perform a daily pre-trip safety inspection of the vehicle. The items checked and recorded shall be at least equal to the pre-trip inspection procedure in the Preventive Maintenance Manual for Virginia School Buses (September 2012) issued by the Department of Education.**

Driving a school bus entails many responsibilities, one of which is performing basic inspections to detect defects or deficiencies on the school bus. Performing a pre-trip inspection before a run and a post-trip inspection after a run can help detect defects or deficiencies. This is the first step in the maintenance process of pupil transportation.

School bus maintenance plays a vital role in pupil transportation. The school bus maintenance staff is responsible for performing scheduled services and inspections. These services help to keep the buses safe and the transportation system efficient. By reporting any defects or deficiencies found during the pre-trip or post-trip inspections, the drivers can help to ensure the school buses remain a safe mode of transportation.

Basic knowledge of the school bus components is instrumental in performing an accurate daily pre-trip inspection. Familiarizing his/herself with the bus and knowing its condition will be useful in adjusting driving performance while on the route.

***Discussion: Discuss your division's policies and procedures concerning pre-trip inspections.***

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## II. Bus Components and Systems

### C.2

The bus components or systems have been divided into seven areas:

#### 1. Braking System

##### a. Hydraulic Brakes

Hydraulic brakes work through fluid pressure. When the brake pedal is depressed, the pressure on the brake pedal moves the piston within the master cylinder, forcing the brake fluid from the master cylinder through the tubing and flexible hose to the wheel cylinders or brake calipers. This action actuates the brake pistons or brake calipers against the drum or rotor thus retarding the rotation of the wheels.

##### b. Air Brakes

Air brakes use compressed air to make the brakes work. The air brake system is composed of three combined braking systems: Service brake, Parking brake and Emergency brake. The service brake system applies and releases the brakes when the brake pedal is depressed during normal driving. The parking brake system applies and releases the park brake when the park brake control is used. The emergency brake system uses parts of the service and parking brake

systems to stop the vehicle in the event of a brake system failure.

##### c. Anti-lock Braking System

The anti-lock braking system uses a computer to monitor and control the braking system. The computer monitors the rotational speed of the wheels through sensors and then releases the brakes when the wheels are about to lock up.

#### 2. Engine

### C.3

##### a. Diesel Engines

The injector pump feeds fuel from the fuel tank to injectors which spray a metered mist of fuel into the engine's combustion chamber. The upward movement (compression stroke) of the pistons creates sufficient heat to ignite the fuel. The ignited fuel causes the pistons to move. The motion of the pistons turns the crankshaft, which is connected to the other components of the power train. The diesel engine requires no carburetion system or electrical firing system. Diesel engines are often equipped with manifold pre-heaters which aid combustion when starting the engine. Fumes are released from the diesel engine through the exhaust system.

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## b. Gasoline Engines

A fuel pump draws fuel from the fuel tank and feeds it to the injectors, which mixes it with air. The fuel/air mixture is fed into the engine's combustion chamber where it is ignited by the spark plugs. The ignited mixture (explosion) causes the pistons to move, which in turn causes the crankshaft to turn. The rotating crankshaft transfers power from the engine to the transmission. The power is then carried to the drive shaft, the differential (rear end), the rear axles, and the rear wheels. The remaining gas from the ignited mixture exits the engine through the exhaust system. Included in the exhaust system is the muffler (dampens the noise) and the tailpipe. The tailpipe extends sufficiently beyond the bus so the noxious fumes cannot enter the passenger compartment.

## 3. Transmissions

### C.4

A transmission is a speed and power changing device installed at some point between the engine and driving wheels of a vehicle. It provides a means for changing the ratio between engine RPM (revolutions per minute) and driving wheel RPM to best meet each particular driving situation. There are two types of

transmissions - manual and automatic. If the bus has a manual transmission, the driver will have to shift the gears, usually with a stick located on the console and the clutch pedal. If the bus has an automatic transmission, the mechanism changes without any help from the driver.

### a. Manual Transmissions

The manual transmission provides a means of varying the relationship between the speed of the engine and the speed of the wheels. Varying these gear ratios allows the right amount of engine power at many different speeds. Manual transmissions require the use of a clutch to apply and remove engine torque to the transmission input shaft. The clutch allows this to happen gradually so the vehicle can be started from a complete stop.

### b. Automatic Transmissions

Automatic transmissions automatically change to higher and lower gears with changes in the vehicle's speed and the load on the engine. This system is operated by transmission fluid pressure; shift valves control the gear changes.

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## 4. Steering

### C.5

The steering system incorporates the steering wheel, steering column, a gearbox and pitman arm or a rack and pinion assembly, steering knuckles and ball joints, and the wheel spindle assemblies. Power steering systems add a hydraulic pump, fluid reservoir, hoses and lines. The rotating movement of the steering column by the steering wheel activates mechanisms inside the steering box; this passes on the steering wheels movement to the tie rods. The steering arm picks up the motion from the tie rods and causes the steering knuckles to turn the wheels.

## 5. Suspension System

### C.6

The suspension system has two basic functions - to keep the vehicle's wheels in firm contact with the road and to provide a comfortable ride for the passengers. A lot of the system's work is done by the springs. Under normal conditions, the springs support the body of the vehicle evenly by compressing and rebounding with every up and down movement. The up and down movement effects are reduced by the shock absorbers.

## 6. Electrical System

### C.7

The first major component in the electrical system is the battery. The battery is the initial source of electricity and is used to store power for starting and for running auxiliary devices. The next major component is the starter motor. The starter converts electricity to mechanical energy which is used to start the engine. The third component is the alternator. It is the charging device powered by the engine. The alternator powers the electrical system when the vehicle is running and restores the charge within the battery. With these basic components, the vehicle maintains its supply of electricity. A device called the voltage regulator keeps the power level stabilized and the fuse box keeps minor problems from becoming major ones.

## 7. Traffic Warning System

### C.8

School bus warning systems are governed by state law that specifically outlines the required warning system.

Buses shall be equipped with four red lamps and four amber lamps.

The traffic warning light system shall be wired so that the amber lamps are activated manually by a hand operated switch. When the door is opened, amber lamps will be automatically deactivated

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and red lamps, warning sign with flashing lamps and crossing control arm shall be activated. When the door is closed, all lamps shall be deactivated.

Newer school buses are equipped with a non-sequential system. This system operates the warning devices on the school bus. The red warning lights, warning sign with flashing lights, and crossing control arm are automatically activated, as a preventative feature, whenever the door is opened. (*Code of Virginia 46.2-1090*)

## III. What is Preventive Maintenance?

### C.9

In order to maintain a safe fleet and keep the bus in serviceable condition, a cost effective maintenance program is incorporated into the school divisions. Whether it is on-site or contracted maintenance, it plays a vital role in keeping the school buses properly maintained.

Virginia Administrative Code (8 VAC 20-70-130) requires that buses be inspected and maintained on a regular basis and Virginia Administrative Code (8 VAC 20-70-380) also requires drivers of school buses to perform daily pre-trip safety inspections.

Preventive maintenance involves making minor adjustments which could prevent

vehicle failures that could result in an accident, injury or death of an individual. The objectives of a preventive maintenance program are:

- Keep the bus in a safe operating condition
- Prevent failures and breakdowns
- Maintain the bus in a serviceable operating condition
- Lower maintenance costs
- Preserve bus components
- Eliminate problems for the driver

## Pre-Trip Safety Inspection

### C.10

The pre-trip safety inspection is the first step in preventive maintenance. Inspecting the bus and recording the results before starting a route or field trip is mandatory.

A written report of the defects or deficiencies detected must be submitted to the maintenance department. The bus cannot be operated if a defect prevents its safe and/or legal operation.

The following is the step-by-step procedure for performing the pre-trip safety inspection:

## IV. Operation of the Bus

### C.11

The school bus is unique in many ways and the school bus driver is in charge with unique responsibilities. While

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driving the school bus the driver will become familiar with the way it handles and will eventually be able to tell when that bus is not running properly. Learning to recognize defects or malfunctions and immediately reporting them will help the maintenance department keep the bus running safe and efficiently.

**Remember:** Defects cannot be repaired if they are not reported.

Be Perceptive, the vehicle “talks” in many ways.

## 1. Listen for problems:

- a. Engine knocking sounds
- b. Clicking or tapping noises
- c. Continuous or intermittent squeals or squeaks
- d. Loud exhaust noise
- e. Engine backfiring, missing, popping
- f. Spitting, steaming, or hissing
- g. Air leaks

## 2. Feel for problems:

- a. Excessive vibrations
- b. Low speed or high speed shimmy
- c. Hard steering or steering wander

## 3. Look for problems:

- a. Check gauges
- b. Excessive smoke coming from the exhaust
- c. Smoke coming from under the hood
- d. Smoke coming from under the dash

## 4. Smell for trouble:

- a. Odor of gasoline/fuel
- b. Odor of burning rubber
- c. Odor of burning oil
- d. Odor of burning rags
- e. Odor of exhaust fumes

***Discussion:*** Discuss the proper procedure in reporting school bus defects.

***Discussion:*** Discuss in detail the pre-trip inspection procedure.

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## Pre-Trip Inspection

### Front of the Bus

#### Check under Bus for Leaks

- Look for wet spots on the ground.
- The area may be darker, shine or slick.
- Green or pinkish fluid may indicate antifreeze; red fluid may indicate power steering fluid; and black fluid may be oil.

#### Check Engine Compartment

- Oil Level: pull dipstick and check level when the engine is cold.
- Coolant Level: look for green or pinkish fluid level in an indicator eye on the radiator. Some buses may have an overflow container and check that it is at least half full of coolant. **DO NOT REMOVE THE RADIATOR CAP TO CHECK FOR ANTIFREEZE!**
- Power Steering Fluid: remove the cap on reservoir and check level when the engine is cold.
- Water Pump: check if any mounting bolts are missing.
- Alternator: check if any mounting bolts are missing or if belt is loose.
- Air Compressor: check for looseness.
- Check for Leaks: look for oil, coolant, power steering and brake fluid as possible leaks. Check for fluid leaks around the brake master cylinder,

exhaust pipes, valve covers or the radiator and hoses.

- Brake Master Cylinder: check brake fluid.
- Check Belts: look for frayed, cracked or worn spots on belts.

### Check Inside of the Bus

Start Engine

#### Check Operation Of:

- Oil Pressure Gauge: for building oil pressure. Oil pressure should come up to normal within seconds after the engine is started. If no gauge, identify the location of the warning light that indicates a system failure.
- Alternator Voltmeter: for proper voltage – 12- to 14-volts.
- Air Pressure Gauges: for building pressure.
- Steering: for excess free-play. Turn the steering wheel in both directions for no more than 2-inches of free-play.
- Parking Brake: for adjustment. Set parking brake, step on the brake pedal, place transmission in gear and slowly release brake pedal and see if the bus moves forward.
- Windshield and Mirrors: look for cracks, fog areas and appropriate adjustment (mirrors only).
- Windshield Wipers and Washers: for proper operation. Check the condition of the blades.

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- h. Dash Indicator Lights and Warning Lights: for operation of signal, head, dash, interior and traffic warning lights indicators.
- i. Horn(s): for proper operation.
- j. Heaters and Defrosters: for proper operation.
- k. Air Brakes: for proper operation. Build air pressure to 120-lbs; Turn engine off-check to see if pressure does not drop more than 2-lbs. within 1-minute; Turn ignition key on, apply the brakes and hold steady pressure and see if air pressure does not drop more than 3-lbs. in 1-minute; Begin pumping the brake pedal to decrease air pressure-at approximately 60-lbs. of pressure, the warning light and alarm buzzer should activate; Continuing pumping the brake pedal until air pressure drops below approximately 40-lbs. and the emergency/parking brake switch pop on. **IF ANY OF THESE STEPS FAIL, DO NOT USE THE BUS-CONTACT YOUR SUPERVISOR.**

## Check Lights Outside of the Bus

Turn on headlights, clearance, 4-way hazard, and traffic warning lights. Exit bus with engine idling, transmission in neutral and park/emergency brake set.

## Right Front Wheel (Entrance Door Side)

### Check For:

- a. Hub Oil Seal: grease/oil leaking from seal. Look for bolts missing.
- b. Lug Nuts: missing or loose lug nuts. Look for rust around the lug nuts.
- c. Rim: cracks, indentations or welds.
- d. Tire: cuts, wear bars, knots or any other imperfections in the tire. Tread depth must be a minimum of 4/32-inch (1/8-inch) in the major groove of the tire.
- e. Spring and Mounts: broken spring leaves; look at U-bolts and spring hangers for cracks, looseness or missing cotter keys.
- f. Shock Absorber(s): oil running from the shock absorber or wet area on bottom and missing bolts.
- g. Air Brake Slack Adjuster: missing cotter keys on the pins. Look and see that the adjuster is set at 90° (all adjusters must be at the same angle at all wheels).
- h. Air Brake Chamber: loose or missing bolts. Check for rust around the chamber.
- i. Brake Hoses: frayed, cracked or rubbing hoses. Check for wet or shiny areas on hoses and/or hose fittings.
- j. Drum or Rotor: cracks or missing pieces.

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## Front of the Bus

### Check For:

- a. Mirror at Entrance Door: broken brackets or missing bolts; shake and see if it is loose.
- b. Lights: proper operation of headlights, 4-way hazard, clearance and traffic warning lights; check for cracked or missing light covers.
- c. Crossing Arm: proper operation and in the extended position.
- d. Crossing Mirrors: broken brackets or missing bolts; shake and see if they are loose.
- e. Stop Sign(s): proper operation and in the extended position; check the operation of the flashing lights.

## Left Front Wheel/Area (Driver's Side)

### Check For:

- a. Hub Oil Seal: grease/oil leaking from seal. Look for bolts missing.
- b. Lug Nuts: missing or loose lug nuts. Look for rust around the lug nuts.
- c. Rim: cracks, indentations or welds.
- d. Tire: cuts, wear bars, knots or any other imperfections in the tire. Tread depth must be a minimum of 4/32-

inch (1/8-inch) in the major groove of the tire.

- e. Spring and Mounts: broken spring leaves; look at U-bolts and spring hangers for cracks, looseness or missing cotter keys.
- f. Shock Absorber(s): oil running from the shock absorber or wet area on bottom and missing bolts.
- g. Air Brake Slack Adjuster: missing cotter keys on the pins. Look and see that the adjuster is set at 90° (all adjusters must be at the same angle at all wheels).
- h. Air Brake Chamber: loose or missing bolts. Check for rust around the chamber.
- i. Brake Hoses: frayed, cracked or rubbing hoses. Check for wet or shiny areas on hoses and/or hose fittings.
- j. Drum or Rotor: cracks or missing pieces.
- k. Steering Box: fluid leaks, missing and/or loose mounting bolts, torn or frayed hoses cracks and non-factory welds.
- l. Steering Linkage: steering column, pitman arm and drag link for missing nuts, bolts, cotter keys; check for bent, loose or broken parts.

## Under the Bus (Driver's Side)

### Check For:

- a. Drive Shaft: all U-shaped safety guard brackets are in

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- place and not loose; missing or loose bolts, cracks and non-factory welds.
- b. Exhaust System: leaks-listen for and/or smell fumes; look for black soot around connections.
- c. Frame: cracks, which may resemble rust lines.
- g. Air Brake Slack Adjuster: missing cotter keys on the pins. Look and see that the adjuster is set at 90° (all adjusters must be at the same angle at all wheels).
- h. Air Brake Chamber: loose or missing bolts. Check for rust around the chamber.
- i. Brake Hoses: frayed, cracked or rubbing hoses. Check for wet or shiny areas on hoses and/or hose fittings.
- j. Drum or Rotor: cracks or missing pieces.

## Left Rear Wheels (Driver's Side)

### Check For:

- a. Hub Oil Seal: grease/oil leaking from seal. Look for bolts missing.
- b. Lug Nuts: missing or loose lug nuts. Look for rust around the lug nuts.
- c. Rim: cracks, indentations or welds.
- d. Tire: cuts, wear bars, knots or any other imperfections in the tire. Tread depth must be a minimum of 2/32-inch in the major groove of the tire.
- e. Spring and Mounts: broken spring leaves; look at U-bolts and spring hangers for cracks, looseness or missing cotter keys.
- f. Shock Absorber(s): oil running from the shock absorber or wet area on bottom or missing bolts.

## Rear of the Bus

### Check For:

- a. Lights: proper operation of taillights, rear license plate, 4-way hazard, clearance and traffic warning lights; check for cracked or missing light covers.
- b. Reflectors: red on the rear and cracked or broken lens.
- c. Exhaust Pipe: look for cracks, indentation or welds and exhaust extends out from underneath the bus.
- d. Rear Emergency Door/Exit: unlocked, door latch out works properly, buzzer/alarm and seal.

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## Right Rear Wheels (Entrance Door Side)

### Check For:

- a. Hub Oil Seal: grease/oil leaking from seal. Look for bolts missing.
- b. Lug Nuts: missing or loose lug nuts. Look for rust around the lug nuts.
- c. Rim: cracks, indentations or welds.
- d. Tire: cuts, wear bars, knots or any other imperfections in the tire. Tread depth must be a minimum of 2/32-inch in the major groove of the tire.
- e. Spring and Mounts: broken spring leaves; look at U-bolts and spring hangers for cracks, looseness or missing cotter keys.
- f. Shock Absorber(s): oil running from the shock absorber or wet area on bottom and missing bolts.
- g. Air Brake Slack Adjuster: missing cotter keys on the pins. Look and see that the adjuster is set at 90° (all adjusters must be at the same angle at all wheels).
- h. Air Brake Chamber: loose or missing bolts. Check for rust around the chamber.
- i. Brake Hoses: frayed, cracked or rubbing hoses. Check for wet or shiny areas on hoses and/or hose fittings.

- j. Drum or Rotor: cracks or missing pieces.

## Fuel Area

### Check For:

- a. Fuel Tank: fuel cap is properly mounted on fuel tank; the gasket on the cap; and loose parts, cracks or missing pieces of the fuel tank safety cage.
- b. Fuel Leaks: Be alert to fume smells and look for fuel spills on the ground.

## Passenger Area Inside of the Bus

### Check For:

- a. Entrance Door: broken glass and proper operation (closing and opening).
- b. Step Treads: treads securely fastened and not posing a tripping hazard; area open and free of any objects or articles.
- c. Handrail(s): looseness, missing bolts and catch-points.
- d. Passenger Seats: loose seats; walk to the back of the bus, grab the back corner of each bottom seat and pull up to see if they are properly attached; check for cuts or torn seat covers.
- e. All Emergency Doors and Exits: all doors, windows and roof emergency exits are unlocked; open each to check their alarm buzzer. If equipped

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- with a Folding Seat (at a side emergency door) check for proper fold-up operation.
- f. Passenger Seat Backs: loose or broken frames and/or mounts; check each seat by grabbing the top corner of the seat and shake to see if it is loose or broken.
- g. Windows: cracked or broken glass; check for the proper operation of the windows.
- h. Emergency Equipment: the proper size and type fire extinguisher is fully charged and properly secured on a bracket; the first aid and body fluids kits are properly mounted and contain required contents; the triangle reflective markers kit contains 3-markers and properly secured; and the web cutter is properly mounted.
- c. Brakes: pull the bus forward and depress the brake pedal to check for proper stopping ability.
- d. Steering: operate the steering wheel back and forth to check for proper control.

## Final Checks

### Check For:

- a. Brake, Back-Up and Turn Signal Lights: proper operation of the lights. Depress the brake pedal, place the bus in reverse gear and look for the red reflections of the brake lights, the reflections of the back-up lights and listen for the back-up alarm.
- b. Clutch and Transmission: start the bus and put the bus in gear, release the clutch and check for proper engagement.

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## Unit Review

1. The \_\_\_\_\_ of school and activity buses shall perform a daily \_\_\_\_\_ of the vehicle prior to transporting children.
2. The air brake warning buzzer should sound off when the air pressure is below \_\_\_\_\_ psi.
3. If a mechanical problem is found, it should be reported to the \_\_\_\_\_ department.
4. Describe the procedure for reporting bus defects in your area.
5. Describe possible equipment failure or defects that could be found on a school bus.

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## Answers

1. drivers, pre-trip inspection
2. 60
3. maintenance
4. Answers will vary
5. Answers will vary