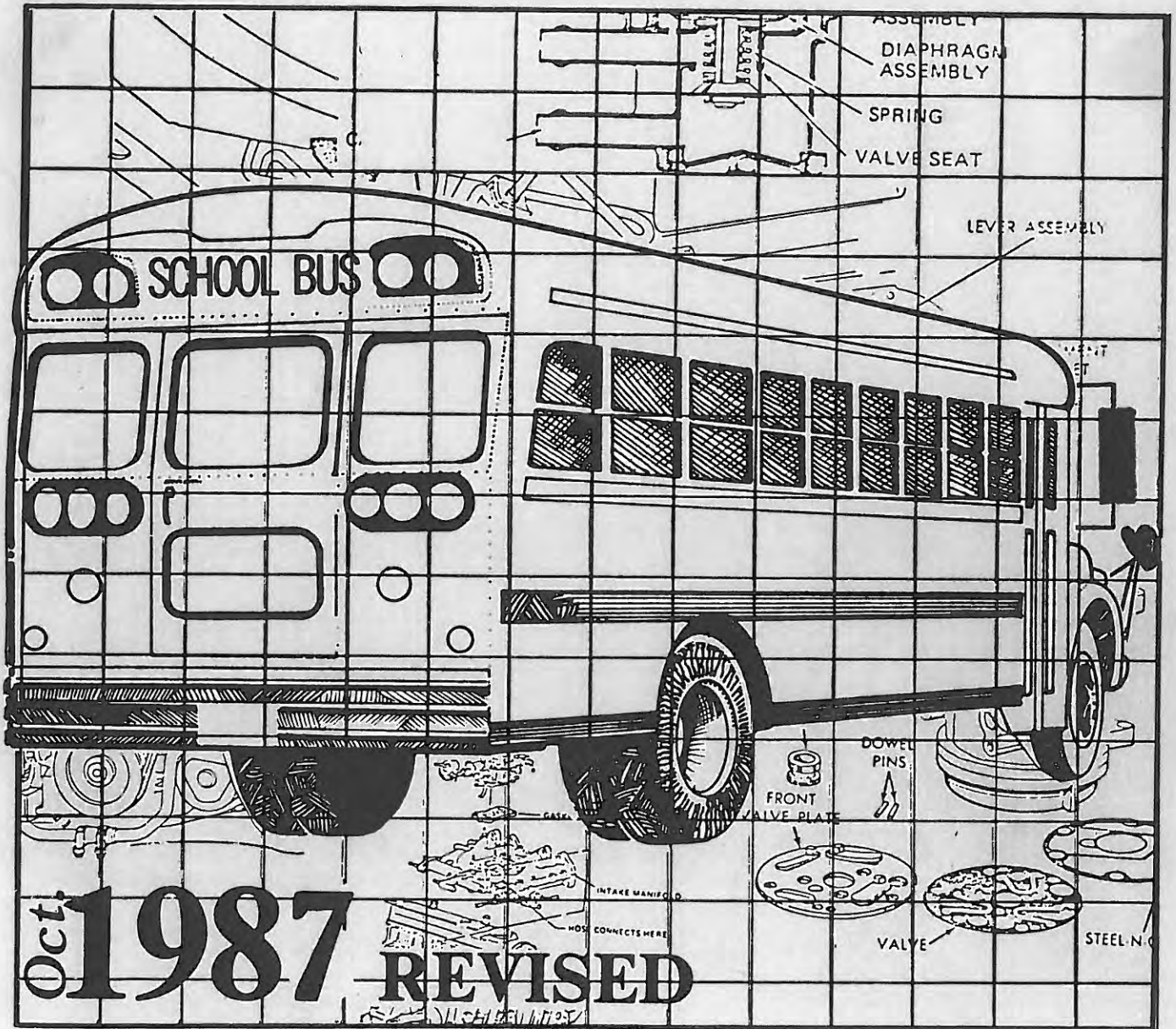


# FLORIDA SCHOOL BUS



## S P E C I F I C A T I O N S

Florida Department of Education  
School Transportation Management  
Tallahassee, Florida



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## **FOREWORD**

The Florida Minimum Specifications for School Buses, herein presented, were revised and adopted by the Florida State Board of Education in October, 1987 and became effective on the same date.

The specifications for school buses, outlined in this document, are the official school bus specifications for Florida as authorized by Section 234.051, Florida Statutes, and are in effect until revised.



## FLORIDA MINIMUM SPECIFICATIONS

### General Information and Provisions

1. All public school buses, (bodies and chassis) owned, operated, leased, and contracted for by any public school board in Florida, used to transport children to and from school or school-related events, and purchased after the effective date of this document shall:
  - A. Meet or exceed the minimum requirements of these specifications; and,
  - B. Meet all applicable Federal Motor Vehicle Safety Standards; and,
  - C. Meet or exceed the current National Minimum Standards for school buses except when in conflict with the requirements herein. In such cases, the requirements specified in this document shall prevail.
2. The requirements specified herein are the minimum requirements for school buses in Florida.
3. All school bus chassis and body manufacturers shall certify to the Commissioner of Education, Florida Department of Education, in the form of a letter, that all school buses offered for sale to or use by the public school systems in Florida meet or exceed all standards, specifications, and requirements as specified herein.
4. Used school buses purchased or operated by a public school board in Florida shall meet or exceed all Federal and State requirements for public school buses that were in effect on the date the vehicle was manufactured.

**NOTE:** Under the authority of Section 316.615, Florida Statutes, certain capacity size school buses owned, operated or leased by nonpublic school systems in Florida are required to meet the specifications prescribed herein.

5. **Definition of School Bus:**

**State Definition:** Section 234.051, Florida Statutes: "... a "school bus" is defined as a motor vehicle regularly used for the transportation of pupils of the public schools to and from school or to and from school activities, and owned, operated, rented, or leased by any school board ..."

**Federal Definition:** 49 CFR ss 571.3 reads: "... "school bus" means a bus that is sold or introduced in interstate commerce for purposes that include carrying students to and from school or related events ..."

6. **Type School Buses:**

**Type "A"** - A Type "A" school bus is a conversion or body constructed upon a van-type compact truck or a front-section vehicle, with a gross weight rating of 10,000 pounds or less, designed for carrying more than 10 persons.

**Type "B"** - A Type "B" school bus is a conversion or body constructed and installed upon a van or front-section vehicle chassis, or stripped chassis, with a vehicle weight rating of more than 10,000 pounds, designed for carrying more than 10 persons. Part of the engine is beneath and/or behind the windshield and beside the driver's seat. The entrance door is behind the front wheels.

**Type "C"** - A Type "C" school bus is a body installed upon a flat back cowl chassis with a gross vehicle weight rating of more than 10,000 pounds, designed for carrying more than 10 persons. All of the engine is in front of the windshield and the entrance door is behind the front wheels.

Type "D" - A type "D" school bus is a body installed upon a chassis, with the engine mounted in the front, midship, or rear, with a gross vehicle weight rating of more than 10,000 pounds, designed for carrying more than 10 persons. The engine may be behind the windshield and beside the driver's seat; it may be at the rear of the bus, behind the rear wheels, or midship between the front and rear axles. The entrance door is ahead of the front wheels.

7. Warranty: New Vehicles

- A. Chassis warranty shall be manufacturer's standard, 12,000 miles or 12 months.
- B. Body warranty shall be manufacturer's standard, 12 months.
- C. Diesel engines on Type B (28-66 capacity conventional), Type C, and Type D units shall be warranted for 60 months/unlimited mileage, 100% parts and labor.
- D. The chassis or component supplier for all Type "B" (28-66 capacity conventional chassis) and Type "C" and "D" chassis shall warranty or provide extended service coverage for the following items, including removal and replacement, for 5 years, unlimited mileage, 100% parts and labor: automatic transmission, drive shafts and U-joints, differential, rear axle housing, rear axles, and rear wheel bearings, but not including gaskets and seals covered under the basic 12 month/12,000 miles chassis warranty.
- E. Body and chassis manufacturers' warranty policies shall allow revision of warranty start date for each vehicle to the actual inservice date by the school district. Appropriate forms to update chassis warranty shall be included in the owner-operator's packet supplied with the chassis and shall be conveyed along with the body warranty by the body builder to the district upon delivery of the completed unit. Above requirements shall apply to the basic warranties, all component warranties and any extended warranties offered or required.

8. Changes or clarification of specifications:

Any part of these specifications may be changed at any time by adoption by the Florida State Board of Education.

Should a clarification or interpretation of these Florida Minimum Specifications for school buses be requested, inquiries should be directed to the **Administrator, School Transportation Management Section, Florida Department of Education, 377 Knott Building, Tallahassee, Florida 32399-0400.**



**SECTION I**  
**CHASSIS SPECIFICATIONS**  
**CONVENTIONAL SCHOOL BUSES**  
**TYPE "C"**



**BASIC MINIMUM SPECIFICATIONS  
FOR GASOLINE AND DIESEL SCHOOL BUS CHASSIS  
FOR MOUNTING TYPE "C" CONVENTIONAL SCHOOL BUS BODIES**

1. Engine Equipment:

(See pages 11 and 12 for approved engines.)

Additional engine items required:

A. Dry type air cleaner.

B. Oil filter(s): Engine shall be equipped with full-flow, spin-on, cartridge-type oil filter(s), with filter header(s) mounted directly to engine block.

*Sight tank*

~~C.~~ Engine coolant recovery or deaeration system required on all chassis. Diesel engines must include some means for visually checking coolant level without removing deaeration tank cap or releasing pressure from cooling system.

D. A warning system consisting of light and buzzer required on diesel- powered chassis to notify driver of low engine oil pressure and/or coolant overheating.

~~E.~~ A fuel/water separator is required on all diesel engines. It shall be of a design and installation compatible with chassis/engine application to ensure trouble-free performance when properly maintained. In addition fuel/water separator shall meet the following requirements:

(1) Must be completely accessible for manufacturer's recommended servicing, with emphasis on underhood mounting location.

(2) Must have a clear drain (sight) bowl with a drain valve to allow detection and draining of accumulated water.

(3) Must contain a replaceable pleated paper element fuel filter of proper design to protect against premature fuel flow restriction or excessive passage of contaminants.

*Direct reader oil pressure gauge*

An engine oil pressure gauge is required. It shall provide accurate, easily discernible readings across the entire operating range from hot idle to full oil pressure. Gauges on engines with idle oil pressure which, under normal conditions, is low shall provide a clear distinction between no oil pressure and engine idle oil pressure.

2. Governor:

Shall permit controlled engine RPM up to manufacturer's recommended maximum for engine use. (See engine requirements pages 11 and 12.)

3. Exhaust System:

Corrosion resistant muffler; extend 5 inches beyond chassis frame. (See National Standards.) Must exit to left of left frame rail and behind rear wheels.

4. Alternator Requirements:

100 amp. minimum rating; 50 amp. minimum output at manufacturer's recommended engine idle speed; dual belt, maximum ratio 2.5 to 1; sealed ball or roller bearings meeting National Minimum Standards.

5. Voltage Control:

Regulator: solid state components (transistorized) readily accessible for service. Voltmeter Required: graduated scale.

6. Battery(ies):

Gasoline - One 475-cold cranking amps (CCA) at 0°F, 12-volt; temporary frame mount location.

Diesel - total of 1250 CCA at 0°F, 12-volt; temporary frame mount location.

7. Turn Signals:

Dash indicator light, self-canceling switch with lead wires on steering column for body manufacturer's attachment including 2-face front turn signal lights, (amber front and rear) fender mounted.

8. Horn:

Dual, 120 decibels. (See National Standards.)

9. Headlights:

Must meet S.A.E. and Federal Standards.

10. Wiring Harness:

100 amp. load and complete wiring for tail and stop lights; color-coded circuits.

11. Fuel Tank:

30 gallon on 29 passenger unit; single 60 gallon required 47 capacity and larger chassis, spout located for ease in servicing. Gauge compatible with tank capacity meeting requirements of Federal Motor Vehicle Safety Standard 301.

12. Hood and Fenders:

Painted National School Bus Yellow. Paint on National School Bus Yellow portions of chassis shall be lead free. (See 1985 National Minimum Standards.)

Tilt hood/fender assembly required on all Type "C" chassis.

13. Ignition System:

Electronic ignition system required on all gasoline engine-powered chassis.

14. Insulation:

Chassis shall include heat and noise insulation inside the bus covering the dash panel (firewall) area to as great an extent as possible.

15. Bumper, Front:

Must be black, full width, channel type minimum 8 inches, of sufficient structural and mounting strength to ensure that front of vehicle may be lifted by means of an air bumper-type jack.

16. Shock Absorbers:

Front and rear, double-acting; adequate size for axle load.

17. Springs, Front:

Double-wrap stationary end. (See requirements, pages 11 and 12.)

18. Springs, Rear:

Progressive type. (See requirements, pages 11 and 12.)

19. Tires and Rims:

Chassis shall be equipped with radial tubeless tires mounted on disc wheels. Tires and rims shall conform to current standards of Tire and Rim Association. (See pages 11 and 13 for size.)

20. Drive Shaft Guards and Shields:

Required.

21. Frame Side Members:

One piece construction.

22. Steering:

Chassis 29-65 capacity shall have factory installed power steering, integral type.

23. Brakes, Service:

A. Hydraulic Brakes: Acceptable on chassis under 59-capacity only. Hydraulic brake models shall have power assist and shall meet National Minimum Standards for School Bus Chassis, 1985 edition, and all applicable Federal Motor Vehicle Safety Standards. Brake lining material shall not contain asbestos.

B. Air Brakes: Acceptable on chassis under 59-capacity; required on chassis 59-capacity and larger. Air brake models shall meet National Minimum Standards for School Bus Chassis, 1985 edition, and all applicable Federal Motor Vehicle Safety Standards. Air brake models shall be equipped with a dessicant or air cooled dryer with an automatic purge and drain cycle and a heating element. Drum-type air brakes on the rear axle of 59-capacity and larger chassis must have minimum 7-inch wide linings. Drum-type air brake lining thickness must be a minimum (except taper) of 3/4 inch on the rear axle and 3/8 inch on the front axle for all capacity chassis. All drum-type air brakes shall be cam-actuated. For all air brake models, if brakes on one axle are self-adjusting, both axles must be self-adjusting. All air brake models (drum, disc-drum, or air disc) must be equipped with spring-set parking brakes on the rear wheels. Brake lining material shall not contain asbestos. A minimum 12 CFM, engine oil-fed air compressor is required on all air brake models.

**NOTE:** See pages 11 and 13 for minimum lining area requirements applicable to hydraulic or air brake chassis equipped with four-wheel drum brakes.

24. Brake, Parking:

On hydraulic brake models an Orscheln type control, or approved equal, mounted in easy access of the driver is required. On air brake models, a dash-mounted control valve to spring-set the parking brake on the rear wheels is required.

**NOTE:** All chassis, 47 capacity and larger, on which a wheelchair lift body is to be mounted shall be equipped with a park brake operating by means of rear wheel brake shoe or pad mechanical actuation.

25. Transmission, Automatic:

**Automatic Transmission Required on all chassis.** Minimum 3-speed forward through 47 capacity; minimum 4-speed forward 53-65 capacity, Allison AT 545 or approved equal. On vehicles equipped with automatic transmission with four forward speeds or more, an external filter in the transmission oil cooler return line is required.

26. Odometer:

Accrued mileage, seven digits, including tenths of miles (999,999.9 mile odometer).

27. Differential Ratio:

Shall be compatible with engine and provide for 55 mph in highest gear. (See requirements pages 11 and 12.)

28. Belt Drive:

To components, such as alternator, air compressor, and power steering, shall deliver to rated requirements without drive slippage at maximum load.

29. Vacuum Attachment for Stop Arm:

Engine manifold of all gasoline-powered chassis shall be tapped for one (1) attachment for installation by the body manufacturer of a vacuum stop arm.

30. Warranty:

Type "C" school bus chassis shall be warranted by the manufacturer for a period of 12 months/12,000 miles. Diesel engines shall be warranted for 60 months/unlimited mileage, 100% parts and labor. Transmission and drive train shall also be covered for 60 months/unlimited mileage, 100% parts and labor. See item #7, page 4.

31. Line-Sett Ticket:

Manufacturer shall include with delivery of vehicle a line-sett ticket to accurately reflect the following: a) all chassis components; b) G.A.W.R. of both front and rear axles; and c) G.V.W.R.

The following basic specifications differ according to size of chassis required for mounting various size school bus bodies.

**PUPIL LOAD BODY SIZE BASED ON MINIMUM OF  
12.8 INCHES PER PASSENGER SEATING POSITION**

<b><u>Gasoline Powered</u></b>	<b><u>29</u></b>	<b><u>47</u></b>	<b><u>53</u></b>	<b><u>59</u></b>	<b><u>65</u></b>
Minimum Engine Size	4.8L 292cid	4.8L 292cid	5.6L 345cid	5.6L 345cid	5.6L 345cid
<b>EXCEPTION: GMC or Chevrolet 350 cid gasoline engine not approved for Type "C" chassis.</b>					
Differential Ratio	6.67-7.20	6.67-7.20	6.50-7.20	6.50-7.20	6.50-7.20
<b>Minimum G.A.W.R</b>					
A. Front	5,000	5,500	7,000	7,500	7,500
B. Rear	10,500	14,200	16,160	17,500	17,500
Cowl to axle, minimum	123"	162"	194"	211"	229"
Approximate wheel base	150"	190"	218"	239"	257"
Front Suspension (axle) lbs. min.	5,000	5,500	7,000	7,500	7,500
Rear axle lbs. min.	11,000	15,000	17,000	17,500	17,500
Ea. front spring at ground	2,500	2,750	3,500	4,000	4,000
Ea. rear spring at ground (progressive spring)	5,250	7,500	8,500	8,750	8,750
Service brake-drum brake only (min. total sq. inch)					
Hydraulic Full Air (7" shoe on rear axle of 59 & 65 Cap.)	440 ---	440 ---	500 ---	--- 663	--- 663
Min. Tire Size: Tubeless-Radial Ply	9R-22.5-F	9R-22.5-F	10R-22.5-F	10R-22.5-F	10R-22.5-F
<b>Min. Wheel Rim</b>					
Size: Disc Wheels for Tubeless Radials	6.75" (6-hole)	6.75" (6-hole)	7.50" (10-hole)	7.50" (10-hole)	7.50" (10-hole)

The following basic specifications differ according to size of chassis required for mounting various size school bus bodies.

**PUPIL LOAD BODY SIZE BASED ON MINIMUM OF  
12.8 INCHES PER PASSENGER SEATING POSITION**

<u>Diesel Powered</u>	<u>29</u>	<u>47</u>	<u>53</u>	<u>59</u>	<u>65</u>
Minimum S.A.E.					
Gross Horsepower	145GHP	155GHP	155GHP	170GHP	170GHP
Minimum S.A.E. Gross Torque/lb-ft	300 lb-ft Torque	300 lb-ft Torque	300 lb-ft Torque	350 lb-ft Torque	350 lb-ft Torque
Maximum (full-load) Governed Engine Speed	3,000 RPM	3,000 RPM	3,000 RPM	2,800 RPM	2,800 RPM
Differential Ratio	4.88-5.86	4.88-5.86	4.88-5.86	4.88-5.86	4.88-5.86
Minimum G.A.W.R					
A. Front	6,000	7,000	7,800	9,000	9,000
B. Rear	12,400	14,200	16,160	17,500	17,500
Cowl to axle, minimum	123"	162"	194"	211"	229"
Approximate wheel base	150"	190"	218"	239"	257"
Front Suspension (axle) lbs. min.	6,000	7,000	8,000	9,000	9,000
Rear axle lbs. min.	13,000	15,000	17,000	17,500	17,500
Ea. front spring at ground	3,000	3,500	4,000	4,500	4,500
Ea. rear spring at ground (progressive spring)	6,500	7,500	8,500	8,750	8,750



The following basic specifications differ according to size of chassis required for mounting various size school bus bodies.

**PUPIL LOAD BODY SIZE BASED ON MINIMUM OF  
12.8 INCHES PER PASSENGER SEATING POSITION**

<u>Diesel</u> <u>Powered</u>	<u>29</u>	<u>47</u>	<u>53</u>	<u>59</u>	<u>65</u>
Service brake-drum brake only(min. total sq. inch)					
Hydraulic Full Air (7" shoe rear axle of 59 & 65 Cap.)	440 ---	440 ---	500 ---	--- 663	--- 663
Min. Tire Size:					
Tubeless-Radial Ply	9R-22.5-F	9R-22.5-F	10R-22.5-F	10R-22.5-F	10R-22.5-F
Min. Wheel Rim					
Size: Disc Wheels for Tubeless Radials	6.75" (6-hole)	6.75" (6-hole)	7.50" (10-hole)	7.50" (10-hole)	7.50" (10-hole)

**SPECIFICATIONS FOR OPTIONAL CHASSIS  
EQUIPMENT IN TYPE "C" BUSES**

1. Optional Rear Axle:

Approved option for rear axle with minimum 18,000 lbs. G.A.W.R. on 59- and 65-capacity chassis.

2. Automatic Slack Adjusters:

Approved option on air brake models.

3. Tow Hooks:

Two heavy-duty tow hooks, installed by manufacturer, one on each frame rail at front of bus in an approved manner.

4. Air Brakes:

Approved option for units under 59 capacity where available.

5. Diesel Noise Reduction Package:

Approved option from chassis manufacturer where available, and exceeding requirements of standard chassis dash panel insulation. See page 8.

6. Higher Output Alternator:

Approved option for an alternator having a minimum of 75 amperes output at manufacturer's recommended engine idle speed and meeting all other requirements of the standard alternator.

7. Spare Disc Wheel:

Approved option; must be same size and type as original rims.

8. Silicone Hose:

Approved option for a package including silicone (or approved equivalent) radiator and other engine coolant hoses supplied by chassis manufacturer (not including heater hoses). Silicone hose, if used, shall require the use of stainless steel shoe-type hose clamps.

9. Polyurethane Enamel Paint:

Approved option for National School Bus Yellow polyurethane enamel or approved equivalent paint on all chassis exterior surfaces where National School Bus Yellow paint is already required. Paint meeting requirements of this option shall be lead-free.

10. Optional Lower Performance Diesel Engine:

<b>CAPACITY</b>	<b><u>59</u></b>	<b><u>65</u></b>
Minimum S.A.E. Gross Horsepower	165	165
Minimum S.A.E. Gross Torque	310	310
Maximum (Full-load) Governed Engine Speed	3,000 RPM	3,000 RPM

Diesel Engine Warranty: 5 years, Unlimited mileage, 100% Parts and Labor.

Required Transmission: Allison AT-545 or approved equal.

11. Optional Higher Performance Diesel Engine:

<b>CAPACITY</b>	<b><u>29</u></b>	<b><u>47</u></b>	<b><u>53</u></b>	<b><u>59</u></b>	<b><u>65</u></b>
Minimum S.A.E. Gross Horsepower	170	170	170	180	180
Minimum S.A.E. Gross Torque	350	350	350	395	395
Maximum (Full-load) Governed Engine Speed	2,800 RPM	2,800 RPM	2,800 RPM	2,800 RPM	2,800 RPM

Diesel Engine Warranty: 5 years, Unlimited mileage, 100% Parts and Labor

Required Transmission: Allison AT-545 or MT-643 or approved equal as per engine manufacturer's requirements.



**SECTION II**  
**CHASSIS SPECIFICATIONS**  
**TYPE "B" and "D" BUSES**



**BASIC MINIMUM SPECIFICATIONS  
TYPE "B" and "D" SCHOOL BUS CHASSIS  
ENGINE MOUNTED IN FRONT FOR MOUNTING SCHOOL BUS BODIES**

1. Engine Equipment:

(See pages 23 and 24 for required minimum size engines.)

Additional engine items required:

- A. Air cleaner, dry type
- B. Oil filter(s): Engine shall be equipped with full-flow, spin-on cartridge-type oil filter(s), with filter header(s) mounted directly to engine block.
- C. Governor shall permit controlled engine RPM up to manufacturer's recommended maximum for engine used.
- D. Oil pressure and coolant temperature gauge. Oil pressure gauge shall provide accurate, easily discernible readings across the entire operating range from hot idle to full oil pressure. Gauges on engines with idle oil pressure which, under normal conditions, is low shall provide a clear distinction between no oil pressure and engine idle oil pressure. (Warning light accepted on bus sizes 22-36 capacity, Chevrolet/GMC P-series type chassis.)
- E. Vacuum take-off connection on intake manifold except diesel.
- F. Engine Warning System consisting of buzzer and light required on all diesel-powered chassis to notify driver of low engine oil pressure and/or coolant overheating condition.
- G. Engine coolant recovery or deaeration system required on all chassis. Diesel engines must include some means for visually checking coolant level without removing deaeration tank cap or releasing pressure from cooling system.
- H. Electronic ignition required on gasoline engines.
- I. A fuel/water separator is required on all diesel engines. It shall be of a design and installation compatible with chassis/engine application to ensure trouble-free performance when properly maintained. In addition fuel/water separator shall meet the following requirements:
  - (1) Must be completely accessible for manufacturer's recommended servicing, with emphasis on underhood mounting location.
  - (2) Must have a clear drain (sight) bowl with a drain valve to allow detection and draining of accumulated water.
  - (3) Must contain a replaceable pleated paper element fuel filter of proper design to protect against premature fuel flow restriction or excessive passage of contaminants.

2. Radiator Filler Tube:

Located for ease of service from outside of bus.

3. Alternator:

100 amp. minimum rating, 50 amp. minimum output at manufacturer's recommended engine idle speed; dual belt drive maximum ratio 2.5:1; ball or roller bearings on drive and slip ring ends meeting National Minimum Standards. **Exception:** 22-36 capacity, Chevrolet/GMC P-series type chassis require a minimum of 80 amps.

**Note:** Single belt approved if and only if one drive pulley and one driven pulley with no added pulleys are included and the combined belt wrap of the drive and driven pulley is 360 degrees. Direct gear driven alternator is an approved equal.

4. Voltage Control:

Regulator: must have solid state components (transistorized) and be readily accessible.  
Voltmeter required: graduated scale on 28-89 capacity units. Voltmeter not required on 22-36 capacity Chevrolet/GMC P-series type chassis.

5. Horns:

120 decibels, dual. (See National Standards.)

6. Turn Signals:

Dash indicator light; self-canceling switch with lead wires on steering column for body manufacturer's attachment, connected to ignition switch.

7. Fuel Tank:

Meeting requirements of F.M.V.S.S. 301. (See pages 23 and 24 for size tank required.)

8. Shock Absorbers:

Front and rear double-acting; adequate size for axle load.

9. Steering:

Integral type power steering required.

10. Transmission:

Automatic - 3 speed, 22-36 capacity, Chevrolet/GMC P-series type chassis; four forward speed, minimum AT-545 or equal on 28-66 capacity with external filter in the transmission oil cooler return line; MT-643 four forward speed, 78-89 capacity and having external filter in the transmission oil cooler return line. See pages 23 and 24 for requirements.

11. Brakes, Service:

A. **Hydraulic Brakes:** Acceptable only on 22-42 capacity, must have approved power assist and meet all applicable requirements of National Minimum Standards for School Bus Chassis, 1985 edition, and applicable Federal Motor Vehicle Safety Standards. Brake lining material shall not contain asbestos.

B. **Air Brakes:** All Type "B" and "D" models over 42-capacity shall be equipped with air brakes. Air brakes are acceptable 42 capacity and less. All air brake equipped chassis, including air disc/drum or air disc, must be equipped with a spring-set parking brake on the rear wheels and meet applicable requirements of National Minimum Standards for School Bus Chassis, 1985 edition, and applicable Federal Motor Vehicle Safety Standards. An approved dessicant or air-cooled dryer with automatic purge and drain cycle and a heating element is required on all air brake models. Drum brakes shall be cam-actuated. If brakes on one axle of any air brake chassis are self adjusting type, both axles shall be self adjusting. Minimum lining thickness on air- actuated drum brakes must be 3/8 inch front and 3/4 inch rear (except taper on brake blocks). Air brake models must have minimum 12 CFM compressor, engine oil-fed. All Type "B" units over 42-capacity, with air-actuated drum brakes, must have a minimum rear brake shoe width of 7 inches. All Type "D" (transit) units with air-actuated, four-wheel drum brakes must have a minimum total lining area of 750 square inches. Brake lining material shall not contain asbestos.



**NOTE:** See page 23 for minimum lining area requirements for Type "B" chassis with four-wheel drum hydraulic or air brakes.

12. Brake, Parking:

Hydraulic brake models, Orscheln type control, or approved equal, foot operated or hand operated; air brake models, dash-mounted control valve to spring-set parking brakes on rear wheels.

**NOTE:** All chassis over 157" wheelbase on which wheelchair lift-equipped bodies will be mounted shall be equipped with a park brake operating by means of rear wheel brake shoe or pad mechanical actuation.

13. Drive Line Guards:

Required to prevent drive shaft from falling to ground if broken.

14. Frame Side Members:

One piece construction, between front and rear spring hangers. Extension of frame length is permissible only when such alterations are not for purposes of extending or reducing wheelbase.

15. Odometer:

Accrued mileage, seven digits, including tenths of miles (999,999.9 mile odometer).

16. Wiring:

100 amp. capacity; color-coded circuits.

17. Exhaust:

Corrosion resistant muffler and tailpipe. Must exit to left of left frame rail and behind rear wheels. **Exception:** 22-36 capacity Chevrolet/GMC P-series type chassis diesel buses may be equipped with dual exhausts exiting behind rear wheels.

18. Battery(ies):

- A. Gasoline powered, Type "B" units shall have a minimum of one 12 volt battery, with a minimum of 475 cold cranking amps at 0°F., mounted in a slide-out tray in body skirt.
- B. Diesel powered, Type "B" units of 22-36 capacity on Chevrolet/GMC P-series type chassis shall have dual, 12 volt, minimum 475 cold cranking amps at 0°F per battery, mounted in slide-out tray in body skirt.
- C. Diesel powered Type "B" units of 28-66 capacity on conventional chassis shall have a total of 1,250 cold cranking amps at 0 degrees F. Batteries must be mounted in slide-out tray in body skirt.
- D. Type "D" transits, engine in front, shall have a single 475 cold cranking amps at 0°F for gasoline powered and total of 1,250 cold cranking amps at 0°F for diesel. Batteries must be mounted in slide-out tray in body skirt.

19. Vacuum Attachment for Stop Arm:

Manifold of all gasoline engines, Type "B" and "D" chassis shall be tapped for vacuum attachment for stop arm to be installed by body manufacturer.

20. Warranty:

Type B and D front engine chassis shall be warranted for a period of 12 months or 12,000 miles whichever comes first. Diesel engines on Type B chassis (28-66 capacity conventional chassis units) and all Type D chassis shall be warranted for 60 months, unlimited mileage, 100% parts and labor. Transmission and drivetrain shall also be covered for 60 months/unlimited mileage, 100% parts and labor. See item #7, page 4.

21. Line-Sett Ticket:

For Type B (28-66 capacity conventional chassis units) and Type D chassis, manufacturer shall include with delivery of vehicles, a line-sett ticket to accurately reflect the following: a) all chassis components; b) G.A.W.R. of both front and rear axles; and c) G.V.W.R.

22. Bumper, Front:

Must be black, full-width, channel type minimum 8 inches, of sufficient structural and mounting strength to ensure that front of vehicle may be lifted by air bumper-type jack.

**TYPE "B"**

**FRONT ENGINE BUS SIZES**

	Type "B" Body Mounted on P-Chassis				Type "B" Body Mounted on Conventional Chassis			
	22-24	28-32	34-36	28-30	40-42	59-60	65-66	
<b>CAPACITY</b>								
Minimum Engine Requirement:								
A. GASOLINE Engine Displacement (Liters):	5.0L	5.0L	5.0L	6.0L	6.0L	6.0L	6.0L	
B. DIESEL Engine:								
1. Minimum S.A.E. Gross Horsepower	135GHP	135GHP	135GHP	145	155	170	170	
2. Minimum S.A.E. Gross Torque (lb-ft)	240 lb-ft	240 lb-ft	240 lb-ft	300	300	350	350	
3. Minimum S.A.E. Displacement (liters)	5.0L	5.0L	5.0L	NA	NA	NA	NA	
4. Maximum (full-load) Governed Engine Speed	3,600 RPM	3,600 RPM	3,600 RPM	3,000	3,000	2,800	2,800	
Diesel Engine Warranty:	12 mo./12,000 miles	12 mo./12,000 miles	12 mo./12,000 miles	5 yr./Unl. miles	5 yr./Unl. miles	5 yr./Unl. Miles	5 yr./Unl. Miles	
Gross Axle Weight Rating	5,000 11,000 14,500	5,000 11,000 14,500	5,000 11,000 14,500	7,500 lbs 15,000 lbs	7,500 lbs 15,000 lbs	7,500 lbs 9,000 lbs 19,000 lbs	9,000 lbs 19,000 lbs	Gas Diesel
Gross Vehicle Weight Rating								
Tires:	Radial-Ply Tubeless	8RX19.5-F	8RX19.5-F	9R-22.5-F	9R-22.5-F	10R-22.5-G	10R-22.5-G	
Approximate Wheelbase:	125"	133"	157"	149"	190"	235"	254"	
Minimum Fuel Tank:	30 gal.	30 gal.	30 gal.	30 gal.	60 gal.	60 gal.	60 gal.	
Alternator:	80 amp.	80 amp.	80 amp.	100 amp.	100 amp.	100 amp.	100 amp.	
Transmission: (Automatic Required)		Minimum 3-speed Automatic				Automatic: 4-speed (AT 545 or equal)		
Rear Axle Ratios:	4.56-5.30	4.56-5.30	4.56-5.30	6.50-7.20 4.63-6.65	6.50-7.20 4.63-6.65	6.50-7.20 4.63-6.65	6.50-7.20 4.63-6.65	

(Ratio shall be compatible with engine and provide for 55 mph in highest gear.)

Minimum Rim Width: Disc Wheels for Tubeless Radials

Service Brake - Drum Brake only (minimum total sq. in) (7-inch shoe on rear axle over 42 capacity)

Hydraulic Full Air

7.5" 6.75" 6.0" 6.75" 6.75" 7.5" 7.5" 663 663

**TYPE "D"**

**FRONT ENGINE BUS SIZES**

<b>CAPACITY</b>	<b><u>78 Gas</u></b>	<b><u>78 Diesel</u></b>	<b><u>83 Gas</u></b>	<b><u>83 Diesel</u></b>	<b><u>89 Capacity Gas and Diesel</u></b>
Minimum Gas Engine Size (Litres):	7.0L	---	7.0L	---	7.0L (Gas)
<b>Minimum Diesel Engine Specs:</b>					
Minimum S.A.E. Gross Horsepower	---	200	---	200	200
Minimum S.A.E. Gross Torque (lb. ft.)	---	440	---	440	440
Maximum (full-load) Gov. Engine Speed	---	2,800 RPM	---	2,800 RPM	2,800 RPM

Diesel Engine Warranty: 5 years/Unlimited mileage, all diesels. See page 4.

Differential Ratio:	Gas Diesel	5.83-7.20 ---	--- 4.63-6.83	5.83-7.20 ---	--- 4.63-6.83	5.83-7.20 4.63-6.83
Minimum Gross Axle Weight Rating:	Front Rear	12,000 18,500	12,600 19,000	12,000 18,500	12,600 19,000	13,000 23,000
Tires - Minimum Size Acceptable (Tubeless Radials Required)		11R-22.5-G	11R-22.5-H	11R-22.5-G	11R-22.5-H	11R-22.5-H
Disc Wheels - Minimum Rim Width		8.25 in.	8.25 in.	8.25 in.	8.25 in.	8.25 in.
Approximate Wheelbase		230 in.	230 in.	230 in.	230 in.	245 in.
Minimum Size Fuel Tank (Meeting Requirements of F.M.V.S.S. 301)		60 gal.	60 gal.	60 gal.	60 gal.	60 gal.

Transmission: Minimum 4-speed, MT-643 or equal.

**NOTE:** \*Maximum overall length of vehicle shall not exceed 40 feet, bumper to bumper.

**BASIC MINIMUM SPECIFICATIONS  
TYPE "D" SCHOOL BUS CHASSIS  
ENGINE MOUNTED IN REAR FOR MOUNTING SCHOOL BUS BODIES**

1. Engine Equipment:

(See page 28 for minimum size engines approved.)

Additional engine items required:

- A. Air cleaner, dry type.
- B. Oil filter(s): Engine shall be equipped with full-flow, spin-on cartridge-type oil filter(s), with filter header(s) mounted directly to engine block.
- C. Governor shall permit controlled engine RPM up to manufacturer's recommended maximum for engine used.
- D. Oil pressure and coolant temperature gauge. Oil pressure gauge shall provide accurate, easily discernible readings across the entire operating range from hot idle to full oil pressure. Gauges on engines with idle oil pressure which, under normal conditions, is low shall provide a clear distinction between no oil pressure and engine idle oil pressure.
- E. Vacuum take-off connection intake manifold except diesel.
- F. Engine Warning System consisting of buzzer and light required on diesel powered chassis to notify driver of low engine oil pressure and/or coolant overheating condition.
- G. Engine coolant recovery or deaeration system required on all chassis. Diesel engines must include some means for visually checking coolant level without removing deaeration tank cap or releasing pressure from cooling system.
- H. A fuel/water separator is required on all diesel engines. It shall be of a design and installation compatible with chassis/engine application to ensure trouble-free performance when properly maintained. In addition, fuel/water separator shall meet the following requirements:
  - (1) Must be completely accessible for manufacturer's recommended servicing, with emphasis on underhood mounting location.
  - (2) Must have a clear drain (sight) bowl with a drain valve to allow detection and draining of accumulated water.
  - (3) Must contain a replaceable pleated paper element fuel filter of proper design to protect against premature fuel flow restriction or excessive passage of contaminants.

2. Radiator Filler Tube:

Located for ease in service from engine compartment.

3. Alternator:

100 amp. minimum rating, 50 amp. minimum output at manufacturer's recommended engine idle speed; dual belt drive maximum ratio 2.5:1; ball or roller bearings on drive and slip ring ends meeting National Minimum Standards.

**NOTE:** Single belt approved if and only if one drive pulley and one driven pulley with no added pulleys are included and the combined belt wrap of the drive and driven pulley is 360 degrees. Direct gear driven alternator is an approved equal.

4. Voltage Control:

Regulator: Must have solid state components (transistorized) and be readily accessible.  
Voltmeter: required; graduated scale.

5. Horns:  
120 decibels, dual. (See National Standards.)
6. Turn Signals:  
Dash indicator light; self-canceling switch with lead wires on steering column for body manufacturer's attachment, connected to ignition switch.
7. Fuel Tank:  
Meeting requirements of F.M.V.S.S. 301. Minimum capacity 60 gallons.
8. Shock Absorbers:  
Front and rear double-acting; adequate size for axle load.
9. Steering:  
Integral type power steering required.
10. Transmission:  
Automatic, MT643 four forward speed, and having external filter in transmission oil cooler return line.
11. Brakes, Service:  
All rear engine Type "D" chassis must be equipped with air brakes (four-wheel drum, combination disc/drum, or air-disc), meeting all applicable requirements of National Minimum Standards for School Bus Chassis, 1985 edition, and Federal Motor Vehicle Safety Standards. All such chassis must be equipped with a spring-set parking brake on the rear wheels. Drum brakes shall be cam-actuated. An approved dessicant or air-cooled dryer with automatic purge and drain cycle and a heating element is required. If brakes on one axle are self-adjusting, both axles shall be self-adjusting. Minimum lining thickness on air-actuated drum brakes must be 3/8 inch front and 3/4 inch rear (except taper). Air compressor shall be minimum 12 CFM and engine oil-fed. All Type "D" chassis with air-actuated, four-wheel drum brakes must have a minimum total lining area of 750 square inches. Brake lining material shall not contain asbestos.
12. Brake, Parking:  
Dash mounted control valve to spring-set parking brakes on rear wheels.
13. Drive Line Guards:  
Required to prevent drive shaft from falling to ground if broken.
14. Frame Side Members:  
One piece construction, between front and rear spring hangers. Extension of frame length is permissible only when such alterations are not for purposes of extending or reducing wheelbase.
15. Odometer:  
Accrued mileage, seven digits, including tenths (999,999.9 mile odometer).

16. Wiring:  
100 amp. capacity; color-coded circuits.
17. Exhaust:  
Corrosion resistant muffler and tailpipe. Must exit to left of left frame rail and behind rear wheels.
18. Battery(ies):
  - A. Gasoline powered units shall have 12 volt, minimum 475 cold cranking amps. at 0° F. Mounted in engine compartment or slide-out tray in body skirt.
  - B. Diesel, Type "D" rear-engine units, shall have a minimum of 1,250 cold cranking amps at 0° F with batteries mounted in engine compartment or slide-out tray in body skirt.
19. Warranty:  
Chassis shall be warranted for 12 months or 12,000 miles whichever comes first. Diesel engines shall be warranted for 60 months/unlimited mileage, 100% parts and labor. Transmission and drivetrain shall also be covered for 60 months/unlimited mileage, 100% parts and labor. See item #7, page 4.
20. Line-Sett Ticket:  
Manufacturer shall include with delivery of vehicle a line-sett ticket to accurately reflect the following: a) all chassis components; b) G.A.W.R. of both front and rear axles; and c) G.V.W.R.
21. Bumper, Front:  
Must be black, full width channel type minimum 8 inches, of sufficient structural and mounting strength to ensure that front of vehicle may be lifted by means of an air bumper-type jack.

## ENGINE MOUNTED IN REAR

### BUS SIZE

CAPACITY	<u>78 Diesel</u>	<u>83-89 Diesel</u>
Minimum S.A.E. Gross Horsepower:	200	200
Minimum S.A.E. Gross Torque (lb-ft):	440	440
Maximum (full-load) Governed Engine Speed:	2,800 RPM	2,800 RPM
Diesel Engine Warranty: 5 years/Unlimited mileage. See <u>page 4</u> .		
Differential Ratio:	4.10-6.17	4.10-6.17
Minimum Gross Axle Weight Rating:		
A. Front	12,000	12,000
B. Rear	23,000	23,000
Tires - Minimum Size Acceptable (Tubeless Radials Req.)	11R-22.5-H	11R-22.5-H
Disc Wheels-10 Stud Minimum Rim Width	8.25 in.	8.25 in.
Minimum Wheelbase	235 in.	260 in.
Minimum Size Fuel Tank (Meeting Req. of F.M.V.S.S. 301)	60 gal.	60 gal.

NOTE: Maximum length of vehicle shall not exceed 40 feet, bumper to bumper.



**SPECIFICATIONS FOR OPTIONAL CHASSIS  
EQUIPMENT IN TYPE "B" AND "D" BUSES**

1. Alternator:

There shall be an approved option on all Type "B" and "D" chassis for an alternator having a minimum of 75 amp. output at manufacturer's recommended idle speed and meeting all other requirements of the standard alternator.

2. Automatic Slack Adjusters:

Approved option on air brake models.

3. Cold Weather Start Assist:

Approved option for diesel-powered chassis.

4. Tow Hooks:

Two heavy duty tow hooks, installed by manufacturer, one on each frame rail at front of bus in an approved manner.

5. Air Brakes:

Approved option for units 42 capacity and smaller where available.

6. Diesel Noise Reduction Package:

Approved option from chassis manufacturer where available.

7. Spare Wheel:

Approved option on all Type "B" and "D" buses. Must be of same size as original rims.

8. Silicone Hose:

Approved option for a package including silicone (or approved equivalent) radiator and other engine coolant hoses supplied by chassis manufacturer (not including heater hoses). Silicone hose, if used, shall require the use of stainless steel shoe-type hose clamps.

9. Optional Type "D" Higher Performance Diesel Engine:

CAPACITY	<u>78-89 F.C.</u>	<u>78-89 Pusher</u>
Minimum S.A.E. Gross Horsepower	210	210
Minimum S.A.E. Gross Torque (lb. - ft.)	500	500
Maximum (Full-load) Governed Engine Speed	2,600 RPM	2,600 RPM

Diesel Engine Warranty: 5 years, Unlimited mileage, 100% Parts and Labor.

Required Transmission: Allison MT-643 or approved equal.

10. Optional Type "B" Higher Performance Diesel Engine:  
(Modified Forward Control on Conventional Chassis; not available 28-42 capacity)

<u>CAPACITY</u>	<u>59-60</u>	<u>65-66</u>
Minimum S.A.E Gross Horsepower	180	180
Minimum S.A.E. Gross Torque (lb. - ft.)	395	395
Maximum (Full-load) Governed Engine Speed	2,800 RPM	2,800 RPM

Diesel Engine Warranty: 5 years, Unlimited mileage, 100% Parts and Labor

Required Transmission: Allison AT-545 or MT-643 or approved equal as per engine manufacturer's requirements.

**SECTION III**  
**BODY SPECIFICATIONS**  
**TYPE "B", "C" and "D" BUSES**



## MINIMUM FLORIDA SCHOOL BUS BODY SPECIFICATIONS

The specifications set forth are descriptive of Types "B," "C" and "D" school buses. Special exceptions for Types "B" and "D" bodies are on pages 45 and 46. The design of school bus bodies is to provide for the safety and comfort of pupils and for economical transportation as required by Florida Statutes and the National Highway Traffic Safety Administration. The National Minimum Standards for School Buses, 1985 Revised Edition, is applicable for items not specified in this document, storage compartment excepted.

### WARRANTY

Bids submitted under this specification shall include a warranty covering materials and workmanship for a period of at least one year.

### PUBLICATIONS

Each Florida school board that is delivered one or more bus bodies shall be furnished a parts catalog and a parts price list. Parts manuals must be designed so that all replaceable parts are illustrated by line drawings and such parts are numbered on the illustration, with a part description on a separate list under the corresponding number. Part descriptions should be annotated appropriately with the part number, a proper description (part name), and the quantity required for the application illustrated on the drawing.

### INSPECTION

Purchase of school buses or bus bodies under this specification shall include the right to inspection of the product before, during and after manufacture by any appropriate state agency or county agency of the State of Florida.

### SIZES OF BODIES

The maximum overall length of any bus shall be 40 feet; maximum overall outside width of all bodies shall be 96 inches. Height of body from top of finished floor to underside of ceiling, at center of body, shall be a minimum of 72 inches.

### STRUCTURAL DESIGN

1. Details of design shall have a direct relationship to specifications for grades of steel in the latest edition for the design of Light Grade Cold-Formed Steel Structural Members of the American Iron and Steel Institute. Material used in the body frame structure shall conform to chemical and mechanical requirements of the listed specifications or other published specifications, including tensile and yield points, which establish properties and suitability of the steel for school bus body test code and safety requirements.
2. All welds used in construction of body shall conform to latest applicable specifications of the American Welding Society.
3. Welds, rivets, or high-strength bolts may be used in connecting parts of the structural body. All bolts shall have provision to prevent loosening under vibratory loads. All bolts, nuts, washers, and screws used throughout the body shall be approved size, cadmium or zinc plated, or thoroughly treated in an approved manner for prevention of rust.
4. All metal used in construction of bus body shall be zinc or aluminum coated before construction; provided that for metals 12-gauge or less in thickness, either zinc or aluminum coating shall be mill-applied for these components: (a) service door panels, (b) emergency door panels, (c) guard rails, (d) all exterior body panels, (e) wheelhousing, (f) body posts and roof bows, (g) side strainers, (h) roof strainers, (i) window caps, (j) window visors where used, (k) all

floor section panels and floor sills; excluded are door handles, interior decorative parts, and other interior plated parts. All metal parts that will be painted shall be chemically cleaned, etched, zinc-phosphate-coated, and zinc-chromate or epoxy-primed, or conditioned by equivalent process. Any areas from which primer is removed for any purpose, such as sanding, grinding, welds, etc., must be thoroughly cleaned and treated as specified and primer applied. Rivets used in assembly shall be zinc-phosphate treated unless coated with rust prevention material and also primed as specified. In providing for these requirements, particular attention shall be given to lapped surfaces, welded connections or structural members, cut edges, metal in which holes are punched or drilled, closed or box sections not vented or drained, and surfaces subjected to abrasion during vehicle operation.

As evidence that above requirements have been met, samples of materials used in construction of the bus body, when subjected to 1,000-hour salt spray test as provided for in latest revision of A.S.T.M. Designation: B 117, "Standard Method of Salt Spray (Fog) Testing," shall not lose, after rubbing to remove corrosion, more than 10 percent of material by weight.

5. Upper body structure shall consist of frames extending from floor on one side to floor on opposite side, at each window post, which may be composed of posts and roof bows or a continuous bow frame and members running from front to rear of body known as strainers.
6. Design shall provide for: (a) a formed longitudinal member having a combined function of supporting floor plates, providing impact resistance, and of supporting exterior ends of seats; or (b) a longitudinal member located about seat line, securely fastened to body posts, and a continuous separate member of a strength equal to a  $1\frac{1}{4}$  X  $1\frac{1}{4}$  X  $1/8$  inch angle securely attached for support of seats.
7. A roof bow shall be located at least at each post to form a bow frame and spaced on approximately 27-inch centers, excepting they may be spaced a maximum of  $36\frac{1}{2}$  inches, provided sufficient supports are installed to maintain integrity of roof structure. Roof bows shall not be buckled or distorted out of cross section during bending processes to curved shape. Bow frames may be formed as one (1) piece or may be joined at window header by connections developing full strength of cross section. Each post shall be securely connected to floor beams directly through gussets or indirectly through side rails.
8. The front end assembly shall be sufficiently heavy to withstand vibrations transmitted to it through chassis cowl. Windshield or corner posts must be of sturdy construction, designed so that they will not be so wide as to unnecessarily obstruct driver's view. Body shall be fastened to chassis cowl in an approved waterproof manner.
9. Rear Corner Reinforcements: Rear corner framing of bus body between floor and window sill and between emergency door post and rear side post shall consist of at least three (3) structural members applied horizontally or vertically or in another combination to provide additional impact and penetration resistance equal to that provided by frame members.
10. Side Strainers: There shall be three (3) or more side strainers or longitudinal members to connect vertical structural members and to provide impact and penetration resistance in the event of contact with other vehicles or objects. Such strainers shall be formed (not in flat strip) from metal of at least 16-gauge and 3 inches wide.

Strainer at roof line or window header shall extend all around the bus.

Side strainer shall be installed in area near bottom of seat frame and shall extend completely around bus body except for door openings and body cowl panel. Side strainers specified above shall be fastened to each vertical structural member in any one or any combination of the following methods as long as stress continuity of members is maintained.

- (a) Installed between vertical members.

- (b) Installed behind panels but attached to vertical members.
- (c) Installed outside exterior panels.

Fastening method employed shall be such that strength of strainers is fully utilized.

Strainer immediately below windows shall extend around body except for door openings and shall be securely joined to vertical members. This strainer shall be secured longitudinally to outside of body posts for length of body and have the bending and penetration characteristics of a rub rail (see below) and may be formed as a channel, lipped channel, box or hat section if installed on vertical members behind panels or as a rub rail if applied outside of body panels. No portion of side strainer or longitudinal member, except at seat level, is to occupy same vertical position as required for rub rails.

### **FLOOR AND FLOOR COVERING**

1. Floor shall be of prime commercial quality steel of at least 14-gauge or other metal at least equivalent in strength to 14-gauge steel. Floor shall be level from front to back and from side to side except for wheelhousings, toeboard, and driver's seat platform areas.
2. (a) Floor Sills - There shall be one main body sill at each side post and two (2) intermediate body sills on approximately 10-inch centers. All sills shall be of equal height not to exceed three (3) inches. All sills shall extend the width of body floor except where structural members or features restrict area.
 

Main body sill shall be equivalent to or heavier than 10-gauge and each intermediate sill shall be equivalent to or greater than 16-gauge, or each of all body sills shall be equivalent to or heavier than 14-gauge. All sills shall be permanently attached to floor.
- (b) Connections between sides and floor system shall be capable of distributing loads from vertical posts to all floor sills.
3. Driver's compartment plate on conventional body shall be removable, installed on level with bus floor. All components requiring servicing must be readily accessible. Openings in bus floor to meet this requirement shall be reinforced so as to maintain full strength of unpunctured floor.
4. Body floor shall have an access hole for removal and repair of fuel tank sending unit.
5. All Type "B", "C" and "D" body manufacturers shall provide an access cover in the body floor adequate to allow removal of the fuel pump without lowering the fuel tank. This requirement applies to all chassis equipped with an in-tank electric fuel pump.
6. Floor in underseat area, including tops of wheelhousings and toeboard, shall be covered with smooth surfaced fire-resistant rubber covering, or approved equal, having a minimum thickness of .125 inch.
7. Covering from toestep landing area to emergency door shall be ribbed aisle- type fire-resistant rubber, non-skid, wear-resistant. Minimum overall thickness shall be .1875 inch measured from top of ribs. Rubber floor covering shall meet Federal Specification ZZ-M-71d.
8. Floor covering must be permanently bonded to floor and resist cracking when subjected to sudden changes in temperature. Adhesive material used shall be waterproof and also of the type recommended by manufacturer of floor covering material.
9. Landing area at top of steps shall be ribbed rubber which shall extend to and join the ribbed aisle cover at an angle and its leading edge (curbed fillets excepted) white or a light color.

10. All joints shall be covered with non-ferrous metal, minimum one (1) inch wide and .095 inch thick, weight .09 per linear foot, providing driver's compartment, except at cowl, shall have a special approved molding. Attaching screws shall be countersunk.
11. Holes around transmission cover shall be adequately sealed.

### **WHEELHOUSINGS**

Wheelhousings shall be constructed of 18-gauge or heavier steel and be rigidly reinforced, shall be attached to floor and side panels in such manner as to prevent water or dust from entering body, and shall be designed for easy removal of tires. For materials, see Structural Design; for covering, see Floor and Floor Covering.

### **STEP WELL**

A step well of at least two (2) steps shall be built in right front assembly enclosed with doors extending to bottom step. Each step shall be covered with ribbed rubber, 3/16 inch thick, bonded to metal base and otherwise constructed so as to provide substantial support, including the leading edge which shall be white or a light color. Entrance to step shall extend below floor line about 14 inches from the ground.

### **GRABHANDLE AT ENTRANCE**

A suitable grab handle or rail shall be provided at the front entrance, securely mounted inside of body and within reach of small children upon entering bus. Grab handles shall be made of round stainless steel, one (1) inch O.D., tubing minimum of 18-gauge, or stainless architectural tubing minimum .018-inch thickness over 18-gauge steel insert.

### **RUB RAILS**

1. There shall be one rub rail on each side of bus approximately at seat level which shall extend from entrance door post around bus body (except for emergency door) to point of curvature near cowl on left side.
2. There shall be rub rails located approximately at the floor line and bottom of outer skirt which shall cover same longitudinal area as upper rub rail, except at wheelhousings, and shall extend only to radii of right and left corners.
3. Rub rails shall be attached twice at each body post and at all other upright structural members.
4. Rub rails shall be four (4) inches or more in width, shall be of 16-gauge steel, and shall be constructed in corrugated or ribbed fashion.
5. Rub rails shall be applied outside of body panels. Pressed-in or snap-in rub rails do not satisfy this requirement.

### **PANELING, EXTERIOR**

1. Exterior paneling includes all sheet metal skin forming exterior surface of body.
2. Exterior paneling should be of 20-gauge steel minimum thickness and shall be attached to bow frames and strainers so as to act as an integral part of structural frame. Roof panel design may include two (2) types:
  - (a) panels extending full width of top and joined to window headers on each side of bus body and each of main roof bows;



- (b) panel section of a length sufficient to extend across three (3) or more main roof bows and joined to window header and supported by and joined to a longitudinal strainer of special design.

All joints of roof panels shall be lapped the full width of supporting members and shall be attached along each side of supporting member to form a watertight joint. (See Structural Design; also Insulation and Sealing of Joints.)

### PANELING, INTERIOR

1. Interior of body shall be lined with panels securely fastened to adjoining parts in an acceptable manner. If ceiling is constructed so as to contain lapped joints, exposed edges shall be beaded, hemmed, flanged or treated to minimize sharp edges. Fastenings shall minimize vibrations and rumble and be installed to facilitate removal. A cove molding, which may be an extension of body panels, shall be installed covering wall to floor joint beginning at windshield post on left side of bus and extending along walls around corners to service door on right side. Molding shall be securely fastened so that dirt will not readily work under it.
2. Interior paneled area immediately below window line shall be aluminum-coated steel. Exposed edges of interior paneling shall be beaded, hemmed, flanged, or treated to eliminate sharp edges.

### BUMPER, REAR

Rear bumper shall be of pressed steel channel at least 3/16 inch thick, 8 inch high ribbed face and flanged two (2) inches at top and bottom or otherwise designed to furnish equal flexural strength. It shall be of wraparound design and securely fastened to each chassis rail and braced diagonally from each end of bumper to chassis rail with heavy braces to permit fully loaded bus to be pushed without permanent distortion to bumper, chassis or body. Contour of bumper shall fit contour of body in a manner to prevent hitching to or riding on bumper. An appropriate seal shall be applied between bumper and body panel.

### SERVICE DOOR

Service door shall be a double-wall split type or jackknife type located at right front of bus. A double-bearing chromium-plated or epoxy-coated mechanical control shall be mounted within comfortable reach of driver on a firm and substantial support and lock in off-center position. On models with service doors opening outward, there shall be installed an approved safety latch. Control shall have a smooth machined handle and the rod to the door shall also be chromium-plated or epoxy-coated. Doors shall be securely hinged with approved heavy-duty hinges with brass or rust resistant rod adequately fastened to adjoined member. Doors shall have a two (2) inch minimum safety gap sealed with a safety flap of approved quality. Door shall extend to bottom step and be fitted with suitable weatherstrip to restrain water entering step well.

Service door shall have minimum horizontal opening of 24 inches and minimum vertical opening of 68 inches. Immediately above the door opening there shall be secured to body panel a high density foam rubber pad, minimum three (3) inch width, or approved equal safety cushion.

Doors shall be so designed and weatherstrips mounted so that there is no binding or tendency for stripping to dislodge during door operation. Two (2) glassed-in openings shall be provided in each door half with glass of same grade as specified on side windows and mounted in rubber. Bottom of lower glass panel shall not be more than 35 inches from ground when bus is unloaded. Top of upper glass panel shall not be more than six (6) inches from top to door.

### EMERGENCY DOOR

1. Emergency door on all conventional and forward control buses shall be located at center of rear of bus and have minimum horizontal opening of 24 inches and vertical opening of 48 inches.

Emergency door shall be hinged on right-hand side using hinge(s) with a brass or rust resistant rod. Door stop shall permit door to open at least 150 degrees but shall protect body lights from damage by the opened door. Inside of door header shall be padded with energy absorbing material a minimum of three (3) inches wide.

2. The emergency door shall be designed to be opened from inside and outside of bus and shall have a fastening device which may be quickly released but designed for protection against accidental release. Control from driver's seat shall not be permitted. Outside control shall consist of nondetachable opening device designed to prevent hitching to but to permit opening when necessary.
3. Emergency door shall be equipped with slide bar, cam-operated lock, having a minimum stroke of one (1) inch. Emergency door lock shall be equipped with suitable electric plunger type switch connected with buzzers as required by Federal Standards. Switch shall be enclosed in metal case, and wires leading from switch shall be concealed in bus body. Switch shall be so installed that plunger contacts farthest edge of slide bar in such a manner that any movement of slide bar will immediately close switch circuit and activate buzzer.

Door lock shall be equipped with interior handle that extends approximately to center of emergency door. It shall lift up to release lock.

Emergency door controls, labeling and warning device shall meet requirements of F.M.V.S.S. 217.

#### **LOCKUP DEVICES**

Any emergency door equipped with a locking device shall have an ignition interlock which prevents starting the engine when the door is locked and shall meet requirements of F.M.V.S.S. 217.

#### **WINDOWS**

1. An adjustable split sash window shall be mounted in side of bus body between each framing post. Safety glass shall be set in an acceptable manner in a sturdy extruded or die formed frame to provide adequate support for glass. Permanent mark showing grade of glass shall be visible and glass shall be a minimum of 1/8 inch thick.

A minimum clear vertical opening of not less than nine (9) inches shall be provided by lowering top sash. Bottom sash shall be stationary. Movable window shall be controlled by approved lock having finger-touch opener providing for ease of operation and shall have minimum of injury prone projections. Sash shall operate in plastic channels. Window latches must be replaceable or rebuildable without disassembling the complete window frame or removing the window from the body. Also, individual window latches or repair parts must be available and part numbers included in the required body parts catalog. Window seals and visors or drip molding shall be installed and unit shall provide ample protection from leakage in hardest rain.

2. For ventilation purposes, the driver's window shall be adjustable and shall be equipped with a positive latch which is lockable from the inside of bus.
3. There shall be installed, in rear door, two (2) windows (one (1) upper, one (1) lower) set in rubber in a waterproof manner. Total glass area in emergency door shall be a minimum of 750 square inches. Glass shall be same type as for side windows.

Rear side windows located at each side of emergency door shall be set in rubber in waterproof manner. Glass area shall be large enough to provide desirable vision to rear and shall be of same quality and grade as for side windows.

4. Galvanized steel or aluminum, each designed to near equal stiffness, as determined by inspection to give adequate support to glass, shall be used for window frames.

## WINDSHIELD

Front body section in area of windshield shall provide for corner vision and be fitted with curved glass, four-piece flat glass or two-piece flat glass as approved by the Department of Education. Glass shall be laminated safety polished plate with dark tint at top, set in rubber in a waterproof manner and slanted to reduce glare. Glass shall meet current S.A.E. specifications and Federal Motor Vehicle Safety Standards. Light tint may be used in transit buses.

## TESTING OF BODY

Load test of body shall meet the requirements of Federal Motor Vehicle Safety Standard 220.

## SEATING

1. Seats shall be mounted forward-facing and provide a minimum of 12.8 inches of seat width per passenger seating position. The aisle shall be 12 inches minimum. This plan of body seating shall determine seating capacity.

Seat spacing shall meet the requirements of Federal Motor Vehicle Safety Standard 222 and shall provide for a minimum of 25 inches knee room at each seat with a measurement to be made at the center of the reference point. In making this measurement from back of seat cushion to back of seat or barrier in front, upholstery may be placed against padding both forward and rear but padding may not be compressed. Exception: Type "D" school bus bodies over 39-feet in length may provide for a minimum of 24-inches knee room.

The padding shall be secured to the frame in a non-snap manner. Screws and bolts used in seat back construction shall not be exposed.

2. Seats, seat back cushions, and crash barriers shall be covered with a material having 42-ounce finished weight, 54-inch width, and finished vinyl coating of 1.06 broken twill or other material with equal tensile strength, tear strength, seam strength, adhesion strength, resistance to abrasion, resistance to cold and flex separation. Padding and covering on all seats shall be of material that will not flash or explode upon contact with spark or open fire. When welt is not used, all seams shall be double-sewn.
3. Driver's seat shall be firmly supported and of a design to give driver stability and support of position and shall be centered behind steering wheel. There shall be 16 hourglass type coil springs of 10 $\frac{1}{4}$ -gauge wire interlaced and joined to an 8-gauge border wire or foam as an approved equal. Seat back shall be form-fitting and shall have locking positions of tilt independent of other adjustments. Seat shall also be adjustable fore and aft for a minimum of 4 inches and have a minimum adjustment of 3 inches up and down. Vertical adjustment must be independent of horizontal adjustment. All driver's seat adjustments shall be designed for fingertip control without use of tools. Minimum distance between steering wheel and back rest of driver's seat shall be 11 inches.

An automatic locking retractor type seat belt shall be provided for the driver. Each belt section shall be booted so as to keep the buckle and button-type latch off the floor and within easy reach of the driver. Belt shall be anchored in such a manner or guided at the seat frame so as to prevent the driver from sliding sideways under the belt.

## UNDERCOATING

Entire underside of body including floor members, wheel housings, and side panels below floor level shall be coated with fire-resistant asphalt base, rubber base, or other undercoating material, applied by spray method to seal, deaden sound, insulate, and prevent oxidation. Any undercoating material used shall be asbestos-free.

## **INSULATION AND SEALING OF JOINTS**

1. Thermal insulation material, if provided shall be of a type that will not harbor dampness shall be fire-resistant and must be approved by Underwriter's Laboratories, Inc.
2. Overlapping of edge of exterior roof and side panels and also the top edge of rub rails shall be sealed with nonhardening resilient material.

## **BATTERY SLIDE-OUT TRAY**

A body skirt-mounted slide-out tray and battery box is required for the battery(ies) on all type B, C, and front-engine Type D buses.

## **FUEL FILLER OPENING**

An opening of adequate size and design shall be provided over fuel filler. Lettering adjacent to fuel filler opening shall indicate fuel type required.

## **VENTILATION**

Body shall be equipped with an effective exhaust type ventilation system, noncloseable type installed in low pressure area of roof, capable of ejecting foul air under all operating conditions. System shall be adequately weatherproof and dustproof.

## **ELECTRICAL EQUIPMENT AND WIRING**

All wiring shall conform to current standards of the Society of Automotive Engineers, be coded by color, and be insulated. All joints shall be soldered or joined by equally effective fasteners. A wiring diagram showing location of wires and code of circuits for buses meeting Florida Specifications shall be installed in each body. Additionally, for all school bus body optional electronic components installed on the bus, the body manufacturer shall provide each district with at least one comprehensive parts and repair manual. Wiring shall be in circuits as follows:

1. **Clearance and step well lights:** Four (4) body corners, upper section-amber front, red rear. Intermediate amber units required on all units over 30 feet. Step well lights shall illuminate the bus entrance and be adequately protected and shall be activated automatically when door is opened and clearance lights are on. Clearance lights shall be activated by headlight switch.
2. **Identification lights:** Three (3) amber front, three (3) red rear, grouped in a horizontal row. Lamp centers spaced not less than six (6) or more than twelve (12) inches apart, mounted as close as practical to the vertical centerline (Federal Standards). Identification lights shall be activated by headlight switch.
3. **Tail lamps:** Bus shall be equipped with two (2) tail lamps and at least one (1) backup lamp (Federal Standards). Light intensity shall at least equal Class A type turn signal units.
4. **License plate lamp:** This lamp may be combined with one of tail lamps above.
5. **Two combination brake and tail lamps:** These shall be a minimum of 7 inches in diameter mounted as high and spaced as far apart laterally as practical, below window line, but not less than three (3) feet measured from center of lamps. Lenses shall meet or exceed the photometric values of Class A turn signals, and be clearly visible throughout 180 degrees. All brake and turn signal lamp housings shall be galvanized or made rust resistant in an approved manner. All lamp sockets must be brass nickel-plated or approved equal and grounded to bus body by wire or strap. Socket springs must be stainless steel or phosphor bronze. Lens retaining screws or fasteners must be stainless steel or brass nickel-plated. They shall meet current S.A.E. requirements and be installed in compliance with Federal Motor Vehicle Safety Standards.

6. Turn signal lamps: On front, turn signal lamps shall be Class A double-face lamp with amber lens, front and rear, and furnished by chassis manufacturer (except on Types "B" and "D"). On rear, lens shall be plastic, amber in color, seven (7) inches in diameter, Class A, mounted as far apart laterally as practical on the same horizontal centerline as the brake stoplamps, and be visible throughout 180 degrees. Front turn signal lamps on Type "B" and "D" bodies shall be of same type as for rear.
7. Warning lamps: Minimum lamp requirements shall be dual, mounted side by side on all corners of bus roof. Mounting shall be as high as practical on top and as near outer edge of bus as curvature permits. Lamps shall be securely mounted in a shroud including hood extending out a minimum of 2½ inches. Housings shall be galvanized or made rust resistant in an approved manner. Black background 1½ inches to three (3) inches wide shall be painted around lights. Lamps shall be par 46, 5.7 inches diameter of sealed beam type, which may be composed of a sealed unit with a plastic lens. Lamps installed on outside shall be red; inner, amber. Lamps shall have aiming pads and meet latest S.A.E. requirements for school bus flashing warning lamps, including five (5) degrees up, ten (10) degrees down, 30 degrees right and 30 degrees left. Lamps shall be clearly visible in bright sunlight for a minimum of 500 feet.
8. Pupil warning lights and stop arm system controls and operations:
  - A. System must be equipped with the following driver actuated controls:
    1. Master switch - provides means for deactivating entire system, as would be required when opening the door at a railroad grade crossing.
    2. Control switch - three positions: OFF, AMBER, and RED. Switch may be rocker, pull-type or other switch providing three positions.
    3. Service door - actuated switch.
  - B. Controls must provide for the following combinations of switch positions and conditions of stop arm, stop arm light, and warning lights as indicated on the chart below.

NOTE: System may not be designed in such a way that the operator is required to actuate controls in a particular sequence to achieve the desired combination of conditions.

EXAMPLE: If the driver places the three-position switch in the amber position, with the master switch "ON" it must not be required that the three-position switch be moved to "RED" or that the service door be opened, in order to de-activate "AMBERS". In this example, the driver must be able to de-activate "AMBERS" by going directly from the AMBER to the OFF position.

WITH MASTER SWITCH, CONTROL SWITCH, and SERVICE DOOR IN THE FOLLOWING POSITIONS:

CONDITION OF STOP ARM(S), STOP ARM LIGHTS, AMBER WARNING LIGHTS AND RED WARNING LIGHTS MUST BE:

COMBINATION	MASTER SWITCH POSITION (ON or OFF)	CONTROL SWITCH POSITION (three-position: OFF, AMBER, OR RED)	SERVICE DOOR POSITION	COMBINATION	STOP ARM, STOP ARM LIGHTS	AMBER WARNING and PILOT LIGHTS	RED WARNING and PILOT LIGHTS
1	ON	OFF	CLOSED	1	RETRACTED, OFF	OFF	OFF
2	ON	OFF	OPEN	2	RETRACTED, OFF	OFF	ON
3	ON	AMBER	CLOSED	3	RETRACTED, OFF	ON	OFF
4	ON	AMBER	OPEN	4	RETRACTED, OFF	OFF	ON
5	ON	RED	CLOSED	5	EXTENDED, ON	OFF	ON
6	ON	RED	OPEN	6	EXTENDED, ON	OFF	ON
7	OFF	ANY POSITION	ANY POSITION	7	RETRACTED, OFF	OFF	OFF

9. Stop arm signal: There shall be installed on left outside of body an approved octagonal design air, vacuum, or electrically actuated stop-signal arm, equipped with two double face flashing lights for signaling a pupil stop. Bodies to be mounted on diesel powered chassis with hydraulic brakes shall be equipped with an electrically actuated stop arm. Light lens of all stop arms shall be RED. (For controls, see item 8 of preceding page. For color, see LETTERING AND TRIM, page 45.) Vacuum or air lines, if used, must not be readily accessible to students inside or outside the vehicle. Vacuum lines must be made of copper, steel or nonmetallic materials meeting S.A.E. Standard J848d, and fittings shall be brass. Stop signal arm shall meet the applicable requirements of S.A.E. J1133.

**NOTE:** Body manufacturer utilizing an engine manifold vacuum source to power the stop arm, must install a 1000 cu.in. vacuum tank with appropriate check valve to actuate the stop arm.

10. Interior Lights: There shall be installed three or more interior lights, depending upon length of bus. If lights are mounted in ceiling above center aisle, they must be of recessed flush-type.
11. Reflectors: Two amber reflectors shall be mounted on side of bus near front and two red on rear side panels, two red on rear panels, and two intermediate amber on buses over 30 feet.
12. Emergency door buzzer: Emergency door (and window) buzzer shall be connected to accessory side of ignition switch.
13. Heater/Defroster: There shall be installed a heater of heavy-duty hot water circulating bus type, with minimum of 90,000 BTU rating. Heater shall have a per-hour capacity specified at a temperature differential of 150°F between the hot water and ambient air temperature. The

heater shall be mounted in front of bus. A supplemental heater, minimum 80,000 BTU rating may be installed in larger buses. The heat exchanger (core) of any heater shall be constructed to withstand a minimum static test pressure of 300 P.S.I.G. without rupture or leakage. Heater lines on the interior of the bus shall be shielded to prevent scalding of the driver or passengers. The windshield defroster and defogging system shall provide defogging of driver's window and entrance door glasses by utilizing hot air taken off the heater. Defroster shall have separate fan(s).

A gate-type coolant flow regulating valve for the heater shall be installed inside the bus accessible to the driver, but in such a location as to discourage tampering by students. Also required are shut-off valves installed in the pressure and return lines at the engine.

The windshield defroster and defogging system shall provide defogging of the entire windshield, driver's side window, and entrance door glasses by utilizing hot air taken off the heater. Defroster fan must be separate from heater blower fan. Bodies which do not have defrosters providing forced heated air by means of ducting across entire base of windshield must be equipped with an additional right-side mounted defroster fan which is operated in conjunction with the heater.

14. Defogger Fan: One 6-inch defogger fan, in addition to defrosters operating in conjunction with bus heater, shall be installed.
15. Two-way Radio: Use of a school district-approved two-way radio communications system is acceptable.

#### WINDSHIELD WIPERS AND WASHERS

1. Electrical windshield wipers shall be standard on all buses. (Air is optional on Types "B," "C" and "D" buses.) All wipers by design and installation shall provide desirable vision for drivers. Two heavy-duty motors shall be provided and equipped with blades of sufficient length and heavy-duty arms to clear windshield glass in driver's direct view. All wiper controls shall be located within easy reach from driver's seat and designed to move blades away from driver's direct view when in stop position.
2. Windshield washers shall be electrically operated. The washer reservoir shall be made of hard plastic or other approved material and have a capacity of at least one-half gallon. Flexible plastic bags are not acceptable.

#### WINDSHIELD STEPS AND HANDLES

A step and appropriate grab handle shall be installed on each front corner of body to facilitate cleaning of windshield. The handle shall be stainless steel, chrome-plated or non-ferrous metal or may be made of non-metallic material of sufficient structural and mounting strength and resistant to weathering and deterioration and shall provide for four point mounting and adequate hand hold. Handle shall be contoured and formed so as to provide a comfortable and safe grip.

#### MIRRORS

1. Interior Mirror: Interior mirror shall be either clear-view laminated glass or clear-view glass bonded to a backing which retains the glass in the event of breakage. Mirror shall be a minimum of 6" x 30". Mirror shall have rounded corners and protected edges.
2. Exterior: Two exterior rear-view mirrors shall be provided, one to left and one to right of driver. Area of each mirror shall not be less than 90 square inches overall. Each mirror shall be firmly supported and adjustable to give driver a clear view past left rear and right rear of bus. Mirror backing plate and rim shall be zinc steel properly primed and painted as other bus body parts or be made of non-ferrous material.

3. Cross View: Two 7½-inch convex cross-view mirrors to give driver view of pupils crossing in front of bus shall be provided. Mirrors shall be mounted on left and right front fenders of Types "B" and "C" buses and the front corners of Type "D" buses. Ball and socket mirror mounting shall have an adjustment for tightening and supports so braced as to restrain vibration.
4. Side View: Two convex mirrors with a minimum of 7½-inch diameter to give driver a view of the left and right side of the bus. Mirrors shall be mounted on the left and right side crossview mirror support bracket on Type "B", "C" and "D" buses.

**SUN SHIELD**

A tinted, transparent plastic adjustable sun shield, minimum 6" X 24", shall be installed and have substantial mounting so that it will remain in position.

**LICENSE HOLDER**

Type "C" buses recessed on left rear outside of body with suitable method for mounting license tag. Type "B" and "D" buses, manufacturer's standard.

**FIRE EXTINGUISHER**

1. A dry chemical-type fire extinguisher with a gauge, and designed to restrain tampering shall be mounted in a place accessible to driver, preferably near service door.
2. Fire extinguisher shall bear label of Underwriters' Laboratories, Inc. showing rating of not less than 2A-10BC.

**EMERGENCY ROADSIDE REFLECTORS**

Three (3) reflector-type warning devices, meeting the requirements of F.M.V.S.S. 125, shall be mounted in a location accessible to driver in front section of bus and stored in a container.

**FIRST-AID KIT**

1. Bus shall carry Grade A, moisture and dust proof first-aid kit with clear cover, mounted in such a manner that it can be easily detached and made portable and in an accessible place in driver's compartment.
2. Number of units and contents shall be as follows:

1-inch bandage compress (e.g., Band-Aids) .....	2 pkgs.
40-inch triangular bandage with two safety pins .....	1 pkg.
4" x 4" sterile gauze pads .....	6 pkgs. of 2 each
2-inch rolled curlex bandage each in length .....	2 rolls six feet
1-inch roll adhesive tape in length .....	1 roll 2½ yards
Eye dressing packet .....	2 pkgs.

**PAINT AND FINISH**

Prior to application of finish coats to body, hood, and cowl, metal surfaces shall be cleaned of grease, foreign matter, excessive body caulking and sealing materials and treated as needed for proper paint adhesion. Two (2) coats of national school bus yellow, should be applied for total dry thickness of 2 mils over metal surface. Trim, lettering and bumpers shall be black. (See requirements for metal preparation under Structural Design.) Lead-free paint shall be used on all interior and exterior surfaces of body which are painted by the body manufacturer.



### LETTERING AND TRIM

Letters and trim on three (3) rub rails below belt-line shall be black (except for stop sign). Letters of words SCHOOL BUS on top front and rear section of bus body shall be eight (8) inches high and correspond to Series B, Standard Alphabet. (See National Standards.) (Name of District) DISTRICT SCHOOLS, on each side of bus body at belt-line shall be in four (4) inch minimum letters. Numbers to be furnished by county shall be in four (4) inch minimum height and on each side and on rear of bus body. EMERGENCY DOOR shall be in two (2) inch letters at top or directly above door, visible inside and outside of bus. Lettering to indicate fuel type shall be located on body adjacent to fuel filler opening.

Stop signal arm shall have red background with a reflectorized white border and the letters STOP shall be in six (6) inch white reflectorized letters.

### MOUNTING OF BODY

Body shall be assembled in body company's standard production facilities. Bid price shall include mounting body upon chassis furnished by bidder. Body shall be securely attached to each chassis side rail at each main body cross beam. All attaching bolts shall not be less than 7/16 inch in diameter with S.A.E. threads. Nuts shall be secured with lock washers.

### TYPE "B" AND "D" FORWARD CONTROL BODY EXCEPTIONS

1. Radiator filler tube shall be located for ease of servicing outside bus body.
2. The distance between barrier at rear of entrance step well and engine cover shall be a minimum of 13 inches.
3. A step, in lieu of stirrup steps, is permitted in or on the front bumper, both sides.
4. Engine cover shall be made of metal or an approved equal and shall provide adequate seal to the bus floor area to keep engine fumes from entering the passenger compartment and shall be insulated to retard transfer of heat and engine noise.

### TYPE "D" PUSHER BODY EXCEPTIONS

1. Entrance door shall be forward of right front wheel.
2. Engine compartment shall be constructed so as to permit servicing of engine, having one or two doors opening at rear and louvered removable panels on each side of engine compartment. Engine compartment must be sealed at top and front to retard heat transfer and prevent engine fumes from entering passenger compartment. Provisions shall be made for easy removal of engine through rear compartment.
3. Mud flaps shall be installed at rear of dual wheels.
4. Engine air intake, meeting chassis manufacturer's approval shall be installed in approved manner to outside of body.
5. A step, in lieu of stirrup steps, is permitted in or on the front bumper, both sides.
6. Front end construction of body shall be designed to prevent distortion and vibration. Forward outer panel shall be substantial for mounting headlamps and turn signals. Provisions shall be made for servicing steering gear.

7. Emergency exits - Bus body shall have an emergency door located on left side of bus body, hinged in front, supplemented by a rear emergency window over motor, hinged at top. There shall be an open access of at least 12 inches in width from the center aisle to the side emergency door. A flip seat meeting F.M.V.S.S. 222 is acceptable. Emergency door and windows shall meet F.M.V.S.S. 217 and 220. Emergency window over engine compartment shall be minimum of 16" X 54".
8. Odometer/Speedometer shall be front-wheel drive or if electrical, it may be driven from the rear axle.

**BODY SPECIFICATIONS FOR OPTIONAL  
BODY EQUIPMENT  
TYPE "B," "C" & "D" BUSES**

1. Book Racks:

(Interior) are approved as an optional item only if installed in buses used for extracurricular purposes and main rails are padded to adequately safeguard pupils against injury.

2. Bus Lock-up System:

Optional whereby a bus can be locked at emergency as well as entrance door. Ignition interlock required for emergency door to prevent starting bus if emergency door is locked.

3. Fuel Supply Lock:

A lock with two keys may be installed in the fuel supply service door of the body skirt.

4. Low Air Pressure Warning Device (Full air brake models):

There may be installed a device automatically actuated when the air pressure drops below the limit for safe bus operation. Signal shall be in driver's direct view and remain in this position until a safe operating pressure is reached.

5. Master Switch (kill switch):

A body electrical circuit master switch (kill switch) that will cut "ON" and "OFF" body circuits by use of a solenoid controlled by the ignition switch.

6. Exterior Light Monitor:

A system of monitoring exterior lights on the front and rear of the bus from the driver's seated position is approved as an option. Such systems shall include:

1. Pupil Warning Lamps, both **RED** and **AMBER**, front and rear.
2. Tail Lamps
3. Back-up Lamps
4. Rear Turn Signal Lamps
5. Stop Lamps

A system that monitors only electrical circuits and does not indicate whether or not the bulb is operational is not acceptable. See page 40 for parts manual requirement for optional components.

7. Power Operated Service Door:

A power operated service door is approved provided the unit is equipped with a manually operated override to enable the driver to manually open the door in the event of loss of power.

8. Public Address System:

A public address system with two speakers inside the bus and one heavy-duty speaker outside the bus with controls to permit the driver to select "inside" or "outside" speakers, mounted in driver's compartment so that all controls are readily accessible to the driver from a normal seated position may be required. See page 40 for parts manual requirement for optional components.

9. Octagonal Stop Sign:

An additional octagonal stop sign meeting Florida Specifications, may be located on the left rear of the body. Optional stop arm shall be of same type as standard stop arm (same power source).

10. Side Mounted Turn Signal Lights:

Optional side mounted turn signal lights for Type "B," "C" & "D" buses. A turn signal light in a protective rim mounted on the right side of the bus body behind the service door and one mounted on the left of the bus behind the stop arm and wired into the turn signal circuit.

11. Strobe-Type Lamp:

Mounted in center of rear part of roof.

12. Tinted Glass in Windows:

Option for tinted glass which provides maximum tinting allowed by Federal and A.N.S.I. standards for the windshield, driver's side window(s) and service door glass and which also includes tinted glass in all windows rear of the driver's compartment with a light transmission of approximately 28 percent.

13. Vandal Box:

A vandal box for safe storage of fire extinguisher, first-aid kit, and warning devices may be specified provided it is equipped with a warning buzzer to warn the driver the box is locked if the ignition switch is in the "on" position.

14. Emergency Exit Windows (Push-out Type):

Two (2) push-out windows of standard design including device for locking in place, buzzer, and lettering "EMERGENCY EXIT." One mounted on each side of bus body.

15. Thermal Insulation:

Optional thermal insulation package shall include full insulation of ceiling and walls, front, and rear of bus (including body bows), plus minimum  $\frac{1}{2}$ " exterior grade plywood covering floor. Insulation material must be fire resistant and of a type that will not harbor dampness, and must be approved by Underwriter's Laboratories, Inc.

16. White Painted Roof:

Option for white painted roof on all types of buses to comply with applicable Federal Standards and National Minimum Standards. White paint shall cover roof but may not extend beyond drip rail on side of vehicle; front and rear caps must remain yellow. Shall be polyurethane or approved equivalent paint. Any paint used to satisfy the requirements of this option shall be lead-free.

17. 52 ounce Upholstery:

Approved option on seats of all types where available.

18. Baggage Compartment:

Approved option on all bodies where available.

19. Three Riser Step:

A three riser service entrance step in lieu of standard two riser entrance is an approved option on all types where available. Each step must be the full width of the stepwell at the point where the step is located. Half-steps or partial-steps are not acceptable.

20. Diesel Noise Reduction Package:

Approved option on all types from body manufacturer where available.

21. Grab Rail:

Approved option: grab rail for aides mounted over wheelchair positions on all ECB's. Grab rail shall be of the same material as required for the service entrance grab handle and shall be located on the ceiling longitudinally approximately the length of the wheelchair positions, and at least 12 inches from the longitudinal centerline of the bus. The grab rail shall be securely mounted and the wording "FOR DRIVER OR AIDE ONLY" shall be located adjacent to it.

22. Pupil Crossing Arm:

An approved crossing control arm to be actuated by the driver. The arm shall pivot out from the right side of the front bumper to prevent students from walking immediately in front of the bus. The crossing control arm shall operate in conjunction with the stop arm and shall not be equipped with a light.

23. Red Light Above Emergency Door:

Approved option on Type "B", "C", and "D" buses for a small red light to be mounted above the emergency door on the interior of the bus, activated whenever the clearance lights are on.

24. Polyurethane Enamel Paint:

Approved option for National School Bus Yellow polyurethane enamel or approved equivalent paint on exterior surfaces of body (Type "C") or body and chassis (Types "B" & "D") where National School Bus Yellow is already required by these specifications. Shall be lead-free.

25. Rear Heater:

Approved option on all Type "C" and "D" bodies for an additional heater mounted so as to provide heat in the rear of the body. Shall have a minimum 80,000 BTU rating.

26. Silicone Hose:

Approved option for silicone (or approved equivalent) heater hoses supplied by body manufacturer. Silicone hose, if used, shall require the use of stainless steel, shoe-type hose clamps. Option requirements are for hoses to front heater only.



**SECTION IV**

**CHASSIS SPECIFICATIONS, TYPE "A" BUSES**





## SCHOOL BUS CHASSIS SPECIFICATIONS FOR TYPE "A" SCHOOL BUSES

The design and construction of the bus shall provide for the safety and comfort of transported students and for economical transportation. Manufacturers and dealers offering Type "A" school buses for sale in Florida for the purpose of transporting public school students shall certify in writing to the Commissioner of Education that any school bus sold in Florida will meet all applicable Federal Motor Vehicle Safety Standards effective on the date the vehicle is manufactured and all Florida Department of Education School Bus Specifications effective at the time the bid prices were established.

The National Minimum Standards for School Buses, 1985 Revised Edition, is applicable for items not specified in this document; storage compartment for snow chains and tools excepted. Any purchase of school buses under this specification shall include the right to inspection of the product during and after manufacture by any district or state agency making purchases or the Department of Education.

The specifications in this part apply to school buses with a rated seated capacity of approximately 16 thru 20 passengers. (Vehicles with single rear wheels are limited to a maximum of 16 seating capacity. Vehicles with dual rear wheels are limited to a maximum of 23-capacity.)

### MINIMUM CHASSIS SPECIFICATIONS FOR ALL TYPE "A" BUSES

1. Engine:

- A. Minimum engine size acceptable 292 cid/4.8 liter, governed.
- B. Engine coolant recovery or deaeration system required on all chassis.
- C. Equipped with full-flow, cartridge type, spin-on oil filter(s) with filter header(s) mounted directly to engine block.

2. Alternator:

Minimum 60 amp. is required.

3. Battery(ies):

Battery shall be 12 volt, minimum 455 cold cranking amps. at 0° F, and mounted under the hood in a manner to provide easy access for servicing. Diesel shall require dual 455 cold cranking amps.

4. Bumpers:

Front bumper of 19 capacity and front and rear bumper of 16 capacity shall be channel design, minimum 6 inches full width. For rear bumper requirements for 19 capacity Type "A" buses, see Section V, Part A.

5. Brakes:

Shall be power assisted, self-adjusting, dual hydraulic, meeting F.M.V.S.S. 105.

6. Differential ratio:

Shall be compatible with engine and transmission used.

7. Drive Shaft Guard:

Required to prevent drive shaft from dropping to the ground.

8. Exhaust:

Shall be corrosion resistant and exhaust shall exit behind rear wheels and left of the left frame rail.

Exception: Dual exhaust acceptable on diesel Type "A" chassis.

9. Fuel Tank:

Shall have a minimum 30-gallon capacity.

10. Gross Vehicle Weight Rating:

16 capacity, G.V.W. minimum shall be 8200 pounds; 19 + Capacity, G.V.W. maximum shall be 10,000 pounds. Applies to gasoline-powered chassis. For diesel G.V.W., see "Diesel Engine Option," this section.

11. Heater:

Deluxe fresh air type heater and defroster required.

12. Horn:

Dual horn minimum of 120 decibels is required.

13. Hubcaps:

Manufacturer's standard is acceptable.

14. Ignition System:

Electronic ignition system required on all gasoline engine powered chassis.

15. Lights:

Headlights, brake lights, back-up lights and turn signals shall meet requirements of F.M.V.S.S. 108. Four-way hazard flashers must not be tied into the brake lamp circuit in such a way as to prevent driver from using flashers while also depressing the brake pedal.

16. Steering:

Power steering required.

17. Painting:

Bus exterior shall be school bus yellow including fenders and hood. These surfaces shall be painted with lead-free paint.

18. Shock Absorbers:

Shall be adequate, front and rear, for axle size.

19. Tires:

Shall be radial ply tubeless meeting Tire and Rim Association standards and adequate size and load rating for applicable GAWR's.

20. Transmission:  
Shall be (3) forward speed, automatic.
21. Vacuum Connection:  
Required in engine manifold for stop sign attachment (gasoline engines).
22. Wheelbase:  
Minimum 123 inches.
23. Windshield Wipers:  
Wipers and washer shall be electric powered and meet Federal Standards.
24. Wiring:  
Shall meet S.A.E. requirements.

#### OPTIONAL CHASSIS EQUIPMENT SPECIFICATIONS, TYPE "A" BUSES

1. Diesel Engine Option:  
16 capacity single rear wheels and 19 capacity, dual rear wheels:
  - A. G.V.W.R. minimum 8,200 pounds and maximum of 10,000 pound G.V.W.
  - B. Minimum tire size - radial ply tubeless tires meeting Tire and Rim Association standards and adequate size and load rating for applicable GAWR's.
  - C. Minimum engine size - 135 net horse power.
  - D. Minimum S.A.E. Gross Torque, 240 lb-ft.
  - E. Minimum displacement (litres) 4.8L.
  - F. Maximum (full-load) governed engine speed of 3,600 RPM.
  - G. Differential ratio - compatible with engine and transmission.
  - H. Batteries - Dual minimum 12 volt, 455 cold cranking amps at 0°F.
  - I. Fuel/Water Separator (required) - Shall be of a design and installation compatible with chassis/engine application to ensure trouble-free performance when properly maintained. In addition, fuel/water separator shall meet the following requirements:
    - (1) Must be completely accessible for manufacturer's recommended servicing, with emphasis on underhood mounting location.
    - (2) Must have a clear drain (sight) bowl with a drain valve to allow detection and draining of accumulated water.
    - (3) Must contain a replaceable pleated paper element fuel filter of proper design to protect against premature fuel flow restriction or excessive passage of contaminants.
2. Spare Radial Ply Tubeless Tire and Wheel:  
Approved option for radial tubeless tire and wheel of same size as original equipment tire/wheel.
3. Tow Hooks:  
Two heavy-duty tow hooks, installed by manufacturer, one on each frame rail at front of bus in an approved manner.



**SECTION V**  
**BODY SPECIFICATIONS**  
**TYPE "A" BUS**



## MINIMUM FLORIDA SCHOOL BUS BODY SPECIFICATIONS FOR TYPE "A" BUSES

The specifications set forth are descriptive of the Type "A" school bus. The design of school bus bodies is to provide for the safety and comfort of pupils and for economical transportation as required by Florida Statutes and the National Highway Traffic Safety Administration. The National Minimum Standards for School Buses, 1985 Revised Edition, is applicable for items not specified in this document, storage compartment excepted. This section is divided into three parts: **Part A** (Body Specifications for 19 capacity Type "A" Buses with Dual Rear Wheels); **Part B** (Body Specifications for 16 capacity Type "A" Buses with Single Rear Wheels); **Part C** (Optional Equipment Specifications for all Type "A" 16 and 19 capacity Buses). The separate 16 and 19 capacity Type "A" bus body specifications are for the purpose of distinguishing between the "van conversion," 16 capacity buses, and the 19 capacity buses with bodies similar to regular school bus bodies.

### WARRANTY

Bids submitted under this specification shall include a warranty covering materials and workmanship for a period of 12 months.

### PUBLICATIONS

Each Florida school board that is delivered one or more bus bodies shall be furnished a parts catalog and a parts price list. Parts manuals must be designed so that all replaceable parts are illustrated by line drawings and such parts are numbered on the illustration, with a part description on a separate list under the corresponding number. Part descriptions should be annotated appropriately with the part number, a proper description (part name), and the quantity required for the application illustrated on the drawing.

### INSPECTION

Purchase of school buses or bus bodies under this specification shall include the right to inspection of the product before, during and after manufacture by any state agency or county agency of the State of Florida.

## PART A

### Body Specifications for 19 Capacity Type "A" Buses with Dual Rear Wheels

#### SIZES OF BODIES

Maximum overall outside width of body shall be 96 inches. Height of body from top of finished floor to underside of ceiling, at center of body, shall be a minimum of 72 inches.

#### STRUCTURAL DESIGN

NOTE: These specifications for design and grade of steel apply to the school bus body supplied by the body manufacturer.

1. Details of design shall have a direct relationship to specifications for grades of steel in the latest edition for the design of Light Grade Cold-Formed Steel Structural Members of the American Iron and Steel Institute. Material used in the body frame structure shall conform to chemical and mechanical requirements of the listed specifications or other published specifications, including tensile and yield points, which establish properties and suitability of the steel for school bus body test code and safety requirements.
2. All welds used in construction of body shall conform to latest applicable specifications of the American Welding Society.
3. Welds, rivets, or high-strength bolts may be used in connecting parts of the structural body. All bolts shall have provision to prevent loosening under vibratory loads. All bolts, nuts, washers, and screws used throughout the body shall be approved size, cadmium or zinc plated, or thoroughly treated in an approved manner for prevention of rust.
4. All metal used in construction of bus body shall be zinc or aluminum coated before construction; provided that for metals 12-gauge or less in thickness, either zinc or aluminum coating shall be mill-applied for these components: (a) service door panels, (b) emergency door panels, (c) guard rails, (d) all exterior body panels, (e) wheelhousing, (f) body posts and roof bows, (g) side strainers, (h) roof strainers, (i) window caps, (j) window visors where used, (k) all floor section panels and floor sills; excluded are door handles, interior decorative parts, and other interior plated parts. All metal parts that will be painted shall be chemically cleaned, etched, zinc-phosphate-coated, and zinc-chromate or epoxy-primed, or conditioned by equivalent process. Any areas from which primer is removed for any purpose, as sanding, grinding, welds, etc., must be thoroughly cleaned and treated as specified and primer applied. Rivets used in assembly shall be zinc-phosphate treated unless coated with rust prevention material and also primed as specified. In providing for these requirements, particular attention shall be given to lapped surfaces, welded connections or structural members, cut edges, metal in which holes are punched or drilled, closed or box sections not vented or drained, and surfaces subjected to abrasion during vehicle operation.

As evidence that above requirements have been met, samples of materials used in construction of the bus body, when subjected to 1,000-hour salt spray test as provided for in latest revision of A.S.T.M. Designation: B 117, "Standard Method of Salt Spray (Fog) Testing," shall not lose, after rubbing to remove corrosion, more than 10 percent of material by weight.

5. Upper body structure shall consist of frames extending from floor to one (1) side to floor on opposite side, at each window post, which may be composed of posts and roof bows or a continuous bow frame and members running from front to rear of body known as strainers.



6. Design shall provide for: (a) a formed longitudinal member having a combined function of supporting floor plates, providing impact resistance, and of supporting exterior ends of seats; or (b) a longitudinal member located about seat line, securely fastened to body posts, and a continuous separate member of a strength equal to a  $1\frac{1}{2}$  X  $1\frac{1}{2}$  X  $1/8$  inch angle securely attached for support of seats.
7. A roof bow shall be located at least at each post to form a bow frame and spaced on approximately 27-inch centers, excepting they may be spaced a maximum of  $36\frac{1}{2}$  inches, provided sufficient supports are installed to maintain integrity of roof structure. Roof bows shall not be buckled or distorted out of cross section during bending processes to curved shape. Bow frames may be formed as one (1) piece or may be joined at window header by connections developing full strength of cross section. Each post shall be securely connected to floor beams directly through gussets or indirectly through side rails.
8. The front end assembly shall be sufficiently heavy to withstand vibrations transmitted to it through chassis. Windshield or corner posts must be of sturdy construction, designed so that they will not be so wide as to unnecessarily obstruct driver's view. Body shall be fastened to chassis in an approved waterproof manner.
9. Rear Corner Reinforcements: Rear corner framing of bus body between floor and window sill and between emergency door post and rear side post shall consist of at least three (3) structural members applied horizontally or vertically or in another combination to provide additional impact and penetration resistance equal to that provided by frame members.
10. Side Strainers: There shall be three (3) or more side strainers or longitudinal members to connect vertical structural members and to provide impact and penetration resistance in the event of contact with other vehicles or objects. Such strainers shall be formed (not in flat strip) from metal of at least 16-gauge and 3 inches wide.

Strainer at roof line or window header shall extend all around the bus.

Side strainer shall be installed in area near bottom of seat frame and shall extend completely around bus body except for door openings. Side strainers specified above shall be fastened to each vertical structural member in any one or any combination of the following methods as long as stress continuity of members is maintained.

- A. Installed between vertical members.
- B. Installed behind panels but attached to vertical members.
- C. Installed outside exterior panels.

Fastening method employed shall be such that strength of strainers is fully utilized.

Strainer immediately below windows shall extend around body except for door openings and shall be securely joined to vertical members. This strainer shall be secured longitudinally to outside of body posts for length of body and have the bending and penetration characteristics of a rub rail (see below) and may be formed as a channel, lipped channel, box or hat section if installed on vertical members behind panels or as a rub rail if applied outside of body panels. No portion of side strainer or longitudinal member, except at seat level, is to occupy same vertical position as required for rub rails.

## FLOOR AND FLOOR COVERING

1. Bus body floor shall be of prime commercial quality steel or other metal. Floor shall be level from front to back and from side to side except for wheel housings.
2. The floor shall provide adequate and firm support for seat legs and shall have a minimum one-half inch exterior grade plywood securely attached to floor.

3. Floor in underseat area, including tops of wheel housings and toeboard, shall be covered with smooth surfaced fire-resistant rubber covering, or approved equal, having a minimum thickness of .125 inch.
4. Covering from toestep landing area to emergency door shall be ribbed aisle- type fire-resistant rubber, non-skid, wear-resistant. Minimum overall thickness shall be .1875 inch measured from top of ribs. Rubber floor covering shall meet Federal Specification ZZ-M-71d.
5. Floor covering must be permanently bonded to floor and resist cracking when subjected to sudden changes in temperature. Adhesive material used shall be waterproof and also of the type recommended by manufacturer of floor covering material.
6. Landing area at top of steps shall be ribbed rubber which shall extend to and join the ribbed aisle cover at an angle and its leading edge (curbed fillets excepted) white or a light color.
7. All joints shall be covered with non-ferrous metal, minimum one (1) inch wide and .095 inch thick, weight .09 per linear foot. Attaching screws shall be countersunk.
8. Holes around engine housing shall be adequately sealed.

### **WHEELHOUSINGS**

Rear wheel housings shall be constructed of 18-gauge or heavier steel and be rigidly reinforced, shall be attached to floor and side panels in such manner as to prevent water or dust from entering body, and shall be designed for easy removal of tires. For materials, see Structural Design; for covering, see Floor and Floor Covering.

### **STEP WELL**

A step well of at least two (2) steps shall be built in right front assembly enclosed with doors extending to bottom step. Each step shall be covered with ribbed rubber, 3/16 inch thick, bonded to metal base and otherwise constructed so as to provide substantial support, including the leading edge which shall be white or a light color. Entrance to step shall extend below floor line about 14 inches from the ground.

### **GRAB HANDLE AT ENTRANCE**

A suitable grab handle or rail shall be provided at the front entrance, securely mounted inside of body and within reach of small children upon entering bus. Grab handles shall be made of round stainless steel, one (1) inch O.D., tubing minimum of 18-gauge, or stainless architectural tubing minimum .018-inch thickness over 18-gauge steel insert.

### **RUB RAILS**

1. There shall be one rub rail on each side of bus approximately at seat level which shall extend from entrance door post around bus body (except for emergency door) to point of curvature near rear of cab section on left side.
2. There shall be rub rails located approximately at the floor line and bottom of outer skirt which shall cover same longitudinal area as upper rub rail, except at wheel housings, and shall extend only to radii of right and left corners.
3. Rub rails shall be attached twice at each body post and at all other upright structural members.

4. Rub rails shall be four (4) inches or more in width, shall be of 16-gauge steel, and shall be constructed in corrugated or ribbed fashion.
5. Rub rails shall be applied outside of body panels. Pressed-in or snap-in rub rails do not satisfy this requirement.

#### **PANELING, EXTERIOR**

1. Exterior paneling includes all sheet metal skin forming exterior surface of body, excluding front cab section sheet metal supplied by chassis manufacturer.
2. Exterior paneling should be of 20-gauge steel minimum thickness and shall be attached to bow frames and strainers so as to act as an integral part of structural frame. Roof panel design may include two (2) types:
  - (1) panels extending full width of top and joined to window headers on each side of bus body and each of main roof bows;
  - (2) panel section of a length sufficient to extend across three (3) or more main roof bows and joined to window header and supported by and joined to a longitudinal strainer of special design.

All joints of roof panels shall be lapped the full width of supporting members and shall be attached along each side of supporting member to form a watertight joint. (See **STRUCTURAL DESIGN**; also **INSULATION AND SEALING OF JOINTS**.)

#### **PANELING, INTERIOR**

1. Interior of body shall be lined with panels securely fastened to adjoining parts in an acceptable manner. If ceiling is constructed so as to contain lapped joints, exposed edges shall be beaded, hemmed, flanged or treated to minimize sharp edges. Fastenings shall minimize vibrations and rumble and be installed to facilitate removal. A cove molding, which may be an extension of body panels, shall be installed covering wall to floor joint beginning behind chassis cab on left side of bus and extending along walls around corners to service door on right side. Molding shall be securely fastened so that dirt will not readily work under it.
2. Interior paneled area immediately below window line shall be aluminum coated steel. Exposed edges of interior paneling shall be beaded, hemmed, flanged, or treated to eliminate sharp edges.

#### **BUMPER, REAR**

Rear bumper shall be of pressed steel channel at least 3/16 inch thick, 8 inch high ribbed face and flanged two (2) inches at top and bottom or otherwise designed to furnish equal flexural strength. It shall be of wraparound design and securely fastened to each chassis rail and braced diagonally from each end of bumper to chassis rail with heavy braces to permit fully loaded bus to be pushed without permanent distortion to bumper, chassis or body. Contour of bumper shall fit contour of body in a manner to prevent hitching to or riding on bumper. An appropriate seal shall be applied between bumper and body panel.

#### **SERVICE DOOR**

Service door shall be a double-wall split type or jackknife type located at right front of bus. A double-bearing chromium-plated or epoxy-coated mechanical control shall be mounted within comfortable

reach of driver on a firm and substantial support and lock in off-center position. On models with service doors opening outward, there shall be installed an approved safety latch. Control shall have a smooth machined handle and the rod to the door shall also be chromium-plated or epoxy-coated. Doors shall be securely hinged with approved heavy-duty hinges with brass or rust resistant rod adequately fastened to adjoined member. Doors shall have a two (2) inch minimum safety gap sealed with a safety flap of approved quality. Door shall extend to bottom step and be fitted with suitable weatherstrip to restrain water entering step well.

Service door shall have minimum horizontal opening of 24 inches and minimum vertical opening of 68 inches. Immediately above the door opening there shall be secured to body panel a high density foam rubber pad, minimum three (3) inch width, or approved equal safety cushion.

Doors shall be so designed and weatherstrips mounted so that there is no binding or tendency for stripping to dislodge during door operation. Two (2) glassed-in openings shall be provided in each door half with glass of same grade as specified on side windows and mounted in rubber. Bottom of lower glass panel shall not be more than 35 inches from ground when bus is unloaded. Top of upper glass panel shall not be more than six (6) inches from top to door.

### **EMERGENCY DOOR**

1. Emergency door on buses shall be located at center of rear of bus and have minimum horizontal opening of 24 inches and vertical opening of 48 inches. Emergency door shall be hinged on right-hand side using hinge(s) with a brass or rust resistant rod. Door stop shall permit door to open at least 150 degrees but shall protect body lights from damage by the opened door. Inside of door header shall be padded with energy absorbing material a minimum of three (3) inches wide.
2. The emergency door shall be so designed to be opened from inside and outside of bus and shall have a fastening device which may be quickly released but designed for protection against accidental release. Control from driver's seat shall not be permitted. Outside control shall consist of nondetachable opening device designed to prevent hitching to but to permit opening when necessary.

Emergency door shall be equipped with slide bar, cam-operated lock, having a minimum stroke of one (1) inch. Emergency door lock shall be equipped with suitable electric plunger type switch connected with buzzers as required by Federal Standards. Switch shall be enclosed in metal case, and wires leading from switch shall be concealed in bus body. Switch shall be so installed that plunger contacts farthest edge of slide bar in such a manner that any movement of slide bar will immediately close switch circuit and activate buzzer.

Door lock shall be equipped with interior handle that extends approximately to center of emergency door. It shall lift up to release lock.

Emergency door controls, labeling and warning device shall meet requirements of F.M.V.S.S. 217.

### **LOCKUP DEVICES**

Any emergency door equipped with a locking device shall have an ignition interlock which prevents starting the engine when the door is locked and shall meet requirements of F.M.V.S.S. 217.

### **WINDOWS**

1. An adjustable split sash window shall be mounted in side of bus body between each framing post. Safety glass shall be set in an acceptable manner in a sturdy extruded or die formed

frame to provide adequate support for glass. Permanent mark showing grade of glass shall be visible and glass shall be a minimum of 1/8 inch thick.

A minimum clear vertical opening of not less than nine (9) inches shall be provided by lowering top sash. Bottom sash shall be stationary. Movable window shall be controlled by approved lock having finger-touch opener providing for ease of operation and shall have a minimum of injury prone projections. Sash shall operate in plastic channels. Window latches must be replaceable or rebuildable without disassembling the complete window frame or removing the window from the body. Also, individual window latches or repair parts must be available and part numbers included in the required body parts catalog. Window seals and visors or drip molding shall be installed and unit shall provide ample protection from leakage in hardest rain.

2. For ventilation purposes, the driver's window shall be adjustable.
3. There shall be installed, in rear door, two (2) windows (one (1) upper, one (1) lower) set in rubber in a waterproof manner. Total glass area in emergency door shall be a minimum of 750 square inches. Glass shall be same type as for side windows.

Rear side windows located at each side of emergency door shall be set in rubber in waterproof manner. Glass area shall be large enough to provide desirable vision to rear and shall be of same quality and grade as for side windows.

4. Galvanized steel or aluminum, each designed to near equal stiffness, as determined by inspection to give adequate support to glass, shall be used for window frames.

### WINDSHIELD

Windshield shall provide for corner vision and be fitted with curved glass, four-piece flat glass or two-piece flat glass as approved by the Department of Education. Glass shall be laminated safety polished plate, set in rubber in a waterproof manner and slanted to reduce glare. Glass shall meet current S.A.E. specifications and Federal Motor Vehicle Safety Standards.

### TESTING OF BODY

Load test of body shall meet the requirements of Federal Motor Vehicle Safety Standard 220.

### SEATING

1. Seats shall be mounted forward-facing and provide a minimum of 12.8 inches of seat width per passenger seating position. The aisle shall be 12 inches minimum. This plan of body seating shall determine seating capacity.

Seat spacing shall meet the requirements of F.M.V.S.S. 222 and provide a minimum of 25 inches of knee room at each seat with a measurement to be made at the center of the reference point. In making this measurement from back of seat cushion to back of seat or barrier in front, upholstery may be placed against padding both forward and rear but padding may not be compressed.

The padding shall be secured to the frame in a non-snag manner. Screws and bolts used in seat back construction shall not be exposed.

2. Seats, seat back cushions, and crash barriers shall be covered with a material having 42-ounce finished weight, 54-inch width, and finished vinyl coating of 1.06 broken twill or other material with equal tensile strength, tear strength, seam strength, adhesion strength,

resistance to abrasion, resistance to cold and flex separation. Padding and covering on all seats shall be of material that will not flash or explode upon contact with spark or open fire. When welt is not used, all seams shall be double-sewn.

3. Chassis manufacturer's standard driver's seat is acceptable. Driver's seat belt assembly shall meet applicable F.M.V.S.S. for school buses under 10,000 pounds G.V.W.R.

### UNDERCOATING

Entire underside of body including floor members, wheelhousings, and side panels below floor level shall be coated with fire-resistant asphalt base, rubber base, or other undercoating material, applied by spray method to seal, deaden sound, insulate, and prevent oxidation. Any undercoating material used shall be asbestos-free.

### INSULATION AND SEALING OF JOINTS

1. Overlapping of edge of exterior roof and side panels and also the top edge of rub rails shall be sealed with nonhardening resilient material.
2. Thermal insulation, if provided, shall be fire-resistant and of a type that will not harbor dampness, and shall be approved by Underwriter's Laboratories, Inc.

### FUEL FILLER OPENING

An opening of adequate size and design shall be provided over fuel filler. Lettering adjacent to the fuel filler opening shall indicate fuel type required.

### VENTILATION

Body shall be equipped with an effective exhaust type ventilation system, noncloseable type installed in low pressure area of roof, capable of ejecting foul air under all operating conditions. System shall be adequately weatherproof and dustproof.

### ELECTRICAL EQUIPMENT AND WIRING

All wiring shall conform to current standards of the Society of Automotive Engineers, be coded by color, and be insulated. All joints shall be soldered or joined by equally effective fasteners. A wiring diagram showing location of wires and code of circuits for buses meeting Florida Specifications shall be installed in each body. Additionally, for all school bus body optional electronic components installed on the bus, the body manufacturer shall provide each district purchasing one or more such items with at least one comprehensive parts and repair manual. Wiring shall be in circuits as follows:

1. Clearance and step well lights: Four (4) body corners, upper section-amber front, red rear. Step well lights shall illuminate the bus entrance and be adequately protected and shall be activated automatically when door is opened and clearance lights are on. Clearance lights shall be activated by headlight switch.
2. Identification lights: Three (3) amber front, three (3) red rear, grouped in a horizontal row. Lamp centers spaced not less than six (6) or more than twelve (12) inches apart, mounted as close as practical to the vertical centerline (Federal Standards). Identification lights shall be activated by headlight switch.

3. Tail lamps: Bus shall be equipped with two (2) tail lamps and at least one (1) backup lamp (Federal Standards). Light intensity shall at least equal Class A type turn signal units.
4. License plate lamp: This lamp may be combined with one of tail lamps above.
5. Two combination brake and tail lamps: These shall be a minimum of 7 inches in diameter mounted as high and spaced as far apart laterally as practical, below window line, but not less than three (3) feet measured from center of lamps. Lenses shall meet or exceed the photometric values of Class A turn signals, and be clearly visible throughout 180 degrees. All brake and turn signal lamp housings shall be galvanized or made rust resistant in an approved manner. All lamp sockets must be brass nickel-plated or approved equal and grounded to bus body by wire or strap. Socket springs must be stainless steel or phosphor bronze. Lens retaining screws or fasteners must be stainless steel or brass nickel-plated. They shall meet current S.A.E. requirements and be installed in compliance with Federal Motor Vehicle Safety Standards.
6. Turn signal lamps: On front, turn signal lamps shall be furnished by chassis manufacturer. On rear, lens shall be plastic, amber in color, seven (7) inches in diameter, Class A, mounted as far apart, laterally, as practical on the same horizontal centerline as the brake stoplamps, and be visible throughout 180 degrees.
7. Four-way hazard flashers: Must not be tied into the brake lamp circuit in order to allow drivers to use the flashers while also depressing the brake pedal.
8. Warning lamps: Minimum lamp requirements shall be dual, mounted side by side on all corners of bus roof. Mounting shall be as high as practical on top and as near outer edge of bus as curvature permits. Lamps shall be securely mounted in a shroud including hood extending out a minimum of 2½ inches. Housings shall be galvanized or made rust resistant in an approved manner. Black background 1¼ inches to three (3) inches wide shall be painted around lights. Lamps shall be par 46, 5.7 inches diameter of sealed beam type, which may be composed of a sealed unit with a plastic lens. Lamps installed on outside shall be red; inner, amber. Lamps shall have aiming pads and meet latest S.A.E. requirements for school bus flashing warning lamps, including five (5) degrees up, ten (10) degrees down, 30 degrees right and 30 degrees left. Lamps shall be clearly visible in bright sunlight for a minimum of 500 feet.
9. Pupil warning lights and stop arm system controls and operations:
  - A. System must be equipped with the following driver actuated controls:
    1. Master switch - provides means for deactivating entire system, as would be required when opening the door at a railroad grade crossing.
    2. Control switch - three positions: OFF, AMBER, and RED. Switch may be rocker, pull-type or other switch providing three positions.
    3. Service door - Actuated switch.
  - B. Controls must provide for the following combinations of switch positions and conditions of stop arm, stop arm light, and warning lights as indicated on the chart below.

**NOTE:** System may not be designed in such a way that the operator is required to actuate controls in a particular sequence to achieve the desired combination of conditions.

**EXAMPLE:** If the driver places the three-position switch in the amber position, with the master switch "ON" it must not be required that the three-position switch be moved to "RED" or that the service door be opened, in order to de-activate the "AMBERS". In this example, the driver must be able to de-activate "AMBERS" by going directly from the AMBER to the OFF position.

WITH MASTER SWITCH, CONTROL SWITCH, and SERVICE DOOR IN THE FOLLOWING POSITIONS:

CONDITION OF STOP ARM(S), STOP ARM LIGHTS, AMBER WARNING LIGHTS AND RED WARNING LIGHTS MUST BE:

COMBINATION	MASTER SWITCH POSITION (ON or OFF)	CONTROL SWITCH POSITION (three-position: OFF, AMBER, OR RED)	SERVICE DOOR POSITION	COMBINATION	STOP ARM, STOP ARM LIGHTS	AMBER WARNING and PILOT LIGHTS	RED WARNING and PILOT LIGHTS
1	ON	OFF	CLOSED	1	RETRACTED, OFF	OFF	OFF
2	ON	OFF	OPEN	2	RETRACTED, OFF	OFF	ON
3	ON	AMBER	CLOSED	3	RETRACTED, OFF	ON	OFF
4	ON	AMBER	OPEN	4	RETRACTED, OFF	OFF	ON
5	ON	RED	CLOSED	5	EXTENDED, ON	OFF	ON
6	ON	RED	OPEN	6	EXTENDED, ON	OFF	ON
7	OFF	ANY POSITION	ANY POSITION	7	RETRACTED, OFF	OFF	OFF

10. Stop arm signal: There shall be installed on left outside of body an approved octagonal design air, vacuum, or electrically actuated stop-signal arm, equipped with two double face flashing lights for signaling a pupil stop. Bodies to be mounted on diesel chassis shall be equipped with an electrically actuated stop arm. Light lens of stop arm shall be RED. (For controls, see item 9 of preceding page. For color, see LETTERING AND TRIM, page 70.) Vacuum or air lines, if used, must not be readily accessible to students inside or outside the vehicle. Vacuum lines must be made of copper, steel or nonmetallic materials meeting S.A.E. Standard J848d, and fittings shall be brass. Stop signal arm shall meet the applicable requirements of S.A.E. J1133.

NOTE: Body manufacturer utilizing an engine manifold vacuum source to power the stop arm, must install a 1000 cu.in. vacuum tank with appropriate check valve to actuate the stop arm.

11. Interior Lights: There shall be installed three interior lights. If lights are mounted in ceiling above center aisle, they must be of recessed flush-type.
12. Reflectors: One AMBER reflector shall be mounted on each side of bus near front and one red on each rear side panel, and one red on each of the two rear panels.
13. Emergency door buzzer: Emergency door (and window) buzzer shall be connected to accessory side of ignition switch.
14. Heater/ Defroster: Deluxe fresh air type heater and defroster required.
15. Two-way Radio: Use of a school district approved two-way radio communications system is acceptable.



## **WINDSHIELD WIPERS AND WASHER**

Windshield wipers and washer shall be electric powered and meet Federal Standards.

## **MIRRORS**

1. **Interior Mirror:** Shall be a minimum of 50 square inches.
2. **Exterior:** Two exterior rear-view mirrors shall be provided, one to left and one to right of driver. Area of each mirror shall not be less than 90 square inches overall. Each mirror shall be firmly supported and adjustable to give driver a clear view past left rear and right rear of bus. Mirror backing plate and rim shall be zinc steel properly primed and painted as other bus body parts or be made of non-ferrous material.
3. **Cross View:** Two 8-inch convex cross-view mirrors to give driver view of pupils crossing in front of bus shall be provided. Mirrors shall be mounted on left and right front fenders. Ball and socket mirror mounting shall have an adjustment for tightening and supports so braced as to restrain vibration.
4. **Side-View:** Two convex mirrors with a minimum of 7½-inch diameter to give driver a view of the left and right side of the bus. Mirrors shall be mounted on the left and right side crossview mirror support brackets.

## **SUN SHIELD**

Manufacturer's standard visor or sun shield is acceptable.

## **LICENSE HOLDER**

License holder shall be manufacturer's standard.

## **FIRE EXTINGUISHER**

1. A dry chemical-type fire extinguisher with gauge and designed to restrain tampering shall be mounted in a place accessible to driver, preferably near service door.
2. Fire extinguisher shall bear label of Underwriters' Laboratories, Inc. showing rating of not less than 2A-10BC.

## **EMERGENCY ROADSIDE REFLECTORS**

Three (3) reflector-type warning devices, meeting the requirements of F.M.V.S.S. 125, shall be mounted in a location accessible to driver in front section of bus and stored in a container.

## **FIRST-AID KIT**

1. Bus shall carry Grade A, moisture and dust proof, first-aid kit with clear cover, mounted in such a manner that it can be easily detached and made portable and in an accessible place in driver's compartment.

2. Number of units and contents shall be as follows:

1-inch bandage compress (e.g., Band-Aids) .....	2 pkgs.
40-inch triangular bandage with two safety pins .....	1 pkg.
4" x 4" sterile gauze pads .....	6 pkgs. of 2 each
2-inch rolled curlex bandage each in length .....	2 rolls six feet
1-inch roll adhesive tape in length .....	1 roll 2½ yards
Eye dressing packet .....	2 pkgs.

### PAINT AND FINISH

Prior to application of finish coats to school bus body, metal surfaces shall be cleaned of grease, foreign matter, excessive body caulking and sealing materials and treated as needed for proper paint adhesion. Two (2) coats of national school bus yellow, should be applied for total dry thickness of 2 mils over metal surface. Trim, lettering and bumpers shall be black. (See requirements for metal preparation under Structural Design.) Lead-free paint shall be used on all interior and exterior surfaces of body which are painted by the body manufacturer.

### LETTERING AND TRIM

Letters and trim on three (3) rub rails below belt-line shall be black (except for stop sign). Letters of words SCHOOL BUS on top front and rear section of bus body shall be eight (8) inches high and correspond to Series B, Standard Alphabet. (See National Standards.) (Name of District) DISTRICT SCHOOLS, on each side of bus body at belt-line shall be in four (4) inch minimum letters. Numbers to be furnished by county shall be in four (4) inch minimum height and on each side and on rear of bus body. EMERGENCY DOOR shall be in two (2) inch letters at top or directly above door, visible inside and outside of bus. Lettering to indicate fuel type shall be located adjacent to fuel filler opening.

Stop signal arm shall have red background with a reflectorized white border and the letters STOP shall be in six (6) inch white reflectorized letters.

### MOUNTING OF BODY

Body shall be assembled in body company's standard production facilities. Body shall be securely attached to each chassis side rail. All attaching bolts shall not be less than 7/16 inch in diameter with S.A.E. threads. Nuts shall be secured with lock washers.

### BATTERY ACCESSIBILITY

Body manufacturer shall provide easy accessibility for maintenance of both batteries on diesel-equipped chassis.

## **PART B**

### **Body Specifications for 16 Capacity Type "A" Buses with Single Rear Wheels**

#### **STRUCTURAL DESIGN**

Construction shall be of prime commercial quality steel or material with strength equivalent to steel. Modifications and additions in construction of the completed unit shall conform with any specifications prescribed by the chassis manufacturer regarding gross axle weight ratings (GAWR), overall gross vehicle weight (GVW), or other areas in which Federal Standards and certification requirements may apply.

#### **FEDERAL STANDARDS**

Completed bus must meet all applicable Federal Motor Vehicle Safety Standards (F.M.V.S.S.), including F.M.V.S.S. 220 for school bus rollover protection.

#### **HEIGHT OF INTERIOR**

Interior height from the floor to the ceiling shall be a minimum of 60 inches.

#### **FLOOR AND FLOOR COVERING**

Floor design shall provide adequate and firm support for seat legs and shall have a minimum of one-half inch exterior grade plywood securely attached to the floor.

The floor covering of underseat area, driver's compartment, and aisle between the passenger seats shall be covered with fire resistant rubber or approved equal, applied to a leveled floor surface. Landing area at top of step shall be ribbed rubber which shall extend to and join the ribbed aisle cover at an angle and its leading edge shall be white or a light color (curbed fillets excepted).

#### **MIRRORS**

1. Interior rear-view mirror shall be a minimum of 50 square inches.
2. Right and left exterior rear-view mirrors shall be a minimum of 50 square inches each.
3. The vehicle shall be equipped with two 8-inch convex crossview mirrors mounted on left and right corner below windshield base to give driver view of pupils crossing in front of bus. Also two convex mirrors with a minimum of 7½ inches diameter shall be mounted to a firm support bracket of right and left cross-view mirrors to give driver view of students on both sides of the bus.

#### **PANELING, INTERIOR**

Interior roof and wall panels shall be lined and free of sharp projections likely to cause injury to pupils.

## WINDOWS AND GLAZING

There shall be a minimum of four split-sash school bus type windows on each side of bus. Window glass, except windshield, shall be safety glass, AS-2 or better grade.

## SEATING

1. School bus type seats, forward facing shall be provided and installed to provide a minimum of 12-inch aisle. Seat frames and seat backs above cushion level shall be padded with energy absorbing materials. Seating must meet requirements of F.M.V.S.S. 222.

Seats, seat back cushions, and crash barriers shall be covered with a material having 42-ounce finished weight, 54-inch width, and finished vinyl coating of 1.06 broken twill or other material with equal tensile strength, tear strength, seam strength, adhesion strength, resistance to abrasion, resistance to cold and flex separation. Padding and covering on all seats shall be of material that will not flash or explode upon contact with spark or open fire. When welt is not used, all seams shall be double-sewn.

2. Chassis manufacturer's standard driver's seat is acceptable. Driver's seat belt assembly shall meet all applicable F.M.V.S.S. for school buses under 10,000 G.V.W.

## PAINTING

- A. Body outside shall be painted school bus yellow.
- B. Guard rails shall be either painted black or have black profile stripe.
- C. Lead-free paint shall be used on all interior and exterior surfaces of body which are painted by the body manufacturer.

## LETTERING

All lettering shall be black as follows:

- A. **(Name of District) DISTRICT SCHOOLS**, each side minimum 4-inch letters.
- B. **"EMERGENCY DOOR,"** 2-inch black letters inside and outside at or near top of emergency door.
- C. **BUS NUMBER** (to be furnished by purchaser) front, rear and each side of bus--minimum 4 inches.
- D. **"SCHOOL BUS,"** 8-inch letters front and rear roof caps, Series B, Standard Alphabet (See National Standards).
- E. Stop Arm Lettering, see "Stop Arm Signal," this part.
- F. Lettering to indicate fuel type shall be located adjacent to fuel filler.

## UNDERCOATING

The entire underside of body and front fenders shall be undercoated with fire resistant undercoating material applied by spray method. Any undercoating material used shall be asbestos free.

## WIRING

Wiring shall meet S.A.E. requirements. Additionally, for all school bus body optional electronic components installed on the bus, the body manufacturer shall provide each district purchasing one or more such items with at least one comprehensive parts and repair manual.

## STEP WELL LAMP

Step well light shall illuminate the bus entrance and be adequately protected. It shall be activated automatically when the door is opened and clearance lights are on.

## STOP ARM SIGNAL

There shall be installed on left outside of body an approved octagonal design air, vacuum, or electrically actuated stop-signal arm, equipped with two double face flashing lights for signaling a pupil stop. Bodies to be mounted on diesel chassis shall be equipped with an electrically actuated stop arm. Light lens of stop arm shall be RED. (For controls, see "Pupil Warning Lights and Stop Arm System Controls and Operation" in this part.) Vacuum or air lines, if used, must not be readily accessible to students inside or outside the vehicle. Vacuum lines must be made of copper, steel or nonmetallic materials meeting S.A.E. Standard J848d, and fittings shall be brass. Stop signal arm shall meet the applicable requirements of S.A.E. J1133. Stop signal arm shall have red background with a reflectorized white border and the letters STOP shall be in six (6) inch white reflectorized letters.

**NOTE:** Body manufacturer utilizing an engine manifold vacuum source to power the stop arm, must install a 1000 cu.in. vacuum tank with appropriate check valve to actuate the stop arm.

## SERVICE DOOR CONTROL

The right front door across the vehicle from the driver's position shall be secured by an over-center locking-type device controlled by the driver. School bus service door control and rod shall be chromium-plated or epoxy-coated.

## EMERGENCY DOOR

The emergency door shall be located at rear of vehicle with door control both inside and outside of vehicle. The door shall be equipped with an audible signal mounted so as to warn the driver if the door control is released while the ignition switch is in the "ON" position. Signal shall meet requirements of F.M.V.S.S. 217. Emergency door shall have at least one window to give driver a view of area behind bus through inside rear view mirror. The emergency door window(s) shall be non-opening type. For lettering requirements, see "LETTERING," in this part.

## LOCKUP DEVICES

Any emergency door equipped with a locking device shall have an ignition interlock which prevents starting the engine when the door is locked and shall meet requirements of F.M.V.S.S. 217.

## PUPIL WARNING LAMPS

Minimum lamp requirements shall be dual, mounted side by side on all corners of bus roof. Mounting shall be as high as practical on top and as near outer edge of bus as curvature permits. Lamps shall be

securely mounted in a shroud including hood extending out a minimum of 2½ inches. Housings shall be galvanized or made rust resistant in an approved manner. Black background 1½ inches to three (3) inches wide shall be painted around lights. Lamps shall be par 46, 5.7 inches diameter of sealed beam type, which may be composed of a sealed unit with a plastic lens. Lamps installed on outside shall be red; inner, amber. Lamps shall have aiming pads and meet latest S.A.E. requirements for school bus flashing warning lamps, including 5 degrees up, 10 degrees down, 30 degrees right and 30 degrees left. Lamps shall be clearly visible in bright sunlight for a minimum of 500 feet.

**PUPIL WARNING LIGHTS AND STOP ARM SYSTEM CONTROLS AND OPERATIONS**

- A. System must be equipped with the following driver actuated controls:
1. Master switch - provides means for deactivating entire system, as would be required when opening the door at a railroad grade crossing.
  2. Control switch - three positions: **OFF, AMBER,** and **RED.** Switch may be rocker, pull-type or other switch providing three positions.
  3. Service door - actuated switch.
- B. Controls must provide for the following combinations of switch positions and conditions of stop arm, stop arm light, and warning lights as indicated on the chart below.

**NOTE:** System may not be designed in such a way that the operator is required to actuate controls in a particular sequence to achieve the desired combination of conditions.

**EXAMPLE:** If the driver places the three-position switch in the amber position, with the master switch "ON" it must not be required that the three-position switch be moved to "RED" or that the service door be opened, in order to de-activate the "AMBERS". In this example, the driver must be able to de-activate "AMBERS" by going directly from the AMBER to the OFF position.

**WITH MASTER SWITCH, CONTROL SWITCH, and SERVICE DOOR IN THE FOLLOWING POSITIONS:**

**CONDITION OF STOP ARM(S), STOP ARM LIGHTS, AMBER WARNING LIGHTS AND RED WARNING LIGHTS MUST BE:**

COMBINATION	MASTER SWITCH POSITION (ON or OFF)	CONTROL SWITCH POSITION (three-position: OFF, AMBER, OR RED)	SERVICE DOOR POSITION	COMBINATION	STOP ARM, STOP ARM LIGHTS	AMBER WARNING and PILOT LIGHTS	RED WARNING and PILOT LIGHTS
1	ON	OFF	CLOSED	1	RETRACTED, OFF	OFF	OFF
2	ON	OFF	OPEN	2	RETRACTED, OFF	OFF	ON
3	ON	AMBER	CLOSED	3	RETRACTED, OFF	ON	OFF
4	ON	AMBER	OPEN	4	RETRACTED, OFF	OFF	ON
5	ON	RED	CLOSED	5	EXTENDED, ON	OFF	ON
6	ON	RED	OPEN	6	EXTENDED, ON	OFF	ON
7	OFF	ANY POSITION	ANY POSITION	7	RETRACTED, OFF	OFF	OFF

**FIRE EXTINGUISHER**

- A. A dry chemical-type fire extinguisher with gauge and designed to restrain tampering shall be mounted in a place accessible to driver, preferably near service door.
- B. Fire extinguisher shall bear label of Underwriters' Laboratories, Inc. showing rating of not less than 2A-10BC.

**EMERGENCY ROADSIDE REFLECTORS**

The vehicle shall be equipped with warning devices meeting F.M.V.S.S. 125.

**FIRST-AID KIT**

1. Bus shall carry Grade A, moisture and dust proof, first-aid kit with clear cover, mounted in such a manner that it can be easily detached and made portable and in an accessible place in driver's compartment.

2. Number of units and contents shall be as follows:

1-inch bandage compress (e.g., Band-Aids)	.....	2 pkgs.
40-inch triangular bandage with two safety pins	.....	1 pkg.
4" x 4" sterile gauze pads	.....	6 pkgs. of 2 each
2-inch rolled curlex bandage each in length	.....	2 rolls six feet
1-inch roll adhesive tape in length	.....	1 roll 2½ yards
Eye dressing packet	.....	2 pkgs.

**RUB RAILS**

Rub rails shall be applied on each side of bus. Upper rub rail shall be located at seat cushion level and extend from front edge of front door and service door to each rear corner of bus, installed in sections to permit operation of doors. Lower rub rail shall be located at floor level and shall cover the same longitudinal area as upper guard rail, except wheelhousings. Rub rails shall be a minimum of 4 inches wide, shall be of 16 gauge steel formed to provide maximum strength and shall be fastened with bolts, rivets or huck bolts at each body member transversed and to outside body skin minimum of two fasteners per foot of rub rail. Upper edge of rub rails shall be sealed to prevent water from entering behind rails and lower edge shall be vented minimum once each two feet.

**LICENSE HOLDER**

License holder shall be manufacturer's standard.

**SUN SHIELD**

Sun visor or shield shall be manufacturer's standard.

**TWO-WAY RADIO**

Use of a school district-approved two-way radio communications system is acceptable.

**BATTERY ACCESSIBILITY**

Body manufacturer shall provide easy accessibility for maintenance of both batteries on diesel-equipped chassis.



**PART C**  
**OPTIONAL BODY EQUIPMENT SPECIFICATIONS,**  
**FOR 18 AND 19 CAPACITY TYPE "A" BUSES**

1. AM/FM Radio:

Shall have two speakers, one flush mounted in passenger compartment and one in driver compartment. See page 66 for parts manual requirements for optional components.

2. Tinted Glass:

Option for tinted glass which provides maximum tinting allowed by Federal and A.N.S.I. standards for the windshield, driver's side window, and service door glass and which also includes tinted glass in all windows rear of driver's compartment with a light transmission of approximately 28 percent.

3. White-Painted Roof:

Option for white painted roof on all types of buses to comply with applicable Federal Standards and National Minimum Standards. White paint shall cover roof but may not extend beyond drip rail on side of vehicle; front and rear caps must remain yellow. Shall be polyurethane enamel or equivalent paint. Paint used to meet the requirements of this option shall be lead-free.

4. ECB Grab Rail:

An approved optional grab rail for aides mounted over the wheelchair positions on all Type "A" ECB's. Grab rail shall be of the same material as required for the service entrance grab handle and shall be located on the ceiling longitudinally, approximately the length of the wheelchair positions, and at least 12 inches from the longitudinal centerline of the bus. The grab rail shall be securely mounted and the wording "FOR DRIVER OR AIDE ONLY" shall be located adjacent to it.

5. Pupil Crossing Arm:

An approved crossing control arm to be actuated by the driver. The arm shall pivot out from the right side of the front bumper to prevent students from walking immediately in front of the bus. The crossing control arm shall operate in conjunction with the stop arm and shall not be equipped with a light.

6. Polyurethane Enamel Paint:

Approved option for National School Bus Yellow polyurethane enamel or approved equivalent paint on exterior of body and chassis already required by these specifications to be painted National School Bus Yellow.

7. Thermal Insulation Package:

Optional thermal insulation package shall include full insulation of ceiling and walls, front, and rear of bus, including body bows of 19 capacity bus. Insulation material must be fire resistant and of a type that will not harbor dampness and must be approved by Underwriter's Laboratories, Inc.



**SECTION VI**  
**BODY SPECIFICATIONS**  
**EXCEPTIONAL CHILD BUSES**  
**TYPES "A," "B," "C" AND "D" BUSES**



**MINIMUM BODY SPECIFICATIONS, EXCEPTIONAL CHILD BUSES  
TYPE "A," "B," "C" and "D"**

**GENERAL REQUIREMENTS FOR EXCEPTIONAL CHILD BUSES**

Exceptional child bus body structure and equipment shall conform to the regular bus body specifications in Sections III and V and must meet the additional requirements of this section (listed below) regarding modifications necessary for installation of special equipment; provided that for 47 and 59 capacity Type "C" the front body section may be approximately 35 inches, or at the option of the builder, a section approximately 9 inches wide may be installed as an addition to the standard 27-inch section as needed to provide the specified wheelchair space. Proper bracing shall be added as specified in the body standards.

Any school bus purchased for the transportation of physically handicapped children shall be equipped with a wheelchair lift. The lift shall be located on right side of the body and in no way attached to the exterior but confined within the perimeter of the standard school bus body other than attaching hardware.

**SPECIAL EQUIPMENT**

**DOOR AND OPENING FOR LIFT**

1. There shall be an enclosed service opening located on the right side of the bus. If it is located forward of the rear wheels it shall be located away from the regular service entrance so any fully opened, forward-mounted door will not obstruct the conventional service entrance. Minimum clear opening shall be 33 inches for lift.
2. Door posts, headers and floor sections around this special opening shall be reinforced to provide strength and support equivalent to adjacent side wall and floor construction of an unaltered model.
3. A drip molding shall be installed above opening so as to effectively spill water from entrance.
4. A single door may be used for enclosing an opening that is not more than 40 inches wide. Sliding doors are not acceptable.
5. Lift openings more than 40 inches wide shall be enclosed by two doors of equal width.
6. All doors must open outwardly.
7. If body opening extends through body skirt, doors shall extend to bottom of body skirt.
8. All doors shall be weather sealed and so constructed that a flange on the forward door overlaps the edge of rear post or door when closed. Design shall provide positive means of holding door, or doors, in open position during lift operation. Friction type catches are not acceptable.
9. When manually operated dual doors are provided, rear door shall have at least a one-point fastening arrangement to header. The forward mounted door shall have at least three-point fastening devices. One shall be to the header, one to the floor line of the body, and the other shall be into the rear door. These locking devices shall afford maximum safety when doors are in the closed position. Doors shall be hinged to body side using a heavy-duty piano-type hinge fitted with brass pin or approved equal. When single door is used, locking device shall meet requirements for emergency door lock.

10. Door materials, panels, and structural strength shall be equivalent to the conventional service and emergency doors. Color, rub rail extensions, lettering, and other exterior features shall match adjacent sections of the body.
11. Each door shall have a glass window set in rubber compatible with and set to the lower line of adjacent sash.
12. Doors shall be equipped with a device that will actuate a visible signal located in the driver's compartment when not securely closed.

### WHEELCHAIR LIFT

1. Unit or lift must be of a standard made by a nationally known manufacturer and approved by the Department of Education. Lifting mechanism shall have a minimum capacity of 700 lbs. Lift may be of through-the-floor design or fold-out type that operates outside the bus body. Power unit shall be an electro-hydraulic, self-contained motor pump dual cylinder valve and reservoir unit or approved equal. Lifting cylinders shall have honed surfaces. The piston rods shall be ground, polished and chrome-plated. All hydraulic oil hoses must conform to or be better than S.A.E. Specification 100-R3. Hose fittings and metal hydraulic lines shall be made of material other than galvanized pipe. When the drive motor and hydraulic pump are located inside the bus, they shall be installed in such a manner so as not to interfere with the movement of wheelchairs through the bus aisle. The unit shall be enclosed to prevent transported students from coming in contact with it and shall be readily accessible to service personnel for routine service and for maintenance. When hydraulic pump and drive motor are installed below the floor level, they shall be enclosed in a box accessible through a door installed in the body skirt. Wheelchair lifts must be equipped with an electric motor for the hydraulic pump having a duty cycle rating of 1:1.
2. A power-up, power-down and a power-up, gravity down lift shall be made available based on local district needs on all type wheelchair-lift equipped bodies. The lift platform shall provide for a manual operating system as a backup in the event of an electrical or hydraulic failure. When the lift platform is in the fully up position, it shall be locked in position mechanically by means other than a support, or lug, on the door. The lift mechanism shall be equipped with adjustable limit switches and/or bypass valves to prevent excessive pressure from building in the hydraulic system when the platform reaches the full up position or the ground. The lift travel shall be vertical. A swing arm design that travels in an arc is not acceptable. Fold-out type lift shall provide for power fold-out and fold-up for storage.
3. Lift platform shall conform to door and floor opening and be a minimum of 30-inches usable width. All edges of platform shall be designed to restrain wheelchairs and operator's feet from becoming entangled during raising and lowering process. Additionally, automatic safety barrier on outside edge of the lift platform is required to restrain the wheelchair in any lift position other than fully extended to ground. Platform ends of through-the-floor type lifts shall be fitted with full-width shields which extend above floor when lift platform is in lowered position.

**NOTE:** Hand rails on fold-out type lifts are an approved item from manufacturer.

4. Platform floor surface is to be covered with smooth-surfaced rubber, 1/8- inch minimum thickness, RCA or approved equal, except fold-out type lift may have platform made of expanded metal. Edges of through-the-floor platform and adjacent floor shall be properly finished and all seams covered with molding as required for bus floor. Flexible seals designed to keep dirt, water and fumes out, when in a locked position, shall be installed along platform edges.

5. For all Type "B", "C" and front-engine Type "D" E.C.B.'s, location of the wheelchair lift shall be either in front of or behind the rear wheels where possible to be specified for individual units based on district needs.
6. On buses that contain through-the-floor type lifts adjacent under-floor areas shall be closed off on three sides with properly designed shields when platform is in lowered position.
7. Through-the-floor type lift shall have a self-adjusting, non-skid metal ramp of a width to minimize incline to lift platform and of sufficient strength to support the front wheels of a wheelchair with student. Control over lowering and placement of ramp shall be convenient to attendant when standing on platform.
8. Positioning of power lift unit shall be controlled by push-button type switch mounted within bus and adjacent to lift, convenient to attendant when standing upon lift platform and when the lift is in any position. An actuating switch shall be installed in the circuit so that the lift mechanism will not operate when the lift platform doors are closed.
9. With the exception of floor molding, no metal screws are to be used in fabrication of platform assembly.
10. Fold-out type lifts must be installed so that portion of main stanchion assembly(ies) or bracket(s) are secured to body sidewall by means of through- the-body, minimum 5/16 inches diameter, corrosion resistant steel grade 8 bolts and self-locking, corrosion resistant nuts (two bolts per stanchion assembly required).
11. The main electrical supply to the lift must be controlled by a master switch accessible to the driver rather than by the ignition switch. A circuit breaker is required in the main electrical feed line to protect the lift from power overload. Body manufacturer shall install 2/0 electrical cable for the main power source to the lift to ensure a minimum voltage drop.
12. An automatic safety barrier is required on outside edge of lift platforms, which would restrain the wheelchair in any lift position other than fully extended to ground.

#### MODESTY PANELS, STANCHIONS AND CHAIN

1. Units with through-the-floor lift shall have heavy-duty padded panels extending above floor level on both fore and aft sides of the special service opening to prevent students from falling in the lift opening when the lift is lowered. The width of the panels shall be equal to the depth of floor opening. A covered chain shall be fastened to rear panel with hook and eye for attachment to forward panel.
2. Fold-out type lift shall have padded panel to protect students if they are thrown forward against lift in raised and stored position.
3. There shall be a padded barrier approximately 8 inches in front of the forward edge of the seat cushion of all passenger seats that do not have another seat approximately 27 inches in front of them.

#### WHEELCHAIR SECUREMENT SYSTEM

An approved four-point wheelchair securement system equivalent to Aeroquip Series A/E is required. System shall be equipped with four nylon strap assemblies of a minimum 2,500 pound combined total pull strength per assembly. Each strap shall be fitted with a captivated D-Ring assembly on one end and a spring lock-type end fitting on the other. Two straps per wheelchair position must be equipped with a cam-type adjusting buckle and two straps per wheelchair position must be equipped with a ratcheting adjuster. In original installations, two one-piece multi- position tracks shall be installed

longitudinally in the bus the full length of the wheelchair position(s) (see NOTE). One track shall be horizontally mounted to the body wall above the seat rail but not exceeding 24 inches in height from the floor, with an emphasis on securing the track to top flange of seat rail and body bows whenever possible. One track shall be mounted longitudinally adjacent to the center aisle on the floor. Tracks shall be mounted so that each strap securement point is capable of withstanding a minimum pulling force of 2,500 pounds on the strap without pulling the strap securement or track away from the floor or body wall. Track may not be mounted using lag bolts or sheet metal screws.

**NOTE:** Track segments joined by a continuous bead weld are considered to be one-piece. Wheelchair positions installed in the field must have one-piece track segments installed longitudinally the length of the newly installed wheelchair position(s).

**NOTE:** There shall be an approved option on all exceptional child buses for a wheelchair securement system utilizing Aeroquip Series G-track or approved equal. System shall meet all other requirements of standard wheelchair securement system.

When wheelchairs are in their locked position, they may not be in a position that would block the movement of an aide up or down the aisle of the bus.

### **PASSENGER RESTRAINING DEVICES**

1. Seat frames shall be equipped with rings or other devices, three per seat, to which restraining devices may be attached.
2. When restrainers are specified, each seat shall be equipped with two individual sets.

### **AISLE**

The aisle leading from the wheelchair position to the emergency door shall be wide enough to allow a wheelchair to be moved between the two rows of seats in the event an emergency evacuation of the bus is necessary. The minimum required aisle width is 30 inches for buses with outside width of more than 90 inches and 28 inches for buses with outside width of 90 inches or less. Thirty-nine inch seats are acceptable forward of the wheelchair positions.

### **LIGHT AT LIFT DOOR**

A light, shall be placed inside the bus, over the special service door, and shall be operated from door area.

### **SERVICE DOOR (REGULAR) ENTRANCE**

1. Stainless grab rails shall be provided on each side of this entrance and shall be placed in such a manner as to afford easy accessibility to small children entering or leaving the bus. Exception: 16 capacity and 19 capacity Type "A" require only one grab rail.
2. When in open position, service doors shall not obscure any portion of grab rails.
3. On buses of 35 capacity shell or larger (except bodies on Chevrolet/GMC P-series type chassis), there shall be three (3) step risers of equal height in the entranceway, placing the first landing approximately 12 inches above ground level, and otherwise meeting all requirements listed for regular type school buses. Each step must be the full width of the stepwell at the point where the step is located. Half-steps or partial steps are not acceptable.



## **SEATING ARRANGEMENTS**

Flexibility in seating and spacing to accommodate special devices shall be permitted due to the constant changing of passenger requirements.

**NOTE:** Because of the wide variation in type, size, construction and design of wheelchair lifts and wheelchair locking positions, the Department of Education reserves the right to inspect any wheelchair lift bus offered for sale to Florida district school boards and to reject any unit found to be unsafe, inadequate or not suitable for use in transportation of physically handicapped students.

## **UNIVERSAL HANDICAPPED SYMBOL FOR BUSES EQUIPPED WITH WHEELCHAIR LIFTS:**

All buses with wheelchair lifts shall have two universal handicapped stickers. Each sticker shall be reflective white on blue, minimum 6" x 6" displaying the universally recognized symbol for vehicles transporting the handicapped. One shall be located on the left (driver's) side of the front bumper and the other one at the center of the rear emergency door immediately below the upper emergency door glass on a 19-passenger Type "A", all Type "B", "C" and front-engine Type "D" buses. Rear stickers shall be located below the emergency window on Type "D" pushers, or on one of the rear doors on the 16-passenger Type "A" buses.



**SECTION VII**  
**AIR CONDITIONING SPECIFICATIONS**  
**TYPES "A," "B," "C" AND "D" BUSES**



## SCHOOL BUS AIR CONDITIONING SPECIFICATIONS TYPES "A," "B," "C" AND "D" BUSES

The following specifications are applicable to all types of Florida school buses equipped with air conditioning. This section is divided into three parts. Part I covers Performance Specifications applicable to all buses. Part II covers specific Equipment Requirements for both smaller buses (Part A) and larger buses (Part B). Part III covers other requirements applicable to all buses.

### I. Performance Specifications (Applicable to all Type "A", "B", "C" and "D" Buses)

The installed air conditioning system shall cool the interior of the bus to 80 degrees Fahrenheit measured at a minimum of three points, located four feet above the floor at the longitudinal centerline of the bus. The three points shall be 1) near the driver's location, 2) at the mid point of the body, and, 3) two feet forward of the emergency door, or, for Type "D" rear engine buses, two feet forward of the end of the aisle.

The test conditions under which the above performance must be achieved shall consist of 1) placing the bus in a room (such as a paint booth) where ambient temperature can be maintained at 100 degrees Fahrenheit, 2) heat soaking the bus at 100 degrees Fahrenheit with windows open for at least one hour, and 3) closing windows, turning on the air conditioner and cooling the interior of the bus to 80 degrees plus or minus two degrees Fahrenheit within a maximum of 30 minutes while maintaining 100 degrees Fahrenheit outside temperature.

The manufacturer shall provide facilities for Department of Education personnel and/or a purchasing school district representative to confirm that a pilot model of each bus design meets the above performance requirements.

### II. Equipment Requirements

- A. This part is applicable to Type "A" (all), "B" (28-30 capacity on modified forward control conventional chassis and 22-36 capacity on GMC/Chevrolet P-type chassis), and 29 capacity Type "C" buses. See Part II. B., pages 91-94 for equipment requirements applicable to larger buses.

Note: 28-30 capacity Type "B" buses on modified forward control conventional chassis and 29 capacity Type "C" buses may alternately meet the requirements applicable to larger Type "B", "C" and "D" buses. See part B (pages 91-94) for those requirements.

1. Power Source and Compressor(s):
  - a. Compressor(s) shall be chassis engine-driven.
  - b. During air conditioning operation, chassis engine idle speed may, if necessary, be stepped up not to exceed 200 r.p.m over engine manufacturer's recommended idle speed to control engine temperature and to provide that system meets minimum performance specifications for maintaining the interior temperature of the bus.
  - c. System shall be equipped with both a high pressure and a low pressure switch to prevent compressor operation when system pressures are above or below recommended and safe levels.
  - d. Compressor size and other aspects are not specified, since bus shall meet performance requirements outlined previously.

2. Condenser(s)

- a. Condenser(s) shall be equipped with copper coils and aluminum or copper fins, except that any aluminum-coiled condenser provided by chassis manufacturer is acceptable.
- b. System shall be equipped with a sight glass which is accessible and directly visible for checking the level of the refrigerant.
- c. Condenser(s) shall be rubber mounted or otherwise mounted so as to isolate condenser(s) from vibration or excessive road shock.

3. Evaporators and Ducting

- a. Type "A" buses shall be equipped as follows:
  - 1) Minimum of two evaporators required (one front and one rear). Rear unit shall be ceiling or bulkhead mounted above emergency exit.
  - 2) Rear ceiling or bulkhead mounted evaporator shall provide that air blows forward; front evaporator shall blow toward rear.
  - 3) Evaporator cases and/or ducting systems shall be equipped with diffusers which are adjustable horizontally and vertically.
- b. Type "B" (22-36 capacity on Chevrolet/GMC P-type chassis and 28-30 capacity modified forward control on conventional chassis) and 29 capacity Type "C" buses shall have ducting to allow the direction and intensity of air flow to be controlled at each seat position (including wheelchair spaces).
- c. For all Type "A", "B", and "C" buses covered under this section:
  - 1) Evaporator cases, lines and ducting (as equipped) shall be designed such that all condensation is effectively drained to the exterior of the bus below floor level under all conditions of vehicle movement without leakage on any interior portion of bus.
  - 2) Any evaporator or ducting system shall be designed and installed so as to be free of injury-prone projections or sharp edges. Installation shall not reduce compliance with any Federal Motor Vehicle Safety Standard (FMVSS) applicable to the standard bus, including FMVSS's 217, 220, 221, and 222.
  - 3) Any evaporators used must be copper cored (aluminum or copper fins acceptable), except that front evaporator, if provided by Type "A" chassis manufacturer, may be aluminum cored.
  - 4) Air intake for any evaporator assembly(ies) except for front evaporator of Type A shall be equipped with replaceable air filter(s) accessible without disassembly of evaporator case.

4. Controls, Wiring, Hoses, and Miscellaneous Hardware

- a. All system operating controls, including on-off switch(es), blower switch(es) and thermostat control(s), shall be accessible to driver in seated position.
- b. Blowers shall be a minimum of two speeds.

- c. Wiring shall be copper with color-coded insulation and shall be in a loom.
- d. System shall be equipped with at least one manually resettable circuit breaker to provide overload protection for the main power circuit feeding the evaporator blowers, condenser fans, etc.; system control circuits shall also have overload protection, but may be fused.
- e. All wiring, hoses, and lines shall be grommeted, routed, and supported so as to reduce wear resulting from heat, chafing, vibration, and other factors.
- f. All flexible refrigerant hoses shall be double-braided; all slip-on type hose-to-fitting connections shall be equipped with stainless steel hose clamps.
- g. The total system shall be thermostatically controlled at the driver's location.

5. Body and Insulation

- a. Body shall be fully insulated between interior and exterior paneling of ceiling, walls, front, and rear of bus, including body bows. Exception: Body bows of 16 capacity Type "A" need not be insulated.
- b. Floor shall be covered with minimum 1/2" exterior grade plywood.
- c. All glass (windshield, service and emergency doors, side and rear windows) shall be equipped with maximum tinting allowed by Federal or A.N.S.I. standards for the respective locations, except that windows rear of the driver's compartment shall have approximately 28% light transmission.
- d. Roof shall be painted white over an area between the roof caps and down to the top window line on each side. White paint shall be polyurethane enamel or approved equivalent.

B. This part is applicable to Type "B" (40-66 capacity Modified Forward Control, Ward Patriot-Type Bus) Type "C" (47-65 capacity), and all Type "D" Buses

NOTE: These specifications may be met for 28-30 capacity Type "B" buses on modified forward control conventional chassis and 29 capacity Type "C" buses as an alternative to previous specifications.

1. Power Source and Compressor(s)

- a. Power source shall be an independent, self-contained unit which is skirt-mounted on the left side of the bus forward of the rear wheels. It shall meet the following requirements:
  - 1) Self-contained except for fuel tank, consisting of compressor(s) and an engine with battery (ies), and starting and charging system sufficient to supply all current demanded by air conditioning system.
  - 2) Rubber mounted within a supporting framework or otherwise isolated so as to reduce vibration and noise transmitted to chassis and body.
  - 3) Power unit must be mounted to allow sliding it out for access to serviceable components without disconnecting any hoses, lines, or other components.

- 4) Supporting framework shall support the weight of the power unit in its normal operating position by the chassis frame.
  - 5) Power unit shall be equipped with splash shields on the forward and rear sides of sufficient design to protect the power unit from environmental contamination. Splash shields shall be constructed of galvanized steel, aluminum, or other acceptable material resistant to corrosion in finished form.
  - 6) Power unit engine shall use same type of fuel as chassis engine and shall be supplied from the chassis fuel tank. Fuel system shall be equipped with at least one filter. Fuel system installation shall not reduce compliance of vehicle with FMVSS 301 on fuel system integrity.
  - 7) Power unit battery(ies) shall be mounted in a slide-out tray in body skirt. Standard body slide - out battery tray may be used for air conditioning power unit battery(ies).
  - 8) Power unit exhaust system shall be routed to left side of bus, with tail pipe ending approximately at body skirt and formed so as to direct exhaust 45 degrees down and to the rear.
  - 9) Power unit shall be equipped with a shut down system for its engine activated by low oil pressure and either high coolant temperature or, for air-cooled engines, high oil temperature.
  - 10) Power unit engine shall also be equipped with a dry- type air filter, a spin-on oil filter, and (if liquid- cooled) a closed cooling system with a translucent reservoir or a sight glass for coolant. Diesel-engined power units shall have primary and secondary fuel filters.
  - 11) Gasoline-powered units shall have electronic ignition and at least one fuel filter.
- b. Interior noise with air conditioner fully operational shall not exceed the maximum interior noise level of 90dBA established by the 1985 National Minimum Standards.
  - c. System shall be equipped with both a high pressure and a low pressure switch to prevent compressor operation when system pressures are above or below recommended and safe levels.
  - d. Compressor size and other aspects are not specified, since bus shall meet performance requirement outlined previously.

## 2. Condenser(s)

- a. Condenser(s) shall be skirt-mounted and shall be located forward of the rear wheels, when possible.
- b. Forward side of condenser assembly(ies) shall be protected by splash shield or mud guards shall be installed behind any wheels forward of it.
- c. Condenser assembly(ies) shall include: 1) copper-coiled condenser(s) with copper or aluminum fins, 2) permanent magnet, ball bearing, sealed motors for cooling fans, and, 3) case constructed of aluminum or other metal treated as specified for standard bus body sheet metal.



- d. System must be equipped with a sight glass (or at least one for each part of a split system) visible from outside the bus.

3. Evaporators and Ducting

- a. Ducting shall provide at least one diffuser per seat (and wheelchair position) to allow direction and intensity of air flow to be controlled at each seat location (including wheelchair spaces).
- b. Evaporator cases, lines, and ducting shall be designed such that all condensation is effectively drained to the exterior of bus below floor level under all conditions of vehicle movement, without leakage on any interior portion of bus.
- c. Any evaporator and ducting system shall be designed and installed so as to be free of injury-prone projections or sharp edges. Installation shall not reduce compliance with any Federal Motor Vehicle Safety Standard (FMVSS) applicable to standard bus, including FMVSS's 217, 220, 221 and 222.
- d. Any evaporator(s) shall be copper-cored with copper or aluminum fins.
- e. Air intake(s) for evaporator assembly(ies) must be equipped with replaceable air filter(s) accessible without disassembly of evaporator case(s).

4. Controls, Wiring, Hoses, and Miscellaneous Hardware

- a. Controls at the driver's position shall include gauges and/or warning lights to monitor:
  - 1) System voltage
  - 2) Oil pressure
  - 3) Oil temperature (air cooled) or coolant temperature
- b. Other controls at the driver's position shall include a remote starting device for the power unit, a remote electric choke control (for gasoline power units), the interior temperature thermostat(s), and a blower speed control providing a single control over all the evaporator blowers and a minimum of two speeds.
- c. Wiring shall be copper with color-coded insulation and shall be in a loom.
- d. System shall have a power unit engine starting device located at the power unit engine.
- e. System shall be equipped with at least one manually resettable circuit breaker to provide overload protection for the main power circuit feeding the evaporator blowers, condenser fans, etc.; system control circuits shall also have overload protection, but may be fused.
- f. All wiring, hoses, and lines shall be grommeted, routed, and supported so as to reduce wear resulting from heat, chafing, vibration, and other factors.
- g. System shall be equipped with a time delay or other positive means to prevent loading the power unit compressor(s) during starting.

- h. All flexible refrigerant hoses shall be double-braided; slip-on connections shall be equipped with stainless steel hose clamps.
  - i. Instruments or gauges located at the power unit shall be included to monitor system voltage, oil pressure, oil temperature (air cooled) or coolant temperature, and total hours of operation.
5. Body and Insulation
- a. Body shall be fully insulated between interior and exterior paneling of ceiling, walls, front, and rear of bus, including body bows.
  - b. Floor shall be covered with minimum 1/2" exterior grade plywood.
  - c. All glass (windshield, service and emergency doors, side and rear windows) shall be equipped with maximum tinting allowed by Federal or A.N.S.I. standards for the respective locations, except that windows rear of the driver's compartment shall have approximately 28% light transmission.
  - d. Roof shall be painted white over an area between the roof caps and down to the top window line on each side. White paint shall be polyurethane enamel or approved equivalent.

III. Other Requirements (Applicable to all Type "A", "B", "C", and "D" air-conditioned buses)

- A. Warranty - the total system shall be fully warranted for two years, including parts (excluding fluids and filters used in normal preventive maintenance) and labor with no warranty limitation on number of operating hours.
- B. Serviceability - all components requiring periodic servicing must be readily accessible for servicing, including, but not limited to, the following:
  - 1. Refrigerant service ports (high and low pressure).
  - 2. Sight glass(es) - must be directly visible.
  - 3. Receiver-dryer (as equipped) - accessible for servicing or replacement; must not use sweat-type fittings.
  - 4. Expansion valve(s).
  - 5. Drive belts - for replacement and adjustment.
  - 6. Power unit filters - oil, air, and fuel.
  - 7. Power unit oil drain and oil filler - oil filler and drain plug must be accessible for filling and draining oil conveniently.
  - 8. Power unit radiator (if equipped) - drain, filter, and reservoir accessible.
  - 9. System fuses and circuit breakers.
  - 10. Evaporator air filters - serviceable.
  - 11. Power unit fluid levels - must be able to be checked without sliding out engine.
  - 12. Power unit engine spark plugs, glow plugs, and/or injectors (as equipped).

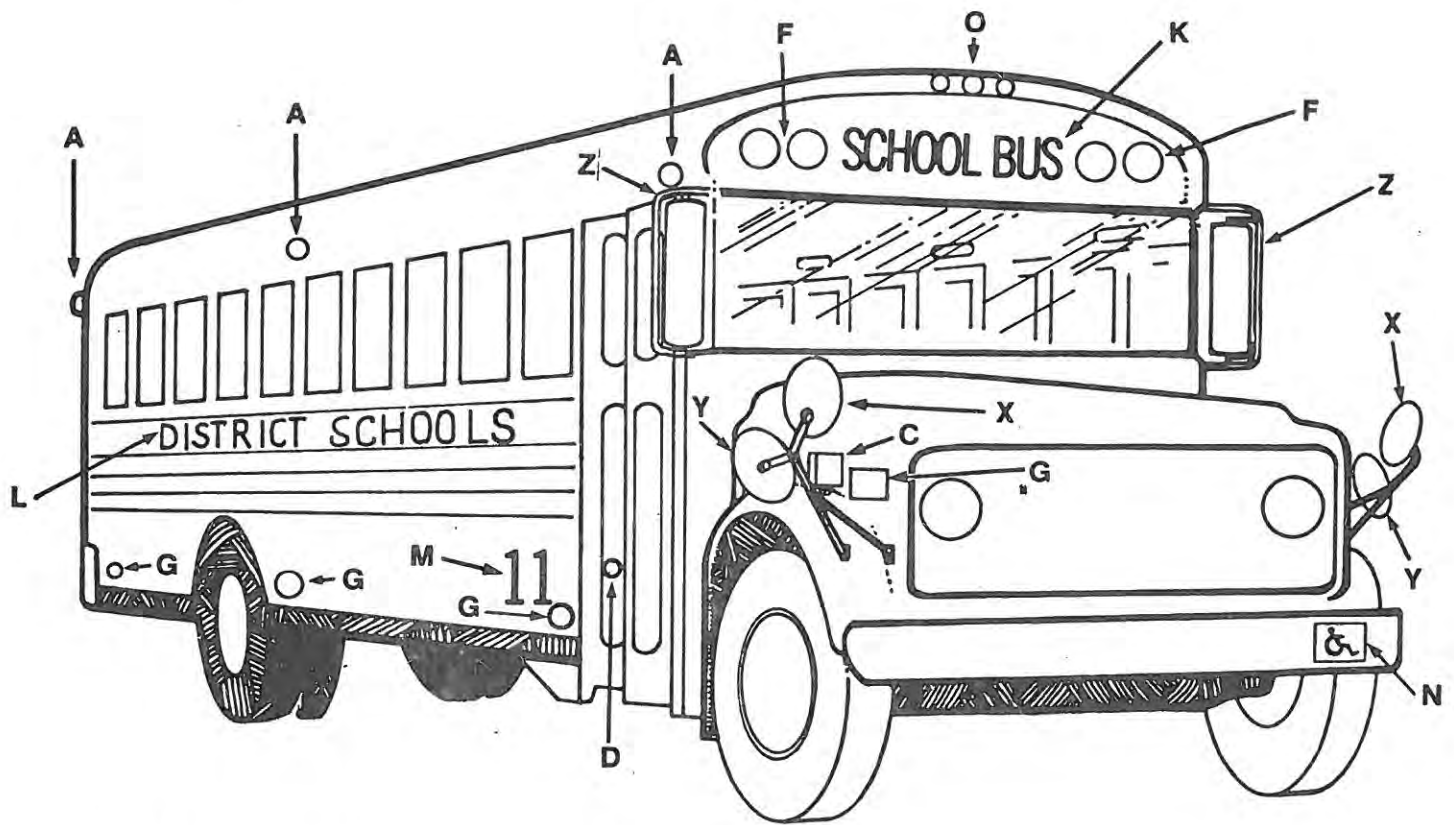
13. All major component serial numbers - must be readily visible.
- C. Parts and Service Manuals - shall be provided for entire system, including, but not limited to, compressor(s), self-contained power unit, wiring (includes wiring diagram) evaporators, condensers, controls, hoses and lines. Parts catalog shall include a price list and must be designed so that all replaceable parts are illustrated by line drawings and such parts are numbered on the illustration, with a part description on a separate list under the corresponding number. Part descriptions should be annotated appropriately with the part number, a proper description (part name), and the quantity required for the application illustrated on the drawings. Service manual shall include an overall A/C system diagram with component plumbing, locations, and identities indicated for diagnostic purposes.
- D. Parts and Tools Availability - all system parts and required special service tools must be readily available, and a list of suppliers shall be provided with each air conditioned bus delivered.
- E. Suspension Capacity and Ground Clearance - ground clearance at the lowest point of the air conditioning system shall be no less than the ground clearance of the bus at the step well. Any special chassis gross axle weight rating (GAWR) requirements required to maintain ground clearance or to insure adequate suspension capacity must be indicated by the body manufacturer for each configuration of air conditioned bus. Standard GAWR's are contained in the chassis sections of Florida School Bus Specifications; any of the above-mentioned special GAWR requirements for air conditioned buses must be provided to the Department of Education before bids on those buses will be considered.
- F. Installed air conditioning system shall not reduce compliance of the finished bus with any Federal Motor Vehicle Safety Standard including FMVSS's 217, 220, 221, 222, and 301.



**APPENDIX**

**OUTLINE OF MINIMUM LETTERING AND  
LIGHTING REQUIREMENTS FOR BOTH  
CONVENTIONAL AND TRANSIT BODIES**



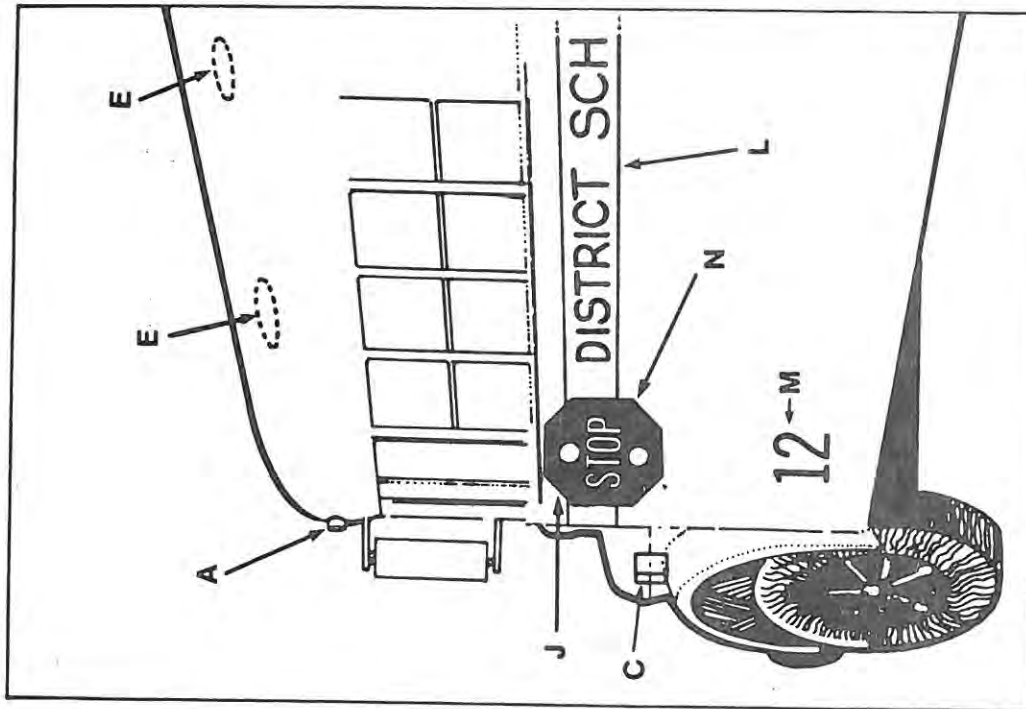


- A... Clearance lights
- C... Front directional signals (double-faced, fender-mounted)
- D... Stepwell light (located inside service door)
- E... Adequate interior lights (not shown)
- F... Warning lights--dual (side by side)
- G... Reflectors, one near front and one near side panel (one intermediate on 30 foot or larger)
- K... SCHOOL BUS--front and rear, 8-inch letters, Series B Standard Alphabet (see National Standards)
- L... NAME OF DISTRICT SCHOOLS--each side, belt line, 4-inch minimum letters
- M... NUMBER--To be furnished by county; 4-inch numbers on each side and rear
- N... (Universal Handicapped Symbol for lift buses)
- O... Identification lamps
- X... Cross-view mirrors
- Y... Convex side-view mirrors
- Z... External rear-view mirrors

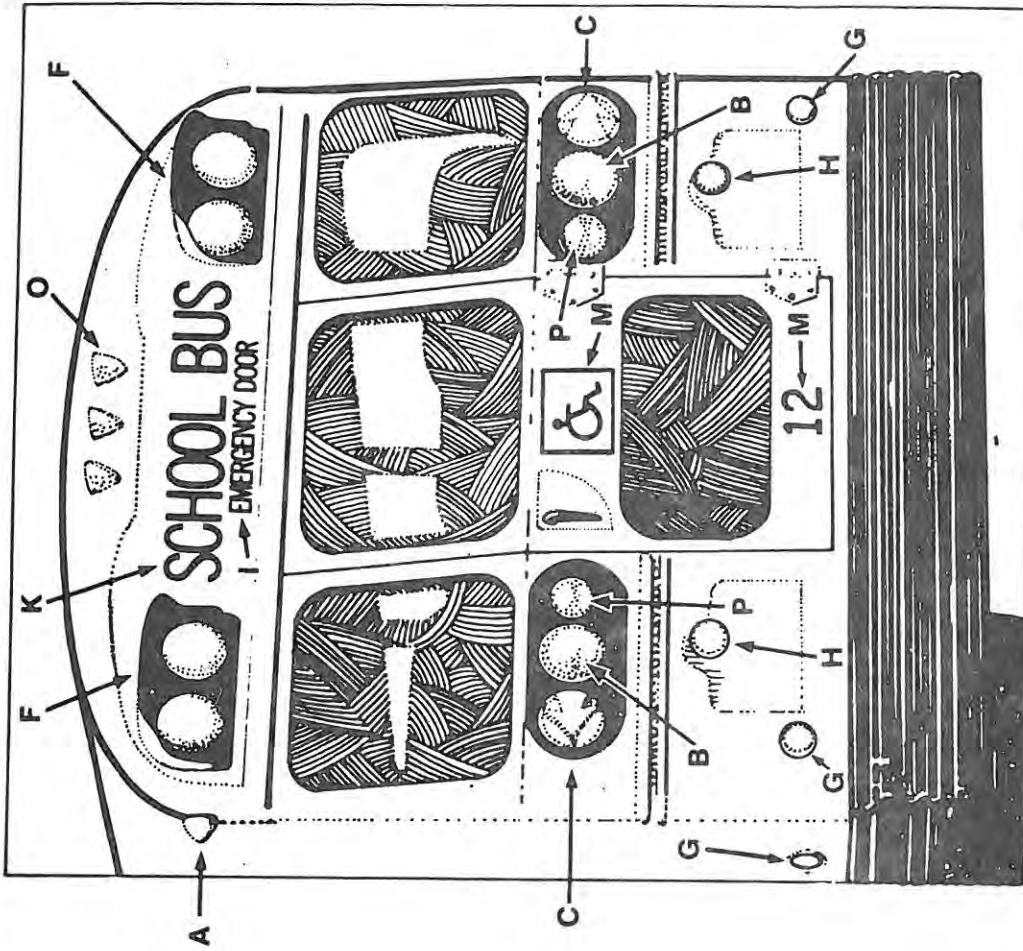
# MINIMUM LETTERING AND LIGHTING REQUIREMENTS







- A... Clearance lights
- B... (Two) combination brake/tail lamps
- C... Back directional signals (front double-faced, fender-mounted)
- E... Adequate interior lights
- F... Warning lights--dual (side by side)
- G... Reflectors (red)
- H... Two tail lamps (One lamp must illuminate license plate.)
- J... EMERGENCY DOOR--2-inch letters inside and outside at top or directly above door
- K... SCHOOL BUS--front and rear 8-inch letters, Series B Standard Alphabet (see National Standards)
- L... NAME OF DISTRICT SCHOOL--each side belt line, 4-inch minimum letters
- N... Vacuum or air-actuated octagonal stop arm, red background, 6-inch white reflective letters, border white reflective
- O... Identification lamps
- P... Back-up lights



- M... NUMBER--to be furnished by county; 4-inch numbers on each side and rear (Universal Handicapped Symbol for lift buses)
- N... Vacuum or air-actuated octagonal stop arm, red background, 6-inch white reflective letters, border white reflective
- O... Identification lamps
- P... Back-up lights

AmTran Pilot

~~First Aid kit Hold-down~~

~~Put feds on~~

~~De-fruster~~

Warning lights. Sequence ✓

Put tail seal on

Seat Belt

Get for Clark info. on ABS Grab/Handle

Wiring Diagram on Flusks. in each Bus -