

Appendix C1

Michigan's Model School Bus Maintenance Program

Introduction: No model school bus maintenance program exists in Michigan. In fact, research has found no model school bus maintenance program exists anywhere in the country. The standardization of the maintenance program for school buses is essential if we are to provide safe transportation services for the nation's most precious cargo, our school children.

Based on research, the program outlined below includes each of the components of a Model School Bus Maintenance Program, a brief description of each, some recommended performance measures and the accompanying performance levels. These components were formulated based on a comprehensive review of vehicle maintenance programs across the country. It is important to note, there currently exists no required maintenance program for school buses other than "follow manufacturer's recommendations." This lack of comprehensive school bus maintenance program and accompanying performance measures provides little direction to school bus fleet operations and, perhaps more importantly, does not provide adequate performances to adequately judge the condition of a school district's fleet. By establishing a model maintenance program, collecting the vehicle record information necessary to maintain school bus fleets, and by implementing performance measures for the maintenance program, fleet managers and school officials can better judge the condition of their fleet and make timely, data driven decisions resulting in improvements and a better maintained school bus fleet. A better maintained fleet for the entire delivery cycle of service is the desired outcome.

Components of a Model School Bus Maintenance Program:

1. **Safety Inspection:** An "in – house" school bus safety inspection program at a maximum of 36 workday intervals, 3,500 miles, or 300 gallons of fuel with prompt deficiency repair.
2. **Preventative Maintenance:** A lube, oil, and filter service interval consistent with the engine manufacturer recommendations and the vehicle equipment.
3. **Daily Trip Inspection:** A daily driver pre/post trip vehicle inspection program with maintenance write-ups when needed.
4. **Special Projects:** A special projects program to address planned service projects and correct detected deficiencies.
5. **Maintenance Records:** A vehicle maintenance records system permitting the ready access to each vehicle's maintenance information and a system that tracks maintenance costs by year of ownerships for the entire vehicle's service life.
6. **Repair Staff:** Highly trained, knowledgeable and certified mechanics and/or vehicle repair staff including the appropriate levels of staffing.

Safety Inspection:

1 The regular safety inspection of school buses by qualified staff is an essential element of any good school bus maintenance program.

In order for a school bus fleet to be well maintained all the time during its operation cycle, a regular safety inspection must take place at specified intervals. The fleet cannot exclusively use the driver pre/post trip inspection form to drive service. It is essential that the people charged with vehicle maintenance responsibilities drive the fleet maintenance level. The repair of the fleet must be mechanic driven. In order to accomplish this, a regular safety inspection program for school buses must be implemented. This inspection program checks every system and component on the bus, determines any deficiencies, and reduces the deficiencies to work orders for timely repair. Attached, please find the form used by the “in house” safety inspector to assess the condition of the bus on a 36 day, 3,500 mile, or 300 gallons of fuel used maximum cycle.

Mileage is also a factor in determining the inspection cycle. The 36 school day maximum cycles for the inspection is based on 15,000 to 18,000 miles per year annual mileage accumulation. This calculation assumes a mileage accumulation rate of 72 to 86 miles per day or 2,880 to 3,440 miles between inspection cycles. If mileage accumulation is higher, the inspection cycle should reflect the mileage accumulation rather than the 36 school day maximum.

Fuel consumption is also a method of determining inspection cycles. Approximately 300 gallons of fuel through the engine maximum should generate an inspection. Any of these inspection triggers can be used to consistently inspect the school bus fleet.

The 36-day/3,500 mile/300 gallons maximum cycle for the inspection cycle was chosen to serve as a starting point and was chosen primarily due to the need to adjust air brakes on a regular basis. **Please understand this is presented as a maximum.**

Performance Level (1-10):

Category: *Safety Inspection Cycle*

In order for a safety inspection to be considered “on-time” it must be conducted within 3 days of the 36-day cycle, not to exceed 500 miles of the 3,500-mile cycle, or not exceed 50 gallons of fuel used beyond the 300-gallon cycle.

- Level 1 = Vehicle repair operation does not adopt the 36 day/3,500 mile/300 gallons “in house” inspection program and is not in compliance.
- Level 10 = Vehicle repair operation adopts the 36 day/3,500 mile/300 gallon “in house” safety inspection program and is at 95% or greater in compliance with the timelines.

Category: *Safety Inspection Repairs*

- Level 1 = Noted red tag inspection repairs are made more than 6 workdays of the inspection.
- Level 1 = Noted yellow tag/other inspection repairs are made more than 10 workdays after the date of the safety inspection.
- Level 10 = Noted “red tag” inspection repairs are completed within 5 days of the inspection at 95% level or higher.
- Level 10 = Noted yellow tag inspection repairs/other are made within 10 workdays of the inspection at 95% level or higher.

Note: Buses must be scheduled for safety inspection by 36 days maximum, 3,500 miles maximum, or 300 gallons of fuel used maximum and should be completed at 95% or greater.

Total number of buses in fleet	_____
Number of buses scheduled for safety inspection/week	_____
Number of safety inspections completed/week	_____
Percentage of scheduled inspections completed w/in schedule	_____

Note: Red tag repairs must be completed within 5 days of the safety inspection and should be completed at 95% or better

Total number of buses w/red tag repairs noted in safety inspect.	_____
Total number of buses w/red tag repairs completed	_____
Percentage of red tag repairs completed w/in 5 days	_____

Note: Yellow tag/other repairs must be completed within 10 days of inspection & should be completed at 95% or greater

Total number of buses w/yellow tag/other repairs noted	_____
Total number of buses w/yellow tag/other repairs noted completed	_____
Percentage of yellow tag/other repairs completed w/in 10 days	_____

Preventative Maintenance:

2 Regular LOF cycles are determined by the manufacturer’s recommendations and must be followed closely as part of any model vehicle maintenance program.

The Lube, Oil, and Filter cycles for the school bus fleet must be based on the manufacturer’s recommendations. These recommendations can be adjusted if lubricants such as synthetic oil and/or synthetic blends are used as opposed to standard oils. In each case, the vehicle maintenance operation must comply with the recommendations in order to receive the longest possible life from the vehicle. These cycles could coincide with the safety inspection but in most instances, given the fact the trend is to greater distance between oil change intervals, they will not.

Oil sampling and analysis can prove helpful in the effort to reduce costs and determine oil change intervals. The use of oil analysis as a regular part of a district’s efforts to provide for excellent school bus maintenance should be encouraged.

LOF cycle =

Performance Level (1-10):

Category: *Determining LOF Interval*

Level 1 = School district has no regular LOF interval in place.

Level 10 = School district uses manufacturers recommendations and/or oil analysis to determine LOF interval.

Category: *Compliance with LOF Interval*

Level 1 = School district has no regular LOF interval and/or is inconsistent in the use of the LOF interval.

Level 10 = School district is in compliance with the LOF interval at a level of 95% or greater.

Note: LOF should be completed as scheduled at the 95% level or greater.

Manufacturer recommended LOF cycle used in school district	_____
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Number of buses schedule for LOF for the week	_____
Number of buses scheduled actually completed	_____
Percentage of scheduled LOF buses completed	_____

Daily Pre/Post Trip:

3 **The driver daily pre and post trip inspection is an essential element in any model school bus maintenance program. The driver is best positioned to notice any new sound or change in the vehicle that might be cause for maintenance.**

In order to maintain a fleet of school buses, it is essential that the drivers pre-post trip each of their buses. The drivers are the first lines of defense in insuring buses go on the road in safe condition. Drivers must complete a pre and post trip inspection of the school bus and complete a request for maintenance should any deficiencies or suspected deficiencies exist. These deficiency or pre/post trip inspection reports must be submitted and verified at a high level in order to insure a high level of fleet maintenance.

(Performance level is based on the number of pre/post trip forms submitted for regular routes and is measured by dividing the number of regular routes by the number of pre/post trip forms submitted daily.

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Formula for Determining Pre/post trip Inspection Rate: #Reg/Spec Pre/Post Trip forms submitted daily divided by #Reg/Spec Route Buses= Pre/Post Inspection Rate

Performance Level (1-10):

- Level 0 = District uses no daily driver pre/post trip inspection form.
- Level 1 = District uses a standard form but returned forms are below the 50% level.
- Level 10 = The district uses the daily driver standard pre/post trip inspection form and the daily submission level is at 95% or higher.

Note: 100% of the buses used should have a daily inspection sheet submitted

Number of buses scheduled on regular routes per day	_____
Number of buses scheduled with daily pre/post trip inspections submitted	_____
Percentage of scheduled buses with pre/post trip inspections submitted	_____

Special Projects:

4 **The designation of Special Projects is utilized in this section to differentiate repairs that are driven by recall, and/or knowledge about the anticipated vehicle component failures. The purpose of which is to get ahead of the failure to keep the vehicle on the road and not experience excessive periods of “downtime”.**

Special projects are used to designate school bus maintenance repairs that are not part of the LOF repairs, not a result of driver pre/post trip, and not a result of the safety inspection. These special projects may be a result of a recall, or the result of information regarding the useful life of a particular part necessitating replacement at a given interval. Another example of a special project would be repainting bumpers and/or

wheels prior to the opening of school. These projects may be fleet-wide projects or target specific make/body of school bus. The primary purpose of these special projects is to, based on bus repair data collected and analyzed, prevent the failure of various components through pre-determining their useful life and replacing components prior to “on road” failures.

Performance Level (1-10):

- Level 1 = District has no Special Projects component in place and conducts no bus repair analysis.
- Level 10 = District has designated numerous Special Projects and regularly analyzes bus repair information to determine useful life of various components.

District maintenance operation has a special projects component	_____ Yes _____ No
List specific projects completed under the Special Projects component for week:	

Bus Maintenance Records:

5 School bus repair and maintenance records are an essential part of any model vehicle repair program. Without the records and regular analysis of those records, the operation cannot adequately manage the timely repair of vehicles.

School bus maintenance records are used to track the repairs of school buses and to insure compliance with manufacturer’s recommended maintenance intervals. These records must be accurate and reflect not only the cost of parts but also the cost of the mechanics time. In this way the true cost of owning and operating the vehicle can be readily calculated. In addition, these records must reflect the amount of “downtime” associated with each repair for this time costs the school district money. The goal of every operation should be to prevent “downtime” and to maximize “uptime”.

Vehicle repair records are the lifeblood of the vehicle repair operation. The orderly tracking of vehicle repairs and the associated costs are essential in a fleet operation. This information must be organized in such a way as to permit the ready tabulating of the annual cost of ownership of each vehicle. In this way, the cost of owning a vehicle can be tracked over its life in the fleet and information collected to assist in designating special projects and in specifying better vehicles in the future.

Performance Measures (1-10):

Category: *Vehicle Records*

- Level 1 = The school district has no vehicle repair records and/or cannot track the cost of annual repairs for each vehicle in the fleet.
- Level 10 = The school district has detailed records of repairs and can readily track the annual repairs on each of the vehicles in the fleet.

District maintains repair records by vehicle	_____ Yes _____ No
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District regularly tabulates the cost of parts and labor on individual work orders by vehicle	_____ Yes _____ No
District annually tabulates the cost of maintaining each vehicle	_____ Yes _____ No
District regularly calculates the cumulative total cost of maintaining each vehicle for the entire time the vehicle is in the district inventory	_____ Yes _____ No
District maintains a running inventory of parts for school bus repair	_____ Yes _____ No
District uses an electronic system for each of the school bus maintenance functions	_____ Yes _____ No
District uses vehicle repair records to determine specifications for new buses	_____ Yes _____ No

Repair Staff:

6 The staff charged with the responsibility of repairing school buses to transport the nation's most precious cargo must be highly trained and certified and the staff must be adequate to perform the necessary tasks.

Michigan is one of the few states that require that mechanics assigned to private garages be certified. There are essentially two kinds of certification that meet the state requirements, state certification and ASE certification. State certification is given by the Secretary of State following the passing of tests. The ASE certification is generally accepted as the more difficult certification and permits certification in school bus specific categories. Currently, there is no requirement that school bus mechanics be certified either by the State of Michigan or ASE. ASE certification, since it is school bus specific and is generally perceived as the more difficult certification would be the benchmark by which school districts should be measured.

In addition to being well trained and certified, the school bus repair and maintenance staff must be of sufficient numbers to insure adequate maintenance. Although there are many opportunities to send repairs to private contractors to provide the repair service, adequate staffing is essential at the repair facility to accomplish the critical mission of keeping vehicles on the road. Numerous studies have been conducted that specify the ratio of the number of repair technicians to school buses. Most studies seem to indicate a ratio of one mechanic to 20 buses would suffice in most school districts in the Midwest environment. Of course this ratio assumes the buses are replaced in an orderly basis of around ten years in regular route service.

Performance Level: (1-10)

Category: *Certified Mechanics*

- Level 1 = Mechanics are not certified in any area.
- Level 10 = All mechanics are ASE certified in all areas in which they work.

Category: *Mechanic Performance Levels*

- Level 1 =No system is used nor is information kept on mechanics work performance.
- Level 10 =Mechanic performance is monitored and all mechanics are working at 95% of capacity or better. (Mechanics are recording at least 95% of their scheduled work time on work orders.)

Category: *Mechanic Efficiency Levels*

- Level 1 =Mechanic efficiency is not monitored or recorded
- Level 10 =Mechanic efficiency is monitored and recorded weekly and posted on an efficiency report. (Efficiency is based on supervisor determined work order scheduled time versus actual time and is shown in %.)

Category: *Mechanic Staffing Levels*

- Level 1 = The mechanic staffing level ratio for school buses is more than 25:1 or more.

- Level 10= The district mechanic staffing level ratio for school buses is 20:1 or less.

Note: Mechanics should be certified in all areas in which they work

Number of vehicle repair staff _____		
Vehicle repair staffing level/ratio (Number of buses divided by number of vehicle repair staff) _____ :		
1		
Mechanic certification by mechanic:		
Mechanic #1	ASE certifications: _____	Secretary of State Certifications: _____
Mechanic #2	ASE certifications: _____	Secretary of State Certifications: _____
Mechanic #3	ASE certifications: _____	Secretary of State Certifications: _____