



**MAINTENANCE PROCEDURES
MANUAL
FOR
CITY OF COLUMBUS, INDIANA
TRANSIT SYSTEM**

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1. Purpose Statement

1.1 Purpose

The City of Columbus Transit System, operates a in the city of Columbus, Indiana, which includes two buses operated in demand response service. Administrative, maintenance and passenger transfer facilities are also required for the operation of this service. All of these facilities and pieces of equipment require effective maintenance in order to provide high quality, cost efficient service throughout their life.

The purpose of this document is to provide a complete description of Columbus's maintenance procedures for use by Columbus personnel to assure proper care and maintenance of Columbus' facilities and equipment.

1.2 Policy

Columbus shall at all times and with all available means, strive to insure that the vehicles, facilities, and equipment entrusted to it's care are utilized to their maximum public benefit, and are maintained in a manner that derives the most advantageous use at the least possible cost. Columbus shall be diligent in this endeavor in several ways. First, Columbus will pursue creative ways to minimize financial expenditures while upgrading the quality of it's services. Secondly, all tangible assets will be kept in as good condition as possible to extend their useful life and maintain the quality of Columbus's services. This will be accomplished by continually updating and monitoring the effectiveness of established maintenance programs for vehicles, buildings, and equipment. Finally, Columbus shall encourage each of it's employees to take pride in their association with Columbus, pride in the duties they perform, and to treat and care for Columbus's equipment and facilities as if each item was their own personal property.

Utilizing these methods, Columbus can continue to provide the excellent quality of service that the Muncie community deserves and has come to expect.

2. Vehicle Maintenance

2.1 Preventive Maintenance

2.1.1. Overview

The Columbus Preventive Maintenance Program for revenue service vehicles consists of a series of inspections which are performed at intervals based on accumulated mileage. There are five levels of inspections for vehicles and three levels for paratransit vehicles, each of which has an assigned letter designation.

Preventive maintenance inspections for all vehicles are tracked and projected by use of a computer software package. This software tracks vehicle mileage as entered into a hand-held data entry device by the service lane employees each night. A list of vehicles having accumulated

mileage within 500 miles of a due inspection is printed daily. The list is printed in advance of the actual due mileage in order to allow for efficient scheduling of the inspection(s) due. From the time that a work order has been issued, the accumulating mileage is tracked daily by the inspecting mechanic or the Group Leader in order to assure that the inspection does not occur too soon nor significantly past due. The established acceptable parameters for the performance of preventive maintenance inspections is a 500 mile "window". If an inspection is performed more than 500 miles after it is due, the inspection is considered late.

In addition, the computer generates a monthly summary report of inspection activity for use by the Director of Maintenance as a means of monitoring the timeliness of inspections. This report, called "PM Logger", shows the amount of miles that a vehicle was serviced early(indicated with a + sign) or late (indicated with a - sign).

The end result of the preventive maintenance scheduling process is that vehicle is in the shop for an inspection of one level or another every 3,000 miles. Once a scheduled inspection is performed, any defects noted therein are either repaired immediately, which is most commonly the case; or in the case of major, time consuming, non safety related items, the defect may be scheduled for repair at a later date.

The results and accuracy of inspections are monitored by the Transit Coordinator and by the Director of Maintenance. The results of roadcall summaries, fluid consumption reports, defect cards, pre-trip inspections, and casual observation of general vehicle condition all contribute to the evaluation of the effectiveness of the preventive maintenance program.

All employees are encouraged to provide input into the maintenance process and do so through informal means as well as more structured forums such as the Columbus Employee Teams and employee meetings.

2.1.2 Fixed-route Vehicles

2.1.2.1 "A" Inspection

The first level of preventive maintenance for fixed-route vehicles is the "A" inspection which is performed every 3,000 miles. This is more commonly referred to in-house as a "brake inspection" due to the fact that it's primary intent is to provide for frequent monitoring of brake wear and function. In addition, it encompasses tire inspection with specific attention to safety related factors, wheel inspection for cleanliness, draining of moisture from air reservoirs and replacement of HVAC filters.

2.1.2.2 "B" Inspection

The second level of preventive maintenance performed on fixed route vehicles is the "B" inspection. As the most comprehensive and detailed inspection, it serves as the baseline for the entire program. It is performed every 6,000 miles and encompasses almost all systems and components of the vehicle including those related to ADA accessibility such as wheelchair lifts. Although the

"C", "D", and "E" inspections contain slightly more items than the "B", they are simply extended versions of this mainstay inspection which take place on a less frequent time frame.

The "B" inspection is not the same for all full size buses. Each particular bus series has an inspection guideline form tailored specifically to meet the requirements of the vehicle as equipped. These forms are labeled accordingly.

2.1.2.3 "C" Inspection

The third level is the "C" inspection. This inspection is basically the same as the "B" except for those items required to be performed on a less frequent basis such as changing the transmission filter. This inspection is performed every 12,000 miles and, as in the case of the "B", the form used in the performance of this is bus series-specific.

2.1.2.4 "D" Inspection

The "D" level inspection is, again, based on the "B" with minor additions for items required to be performed at the 24,000 mile interval such as changing air dryer components and testing door emergency release mechanisms.

2.1.2.5 "E" Inspection

The last and most infrequent of the inspections performed on the Columbus fixed route buses is the "E" level inspection. This inspection is based on the "D" inspection with the addition of a tune-up process designed to assure maximum engine performance in terms of power and fuel efficiency. The exact diagnostic procedures and adjustments performed depend on the particular series of vehicle and, consequently, which type of engine it is equipped with. The "E" inspection also includes the addition of several other items such as cleaning of transmission and differential vents and replacing differential fluid.

This inspection is performed every 48,000 miles.

2.1.3 Call-A-Buss Vehicle Inspections

2.1.3.1 "A" Inspection

The "A" inspection for a vehicle is the basis for all levels. This inspection is performed every 3,000 miles and encompasses the vast majority of all vehicle systems.

2.1.3.2 "B" Inspection

The "B" level inspection for a vehicle is very similar to the "A" with several additions for items due at the scheduled interval of 12,000 miles. The main additions to this level relate to

changing fuel filters, replacing front brake pads, and changing the engine air filter.

2.1.3.3 "C" Inspection

The "C" inspection is identical in content to the "B" excepting for the addition of several items required to be performed at this mileage interval such as changing transmission fluid, changing differential fluid and checking steering column mounting. This inspection takes place every 24,000 miles.

2.2 DAILY MAINTENANCE

2.2.1 CLEANING AND WASHING

All Columbus vehicles are serviced each day at the end of their scheduled runs. Each vehicle is driven into the service lane area where a structured routine of fueling and cleaning activities. The details related to fueling activity are entered into a hand-held data storage device, or "collector".

Each vehicle is scheduled for routine cleaning, washing, and fluid checks once per week. However, they may be washed more frequently as required during periods of inclement weather. After the vehicle completes the service lane procedure, it is parked in the storage area. There, a performs a general interior cleaning process which includes cleaning rear view mirrors, dusting the seats, dash, window ledges, mullions and wheelchair control boxes; cleaning windows as required and mopping the floors and step wells. At times a third party contractor is utilized to conduct vehicle cleaning.

2.2.2 FLUID REPLENISHMENT

All revenue service vehicles are checked nightly for proper fluid levels by the service lane Bus Cleaner. These fluids are checked and replenished after being parked in order to obtain the most accurate readings from dipsticks. The employee performing this function enters the amount of fluids used into the same hand-held data entry device used to enter fuel usage. Further information regarding this data is included later in section 2.3.4, "Fluid Consumption".

2.3 RESPONSE MAINTENANCE

2.3.1 PRE-TRIP INSPECTION

Columbus Operators are required to perform a thorough pre-trip inspection of their vehicle prior to pull-out from the garage. Those drivers who take possession of a vehicle from another operator while the vehicle is in service are required to perform a "mini pre-trip" inspection. The transfer driver notes any defects in the vehicle on the designated portion of the

combination pre-trip/defect card and reports these to the mechanic on duty for determination as to whether the vehicle should be held and repaired immediately or allowed to run as is until repairs can be effected. In either case, the completed pre-trip inspection form is deposited in a container kept in the parking area prior to vehicle pull-out and is filed as a record of these inspections.

2.3.2 ROADCALLS

Roadcalls are performed by a contractor or Maintenance Department at the discretion of the Transit Coordinator or her designee only when the problem reported is of a serious nature requiring immediate attention. Vehicle deficiencies involving a threat to human safety, or which pose a potential threat of damage to public or company property receive priority treatment. Roadcalls are not performed for minor deficiencies. These types of problems are deferred to the defect card.

When a problem develops which requires that a roadcall be performed, the attending mechanic records pertinent details of the action taken on a roadcall report work order. Monthly totals are reported to the Coordinator.

2.3.3 FLUID CONSUMPTION

Fluid consumption for all vehicles is monitored by the Director of Maintenance using weekly reports provided by the Transit Coordinator. These reports are generated by the computer or hand writing when time does not allow access to computer. This report lists the vehicles and reports their respective mileage and a one-week summary of fluid consumption for all fluids except power steering oil or fuel.

Fuel consumption is monitored by use of a separate computer generated report which is provided weekly to the Director of Maintenance. This report provides the latest usage and current fuel mileage average information thereby allowing the Director to easily spot potential problems with a vehicle and implement corrective actions, as needed, quickly and accurately.

The main purpose of these reports is to provide informative data indicative of small problems which can be solved prior to becoming large ones.

It should also be noted that the Coordinator confirms that the total amount of fuel dispensed into vehicles matches the amount indicated by the dispenser readings and the electronic fuel reservoir level monitor. This is done to uncover any theft, leakage, or errors which might occur.

2.4. BODY AND PAINT

2.4.1 OVERVIEW

Columbus is fully equipped to perform some body and paint repair to its vehicles.

2.4.2 GENERAL MAINTENANCE

Columbus has established a standard of maintaining the outward appearance of its vehicles in the best possible condition at all times. Daily wear and tear, aging of the paint, and minor scratches and dents all combine over a period of time to necessitate corrective action. Each year, as part of the establishment of yearly goals and objectives for the department, determinations are made as to the number of vehicles to be repainted, the extent of the repairs to be made, and the time frame allotted for completion of the repairs. The established standard is to complete a fleetwide repainting cycle every five years. Throughout the year, cosmetic repairs are scheduled and performed, as fleet status and manpower allow, in an attempt to reach the goal established for that year.

2.4.3 COLLISION REPAIR

When Columbus vehicles are involved in accidents which cause physical damage, the vehicle is held out of service and scheduled for repairs as soon as possible. In most circumstances, the vehicle is repaired in-house using Columbus manpower and facilities. However, in some cases it is determined that this course of action is not the most practical, cost-effective, or feasible solution.

Typically, a vehicle is repaired by an outside vendor only if the cost of the repair is being borne by an insurance company as restitution for damage caused by fault of a party other than a Columbus employee. Even in these cases the repair will be performed by in-house employees unless the repair requires special equipment not available at Columbus, specialized skills not typical of our employees or in cases where warranty provisions are at risk of circumvention if repairs are not performed by factory authorized entities. Decisions on these matters are made on a case by case basis.

A sample copy of the Columbus collision damage estimate form is attached in the copy of the "Body Work Log" used as a quick reference to body work status for the year noted.

2.5 DATA COLLECTION AND RECORDKEEPING

2.5.1 WORK ORDERS

The mechanic's daily work assignments are scheduled or approved by the Transit Coordinator. As the mechanic clocks on to his or her shift, the city begins to track and record the time and material used by the mechanic in performance of each task. Upon completing the task, the mechanic "closes" the work order. The Coordinator reviews all completed tasks for accuracy before being transferred to the hard file for the applicable vehicle.

In the event of problems which prevent the recording of repair activity on the computer, a paper "Repair Order" form is available as a backup. In the rare case where these are used, the information is transferred into the computer as soon as problems are corrected.

2.5.2 VEHICLE SERVICE HISTORY

Each Columbus vehicle has an assigned file used to maintain written documentation of its service and repair history. These files are kept in one year increments and a two year history is kept in the files at all times for referral by mechanics or other employees as needed. After a file ages beyond two years, it is transferred to long-term storage and remains there indefinitely for future referral.

This "paper" file contains all documentation of service activity pertaining to the vehicle and a summary sheet which functions as a quick reference and table of contents for the file.

While hard copy files are maintained for use as described, the same information contained therein is maintained in computer historical files and backup files as insurance in the event of need.

A sample copy of the vehicle summary sheet used in the hard file is attached in figure 25.

2.6 WARRANTY PROTECTION AND TRACKING

Nearly every vehicle or component purchased by Columbus has a warranty of some type associated with it. Tracking the provisions and expiration of these is one of the duties of the Mechanic. This person also checks each repair order to determine whether any activity is compensable under the terms of the vehicle warranty or individual component warranties. When it is determined that compensation is due, the appropriate request is made to the applicable vendor. In some cases, the request takes the form of a written claim while, in others, the action is as simple as making a telephone call to effect corrective action.

After a warranty-related action has been made, the details of the action are entered into the appropriate file(s) and maintained as a part of the permanent record.

2.7 PARTS USE MONITORING

Columbus maintains a Parts Room which contains a substantial inventory of the parts most commonly required to maintain its active fleet of vehicles. In addition, the same storage area is used to harbor commonly used supplies for the Building and Grounds Department. This area is secured from entry by unauthorized persons via locked entry points between the hours of 8:00 AM and 4:00 PM. While a part-time mechanic serves as Parts Supervisor is on duty Monday through Friday, COLUMBUS does not have the capability to staff a full-time parts person.

In addition, the interior of the parts room is monitored by video cameras fed to a recording device which creates a taped record of activity in the area available in the event of need.