

## TRANSIT MAINTENANCE PROGRAM

The mission of VTA's Transportation and Maintenance Department is to provide clean, reliable, safe and well-maintained vehicles, equipment, and facilities through the efforts of a competent and committed work force using modern facilities, tools and equipment. The purpose of VTA's Maintenance Plan is to provide consistent, systematic and integrated program guidance that will enable the various units of the Transportation and Maintenance Department to properly maintain and service the assigned vehicles, equipment, and facilities in support of revenue operations.

Policies of the Transportation and Maintenance Department reflect the following:

- Standardized procedures and practices,
- Compliance with all applicable regulatory requirements,
- An effective maintenance and quality assurance program.

VTA takes a functional holistic approach to the maintenance and servicing of all vehicles, equipment, and facilities that emphasizes regular preventive maintenance, comprehensive inspections and overall efficiency and cost effectiveness. This approach assures a safe, reliable and cost effective transit maintenance program. Key components of VTA's current Transit Maintenance Program are as follows:

- A comprehensive bus and light rail vehicle maintenance program that includes daily maintenance.
- An aggressive preventative maintenance and component change-out program.
- A running repair procedure to avoid removing vehicles from service.
- A centralized overhaul and repair program.
- A maintenance management system.

### **Maintenance Program**

VTA's maintenance functions are organized into one department combining the maintenance of buses, light rail vehicles, support vehicles, and facilities, with support activities such as engineering, materials management and other support services. Many internal documents exist concerning issues such as maintenance and repair procedures, inspections, schedules, and reports. The VTA Maintenance Plan provides an overall approach to maintenance and specific guidelines for the entire maintenance department, its sections and branches. The specific intent of the Maintenance Plan is to document responsibilities to ensure that all VTA owned vehicles, facilities, and

equipment are kept in good working order. VTA's Maintenance Plan is a "living document" which is updated periodically to reflect changes in maintenance policies, systems, equipment and program improvements.

The following maintenance functions are described below:

- Maintenance Engineering
- Bus Maintenance
- Rail Maintenance
- Facilities Maintenance
- Maintenance Support Services (Training, Information Systems, Warranty)
- Materials Management

### **Maintenance Engineering**

The Maintenance Engineering function includes the following:

- Organizing and directing engineering work in support of bus maintenance, rail maintenance and maintenance support services.
- Conducting reliability and performance studies.
- Evaluating new vehicle/equipment design and availability.
- Providing technical guidance to the mechanical instruction program.
- Developing technical requirements and specifications, operating and maintenance instructions, and preventive maintenance programs for vehicles, shops and equipment.
- Managing and controlling vehicle and equipment configuration, and developing and designing changes to upgrade vehicles, systems and equipment.
- Administration of bus and rail vehicle procurement contracts.

### **Bus Maintenance**

Components of VTA's bus maintenance program are as follows:

**Daily Servicing** – Daily servicing items include the following:

- Vault pull
- Taking appropriate corrective action to reported Driver defects
- Fuel island servicing
- Interior/exterior cleaning
- Seat and window cleaning/replacement

**Preventive Maintenance** - Regular maintenance is performed at prescheduled cycles to ensure optimal performance, efficiency, safety and reliability of assigned equipment. Preventive maintenance inspections are performed within one thousand miles of scheduled cycles. **Table 2-6** shows VTA's Preventive Maintenance cycles.

**TABLE 2-6  
PREVENTATIVE MAINTENANCE CYCLES FOR BUSES**

P.M. Type	Inspection	Cycle (every)	Within
Minor/safety	A	2,000 miles	+/- 500 Miles
Intermediate	B	6,000 miles	+1,000/-500 Miles
	C	12,000 miles	+1,000/-500 Miles
Major	D	24,000 miles	+1,000/-500 Miles
Special Service	Winter	Seasonal	
	Summer	Seasonal	

**Running Repair/Corrective Maintenance** - This establishes a procedure to repair items identified by operators during the daily operation of a bus. These repairs are usually completed without removing or withholding a vehicle from normal service. Maintenance repairs or actions for road calls are documented in the maintenance information system and analyzed to assure that proper corrections are made, to provide for consideration of fleet inspections, and to modify the Preventive Maintenance Program, as needed.

**Scheduled Component Change-out** - VTA's component change-out program is based on manufacturer's recommendations, failure history and failure analysis. Designated components are tracked and monitored to ensure that the program is efficient and cost effective. This program allows for the preparation of complete standardized kits with standardized replacement practices for improved efficiency.

**Overhaul and Repair (O&R) Program** – The projected life expectancy for heavy transit buses is fifteen years and 750,000 miles. In order to achieve this, VTA has determined, based on manufacturers' recommendations and actual experience that buses require a major overhaul at about the mid-point of their life. The O&R program is a centralized bus maintenance program that includes paint and body repair, upholstery, farebox repair, component overhaul, and the heavy repair/rebuild of engines and other components.

## Light Rail Vehicle Maintenance

Key elements of the Light Rail Vehicle Maintenance Program include daily maintenance procedures, running repair/corrective maintenance, scheduled overhauls, and preventive maintenance. Preventive maintenance includes regular maintenance performed at prescheduled cycles to ensure optimal performance, efficiency, safety and reliability of assigned equipment. Preventive maintenance inspections are performed within one thousand miles of scheduled cycle. Preventive maintenance cycles are shown in **Table 2-7**.

**TABLE 2-7  
LIGHT RAIL VEHICLE PREVENTIVE MAINTENANCE CYCLES**

P.M. Type	Inspection	Cycle (every)	Within
Daily/safety	Daily	Daily	
Minor	A	10,000 miles	+500/-1,000 Miles
Major	B	30,000 miles	+500/-1,000 Miles
Major	C	60,000 miles	+500/-1,000 Miles

**Light Rail Vehicle Overhaul Program** – The normal life expectancy of VTA’s two types of LRVs is approximately 30 years. To achieve this, the car builders, UTDC and Kinkisharyo (KI), have recommended scheduled maintenance and overhauls be done at certain intervals. VTA has implemented a 3-phased maintenance overhaul program involving major components of the UTDC LRV fleet as shown in **Table 2-8**. As the UTDC cars will be phased out of service by January 2004, replaced by the new low floor KI LRVs, there will no further requirement to perform the overhauls projected for the UTDC cars, and a similar program will be implemented for the new low floor cars.

Major component overhauls are scheduled at two major intervals to ensure that all systems will perform safely, reliably, and efficiently throughout the entire life of the vehicle.

Overhaul is typically conducted in the form of component change-out to minimize vehicle down time. Components are then overhauled and refurbished in efficient size batches.

The first major component overhauls for the KI cars are projected to be performed at approximately 120,000 miles or two years, assuming 60,000 miles per vehicle per year, beginning approximately in July 2005. The second phase of major component overhaul is preliminarily being planned to occur at 240,000 miles. Based on the condition of the components found in the first overhauls, the interval and scope of subsequent replacements may be adjusted, so as to attain maximum effective life from major components, while maintaining reliability.

A brief description of each phase of VTA's overhaul program is provided below:

**Overhaul I** – Rebuild and overhaul of hydraulic brake components and systems, pneumatic systems, pantographs, and center truck wheel bearings. VTA intends to do a prototype overhaul where several additional components will be removed, thoroughly inspected and evaluated to determine the need for fleet-wide overhaul.

**Overhaul II** – Rebuild and overhaul of major components including all components of Overhaul I plus motor truck assemblies, journal bearings, gear cases, traction motors, suspension systems, couplers, and doors. Similar to Overhaul I, a prototype overhaul will be performed to evaluate systems and determine the exact scope of the Overhaul II program.

**Overhaul III** – Rebuild and overhaul of the air conditioning system, carbody refinishing and repainting (interior and exterior), and potential replacement of major electronic components, roof resistors and PC boards, if needed. The life of the paint system is greatly dependent on environmental factors, vandalism, and the methods and care of the initial application. Exterior paint is expected to last approximately eight to 10 years.

**Table 2-8  
LIGHT RAIL VEHICLE OVERHAUL CYCLES**

Overhaul Type	Cycle (every)
I	120,000 miles or two years
II	240,000 miles or four years
III	As needed, approximately every 7 to 10 years

### **Way Power & Signal Maintenance**

VTA's Maintenance Program includes preventive maintenance, inspections, repair and servicing of light rail right-of-way, rail system power, tracks, signals, station facilities and related equipment. Preventive maintenance is primarily time driven in accordance with system specific functions. Specific components are as follows:

- Station and wayside facilities such as light rail stations, terminal buildings, restrooms, park & ride lots, landscaping, fences, guardrails and other trackside areas.
- Rail, switches, ties, roadbed and track systems.
- Light rail electric power systems including overhead, substations, lighting and other electrical systems.
- Signal systems, crossing gates, fare machines audio/video equipment.

### **Facilities Maintenance**

VTA's Facilities Maintenance includes overall environmental regulatory record keeping and oversight; hazardous waste disposal and manifests; timely and reliable maintenance, preventive maintenance, inspections, repair and servicing of VTA's buildings, shelters, grounds, bus stops and related equipment.

### **Maintenance Support Services**

VTA's Maintenance Support Services includes Warranty & quality Assurance, Non-revenue Vehicle Maintenance, Maintenance Training, and Maintenance Information Systems. Specific functions are as follows:

- Management of Warranty and Warranty Reimbursement Program
- Management of Quality Assurance Program
- Administration and maintenance of VTA's Non-Revenue vehicle fleet
- Development and provision of Maintenance Training programs
- Administration of the Fleet Information System (FIS) and maintenance/materials management-related modules of the SAP (Systems, Applications, Products) computer system
- Development, administration, and distribution of Maintenance Standard Procedures.

### **Materials Management**

Materials Management includes Materials Management, Bus Parts, and Light Rail Parts. This section operates one (1) main warehouse and three (3) operating

storerooms for bus parts, and one (1) main warehouse and one (1) operating storeroom for rail parts. Specific functions include:

- Management of VTA's bus and light rail parts inventory at all VTA warehouses and storerooms
- Timely receipt and issue of bus and light rail parts at all VTA warehouses and storerooms.