

S.O.P. # 400-09

SUBJECT: APPARATUS AND RELATED EQUIPMENT (MAINTENANCE AND CARE)

DIVISION: EMERGENCY OPERATIONS

OBJECTIVE:

To provide a procedure for the completion and documentation of pre-trip inspections of apparatus and related equipment assigned to or being used by fire department personnel. This includes all front line and reserve engines, trucks, medics, brush units, EMS District Officer vehicles, and specialty apparatus. Reserve cars and EMS District vehicles are addressed in SOP 400-18. The Company Commander shall be held responsible for implementing and ensuring compliance with the following procedures for any apparatus/equipment assigned to or in use under their command.

SECTION 1 – PRE-TRIP INSPECTION

A. Daily Inspection Requirements:

All front line and reserve apparatus/vehicles in frontline status shall complete a pre-trip inspection that shall be documented within Operative IQ - FRONTLINE for all shifts. All frontline apparatus/vehicles and reserve apparatus/vehicles in frontline status, regardless of type, shall have a pre-trip inspection initiated at the beginning of each shift, completed, and documented as soon as practicable, except where noted in Section 2.B. Pre-trip inspections shall be initiated at 0700 for day shift, E shift, and M-1 shift; 0900 for M-5 shift and M-6 shift, 1500 for M-2 shift; and 1700 for night shift.

B. Weekly Inspection Requirements:

1. All reserve apparatus/vehicles in reserve status, regardless of type, shall complete a pre-trip inspection that shall be documented within Operative IQ – FRONTLINE once every Sunday, regardless of the shift on-duty. The inspection shall be initiated at the beginning of day shift, completed, and documented as soon as practicable.
2. Chief Officer response vehicles and all other staff/support service vehicles shall be inspected weekly; on the first day of the tour/week of duty.

C. The completion and documentation of pre-trip inspections is the responsibility of the driver assigned to the vehicle for the shift, or the person designated by the Officer-in-Charge. Pre-trip inspections must be completed properly and thoroughly. Inspections shall include, but not be limited to all criteria listed in Operative IQ – FRONTLINE and SOP 400-09 which apply to the respective apparatus type being inspected.

D. Reporting and Notification Requirements:

1. In the event that defects, deficiencies, or missing equipment are noted by the personnel performing the pre-trip inspection, those issues must be documented in Operative IQ – FRONTLINE, **and** be immediately reported to the officer-in-charge.
 2. Officers notified of defects, deficiencies, or missing equipment must immediately make the appropriate notifications and required documentation as described in Section 3 of this SOP and SOP 400-18 – Care and Maintenance of Reserve B.C. and E.M.S. Vehicles.
- E. Station Officers and Chief Officers will receive an automated report via email daily listing the pre-trip inspection status for all units county-wide. This report will be generated and distributed twice per day, AM and PM (the PM report will contain M-2 shift units).
- F. Resources:

A short training video is available on the Fire-Rescue Academy LMS web site to guide personnel in the use of Operative IQ – FRONTLINE for pre-trip inspections

1. Driving and crew areas, apparatus body and compartmentation:

The following defects and deficiencies of the driving and crew areas, the apparatus body, and the compartmentation reduce the operational safety and performance of the fire apparatus and shall be considered when determining out-of-service status.

- Body mounting that is defective
- Cab mounting that is defective
- Seat belts that are torn or have melted webbing, missing or broken buckles, or loose mountings. Due to the extreme safety-related consequences of a defective seat belt, and the fact that one defective seat belt (unless it is the driver's seat belt) does not render a piece of apparatus unusable, the authority having jurisdiction shall take any seating position with a defective seat belt out of service.
- Cracked or broken windshield that obstructs the driver's/operator's view
- Missing or broken rearview mirrors that obstruct the driver's/operator's view
- Windshield wipers that are missing or inoperable
- Steering wheel that has a deficiency
- Oil pressure gauge or engine or transmission temperature gauges that have failed
- Air gauge or audio low air warning device that have failed
- Door latches that are defective
- Defrosters that are defective
- Foot throttle that is defective

2. Chassis, Axles, Steering and Suspension Systems, Driveline, Wheels, and Tires:

The following defects and deficiencies of the chassis, axles, steering and suspension systems, driveline, wheels, and tires reduce the operational safety and performance of the fire apparatus and shall be considered when determining out-of-service status. Refer to Section 4 letter C for tire repair:

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- Tires that have cuts in the side wall that penetrate to the cord
 - Tires that are defective
 - Tires that have a tread depth of 4/32 in. or less in any steering axle or 2/32 in. or less on any non-steering axle in any major tread grooves anywhere on the tire
 - Any tire that is flat or has detectable or audible leak
 - On dual wheel tires: tires that are touching sidewall to sidewall
 - Suspension components that are defective
 - Wheel studs missing or loose wheel lugs
 - Wheels that are defective
 - Any cracks in wheels
 - Axle flanges that have Class 3 leakage
 - Any axle with a hub seal that has Class 3 leakage or an empty reservoir
 - Steering components that are defective
 - A steering component that has constant leakage
 - Driveline components that are defective

3. Engine Systems

The following defects and deficiencies of the engine systems reduce the operational safety and performance of the fire apparatus and shall be considered when determining out-of-service status:

- Air filter restriction indicator that shows maximum restriction
- Engine that won't crank or start
- Engine that is overheating
- Oil that contains coolant
- Oil that is diluted with fuel
- A fuel system component that has Class 2 leaking of fuel
- Fuel tank, mountings, or straps that are defective
- Stop-engine light that fails to turn off after engine is started

4. Engine Cooling System

The following defects and deficiencies of the engine cooling system reduce the operational safety and performance of the fire apparatus and shall be considered when determining out-of-service status:

- Cooling system component that has Class 3 leakage
- Coolant that contains oil
- Radiator that is defective
- Water pump bearing that is defective
- Cooling fan that is defective
- Coolant system components that are defective

5. Transmission

The following defects and deficiencies of the transmission reduce the operational safety and performance of the fire apparatus and shall be considered when determining out-of-service status:

- Transmission components that are defective
- Shift linkages that are defective
- Automatic transmission that overheats in any range
- Automatic transmission that has a “Do not shift” light on

6. Low Voltage and Line Voltage Electrical Systems

The following defects and deficiencies of the low voltage electrical system and the line voltage electrical system reduce the operational safety and performance of the fire apparatus and shall be considered when determining out-of-service status:

- Federal Department of Transportation lighting that is defective
- Ignition system that is defective
- Charging system that is defective

7. Braking Systems

a. Air Brake Systems

The following defects and deficiencies of the air brake system reduce the operational safety and performance of the fire apparatus and shall be considered when determining out-of-service status:

- Service brakes that have an air pressure drop of more than 2 psi (13.8 kPa) in one (1) minute for single vehicle or more than 3 psi (20.7 kPa) in one (1) minute for combination vehicle, with the engine stopped and the service brakes released
- Leak-down rate (time) of the applied side of the air brake that is more than three (3) psi (20.7 kPa) in one (1) minute for single fire apparatus or more than 4 psi (27.6 kPa) in one (1) minute for combination fire apparatus, with the engine stopped and the service brakes applied
- Brakes that are out of adjustment
- Braking system components that are defective
- Braking operation that is ineffective
- Parking brake operation that is ineffective
- Air compressor that fails to build air pressure
- Air pressure that fails to maintain 80-90 psi (552-621kPa) pressure in the system with the service brakes applied and the engine at idle, or air compressor that fails to fill the air system to the air compressor governor cutout pressure with the service and parking brakes released
- Friction surfaces, brake shoes, or disc brake pads that have grease or oil on them
- Antilock braking system (ABS) warning indicator that is activated

b. Hydraulic Brake Systems

The following defects and deficiencies of the hydraulic brake system reduce the operational safety and performance of the fire apparatus and shall be considered when determining out-of-service

status:

- Brake system components that have Class two (2) leakage of brake fluid
- Friction surfaces, brake shoes, or disc brake pads that have grease or oil on them
- Braking system components that are defective
- Braking operation that is ineffective
- Parking brake operation that is ineffective
- Brake warning light that is activated or brake pedal that falls away or drifts toward the flooring when brake pressure is applied
- ABS warning indicator that is activated

8. Fire Pump System

The following defects and deficiencies of the fire pump system reduce the operational safety and performances of the fire apparatus and shall be considered when determining out-of-service status:

- Pump test results that fall below 90 percent of the original rating of the pump when tested in accordance with NFPA 1911, *Standard for the Inspection, Maintenance, Testing and Retirement of In-Service Emergency Vehicles*
- Pump that will not engage
- Water tank that will not hold water
- Pressure control system that is not operational
- Pump transmission lubricant that is contaminated
- Pump panel throttle that is defective

9. Aerial Device Systems

The following defects and deficiencies of the aerial device and its systems reduce the operational safety and performance of the fire apparatus and shall be considered when determining out-of-service status:

- Power takeoff (PTO) that will not engage
- Stabilizer system that is defective
- Aerial device that is defective
- Hydraulic system components that are defective
- Cable sheaves that are defective
- Cables that are defective or frayed
- Base and section rails that show ironing beyond the manufacturer's recommendations
- Aerial device that is structurally deformed
- Torque box structure or fasteners that are defective
- Turntable fasteners that are defective or missing

10. To ensure equipment is maintained at the station level, the company commanders will maintain the proper levels of the following supplies. The electronic Form 111, Parts Requisition Form, will be used to re-order and is submitted electronically to firesupply@baltimorecountymd.gov

- REDTAC #2 grease
- Lubriplate 110 grease

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- Clear, synthetic grease
 - Hydraulic Oil
 - Lubricant WD-40
 - Motor Oil
 - Antifreeze
 - Transmission Fluid
 - Power steering fluid
 - Windshield washer fluid
 - Mineral spirits

11. To ensure equipment is maintained at the station level, the company commanders will maintain the proper levels of the following supplies. The Supply Requisition Form on Operative IQ – FRONTLINE will be used to re-order and is submitted electronically.

- Vehicle wax
- Simple Green All-Purpose Cleaner DEF (Diesel Emissions Fluid) ordered from Logistics by the 5th of each month. It is recommended to evaluate DEF inventory when completing the end of month mileage report.
- All other supplies not included on the Form 111 or Operative IQ – FRONTLINE's Supply Requisition Form may be requested via an email to firesupply@baltimorecountymd.gov.

12. Tire Chains or Cable Chains - Two sets for each vehicle. One set will be carried on the vehicle during the months of November through April. Whenever a vehicle is permanently reassigned, the chains will be sent with it to the new location.

- When conditions for chains exist, stations housing reserve apparatus will ensure the unit is chained up prior to leaving the station when it has been called for to replace first line equipment. The chains installed at this time will be the second set kept at the reserve apparatus home station.
- Chief Officers may order all front line and reserve equipment within their Battalion to be chained up when, in their opinion, the situation warrants.

G. Tools to be carried in apparatus toolboxes: At a minimum, the following will be carried and inventoried weekly:

1. Engine:

- Assortment of screw drivers, both straight and Phillips head.
- One 10-inch adjustable wrench.
- One pair of vise grip pliers.
- One pair of needle nose pliers.
- One pair of lineman type pliers.
- One pair of diagonal type pliers.
- One pair of Standard slip joint pliers.
- One 14-inch pipe wrench.
- One pair of 12-inch channel lock pliers.

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- One set of open and box end wrenches ½ thru 1½, standard and metric.
 - One claw-type hammer.
 - One dead blow hammer, 3 lbs.
 - One set each of Allen wrenches, standard and metric.
 - Two wooden sprinkler wedges.
 - One toolbox.
 - TORX driver set.
 - Metric and standard socket wrenches.

2. Truck:

- Assortment of screw drivers, both straight and Phillips head.
- One 10-inch adjustable wrench.
- One pair of vise grip pliers.
- One pair of standard-type slip joint pliers.
- One pair of lineman's pliers.
- One pair of diagonal pliers.
- One pair of needle nose pliers.
- One pair of 12-inch Channel lock-type pliers.
- One 14-inch pipe wrench.
- One set of open end and box end wrenches ½ thru 1½, standard and metric.
- One set of metric open end and box end wrenches, 5mm through 17mm.
- One set of Allen wrenches, metric and standard.
- One hacksaw and blades.
- One pair of tin snips.
- One dead blow hammer.
- One claw hammer.
- One set of standard and metric 3/8-inch socket set, through bolt-type.
- One set of standard ¼-inch socket set, through bolt-type.
- 2 toolboxes.
- TORX driver set.
- Set of crescent wrenches.

3. Medic

- Assortment of screwdrivers, both straight and Phillips head.
- One pair of standard slip joint pliers.
- One 10-inch adjustable wrench.

SECTION 2: CLEANING OF FRONT LINE AND RESERVE APPARATUS

- A. All apparatus shall be cleaned when dirty.
- B. Tires and wheels will not be washed for at least one hour after the apparatus returns to quarters.
- C. All compartments shall be cleaned weekly to include the preventive maintenance of all portable equipment to include gas, hydraulic and electric equipment and appliances. This includes lubrication utilizing WD-40 of all compartments, chassis door hinges, latches, sliding steps, roll out compartments, and shelves.

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- D. All apparatus shall be waxed at least every three months.
- E. All stored apparatus is to have a complete preventive maintenance check and road test on Sundays until the engine temperature reaches a minimum of 180 degrees Fahrenheit. During this road test, the driver should be alert for any problems with steering, transmission, brakes, etc. Any deficiencies shall be documented in Operative IQ – FRONTLINE and a repair request shall be submitted through the electronic reporting system.

SECTION 3: REPAIR OF APPARATUS AND EQUIPMENT

- A. The instructions of the Fire Maintenance supervisor (FM1) or Fire Maintenance Liaison (FM2) shall be strictly followed relative to the care and operation of apparatus and no repairs or alterations shall be made without proper authorization.
1. Members shall not change or alter the arrangement of firefighting equipment on apparatus, nor otherwise disarrange the system in effect, unless approval has been received from all station Captains in writing.
 2. Mechanical defects in apparatus or equipment shall be reported to the Company Commander.) immediately upon discovery, and shall be submitted as soon as practical through the electronic reporting system. If the mechanical issues require URGENT attention, you must contact Fire Maintenance supervisor (FM1) or Fire Maintenance Liaison (FM2) via telephone during the hours of 0630 to 1430 for immediate guidance on where to take the vehicle.
 3. Officers will immediately contact the Battalion/Deputy Chief and make them aware of conditions that require their knowledge or actions immediately. Under no circumstances will necessary actions be delayed and thereby passed on to an oncoming shift.
 4. No equipment will be allowed to lay loose in any cab area of any apparatus. All equipment in cab area must be securely mounted with a positive type device.
 5. Basic repairs such as tightening of all loose screws and bolts should be accomplished by the Fire Apparatus Driver Operator or the Company Commanders designee.
- B. Upon the arrival of a mechanic at the station, the officer-in-charge shall:
1. Assign the F.A.D.O, Alternate F.A.D.O. or Medic Unit Driver to inform and assist the mechanic. NOTE: The mechanic may be asked to perform any additional minor repairs while at the station, but he must first obtain authorization from Fire Maintenance.
 2. The Battalion/Deputy Chief and the A.D.O. are to be notified immediately, via phone or ADO talk group when:
 - a. Apparatus is placed out-of-service due to the need for repair
 - b. When apparatus is placed back in service after the repairs have been completed.
 - c. When authorized replacement or repairs are accomplished by fire station members, a request in the electronic reporting system shall be submitted that includes the following information:
 - i. "Work Completed at station level" identified
 - ii. A description of the item(s) repaired or replaced
 3. Reporting to Fire Maintenance
 - a. FM 1 or FM 2 must be contacted prior to leaving the station prior to reporting to Fire Maintenance as personnel may be directed to pick up additional equipment on the way.

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- b. Upon arrival at Fire Maintenance, roll up all windows and place portable radios on talk group A4. If directed to park outside, plug the unit in and turn on the electrical switch associated with the charging cord at the electrical box. The switch must be turned on for the cord to charge the unit. When retrieving a piece of apparatus that is plugged in, turn off the electrical charging cord, roll it back up, and place on the hanger.
 - c. Equipment will be cleaned of all trash and debris before the unit is checked into Fire Maintenance. Any trash in biohazard bags or used items potentially used for BSI or patient care will be properly discarded, and any trash bag will be removed from the unit.
 - d. Upon completion of the work by Fire Maintenance, the crew taking the unit will:
 - i. Complete a pre-trip inspection
 - ii. Immediately notify FM2 (DC/BC after hours) when:
 1. When a service request has not been addressed. Should any of the outstanding service requests not be completed, the unit will not be placed back in service until all work is accomplished.
NOTE: There may be an isolated situation where the unit goes back in service regardless of the completion of the service requests. This will be an exception to the rule and will be determined by the OIC of Logistics or FM2.
 2. All the equipment is not accounted for
 3. Equipment is in poor condition
 4. Apparatus is in poor condition or new damage is identified
 - e. The OIC of Logistics (DC/BC after hours) will make the final determination if apparatus is not accepted from Fire Maintenance. Under no condition will company commanders or crews reject equipment without approval from the OIC of Logistics or DC/BC.

C. Tires on vehicles maintained by Fire Maintenance

1. Tread Depth Determination
 - a. The tread depth of each tire on the vehicle will be measured and recorded in Operative IQ – FRONTLINE on the first of each month. Additionally, the tread depth of each tire on the vehicle shall also be visually inspected each shift. This will allow adequate notice before tires reach minimum tread depth so that a buffer exists for planning and scheduling replacement.
 - b. Any tire on the front wheels shall have a tread groove pattern depth of at least 4/32 of an inch when measured at any point on a tread groove. The measurement shall not be made where tie bars, humps, or fillets are located.
 - c. All other tires shall have a tread groove pattern depth of at least 2/32 of an inch when measured in a major tread groove. The measurement shall not be made where tie bars, humps, or fillets are located.
2. Immediate vs. routine replacement shall be determined using Section 1.A.2
 - a. Immediate Need: Fire Maintenance shall be immediately contacted when tread depths approach the minimum acceptable depth, when tires are found to be damaged, or safety is of concern.
 - i. Monday – Friday 0630-1430 and during extended open hours, contact Fire Maintenance supervisor (FM1) or Fire Maintenance Liaison (FM2) for all tire repairs.
 - ii. After normal shop hours, contact ADO for service. ADO will contact the on-call mechanic who will determine the need for a vendor response. Note: Under no circumstances are Fire Department Employees to call the tire vendor for service.
 - iii. It shall be the responsibility of Fire Maintenance to inspect damaged tires and determine if they are serviceable enough to be repaired or in need of replacement.

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- iv. Stations will have the following information ready for any service request:
 1. Specific location of the apparatus.
 2. Size and manufacturer of the tire to be replaced.
 3. The use of the tire (i.e., drive tire/steering tire).
 4. After service is completed, forward all bills to Logistics through departmental mail.
 3. Regular Wear Replacement.
 - a. Submit an electronic service request for replacement when tread depths approach the minimum acceptable depth and when tires are found to be damaged
 - b. Fire Maintenance will schedule any and all tire replacement.

SECTION 4: VEHICLE TOWING POLICY

- A. During normal hours of operation of Fire Maintenance, Monday through Friday 0630-1430 hours, all towing requests are to be referred to Fire Maintenance.
- B. When Fire Maintenance is closed, the A.D.O. will advise the on-call mechanic of the situation. The on-call mechanic will use discretion as to when to respond and check out the unit prior to towing. (Staff vehicles are towed by VOM, not Fire Maintenance.)

SECTION 5: MARKING EQUIPMENT

- A. All emergency equipment issued to companies is to be plainly marked with proper adhesive equipment sticker or stenciled with company number so as to avoid confusion in identification at the scene of the emergency.
- B. The tools and equipment on the apparatus shall be cleaned and painted as needed.

SECTION 6: FIRE HOSE

- A. Amount carried on each apparatus
 1. Engines
 - a. One thousand feet of 4" and five hundred feet of 3" fire hose
NOTE: An engine will not be considered "out-of-service" as long as it has at least five hundred feet of supply hose in the bed and a full booster tank.
 - b. A minimum of two hundred fifty feet of 2-1/2 inch hose for use as a hand line. A minimum of five hundred feet of 1-3/4" inch hose
NOTE: The condition of the 1-3/4" hose will not affect the "in service" or "out-of-service" condition of the engine.

Due to manufacturer-specific performance and friction loss factors of each type of hose, hoses of different manufacturers are not to be mixed or matched together and utilized under any circumstances.

- B. Care of Fire Hose

1. Before hose is removed from apparatus for change, the necessary replacement sections will be properly prepared and couplings examined.
2. Hose carried on the apparatus shall be securely coupled and orderly in arrangement. Special care shall be exercised to see that fitted gaskets are in place and that those which are deteriorating are replaced.
3. A small amount of flake graphite may be used as a lubricant for hose coupling threads.
4. Hose shall not be allowed to remain on the apparatus in a dirty condition in excess of 24 hours.
5. Dirty hose and suction sections shall be washed with cold, car wash soap or mild detergent water only. No other cleaning agent will be used for this purpose without permission of the OIC of Logistics.
6. Hose returned to the station during the day shift's tour of duty, which requires washing will be washed the same day. Hose returned on the night shift's tour of duty shall be washed the following day.
7. As a protective measure, when handling hose, it shall be carried (where possible), not dragged. Care shall be exercised in "breaking" hose lines inside of buildings to see that water damage is kept to an absolute minimum.
8. Any hose used to discharge foam or wet water solutions shall be flushed with fresh water after use for three minutes.
9. The Company Commander shall be held strictly responsible for the proper storage of hose in quarters.
10. Police action shall be requested when hose in use at fires or drills is driven over by drivers of unauthorized vehicles. Apparatus shall not be driven over any hose line.
11. All hose 3" or larger will be marked with the unit ID within the first five feet of each coupling with a BLACK permanent marker (i.e. E-1). When the identification becomes excessively marred, the couplings shall be remarked.

C. Hose Repair or Replacement

1. Hose sent to Logistics for repair or replacement shall be clean, dry and properly rolled.
2. Hose will have a rag or tape attached at the damaged location.
3. A tag shall also be attached, with a brief description of the damage location and type, along with hose serial number. Example: Hose leaks 4 ft. from the male connection.
4. Any time fire hose is returned from repair or replaced, it shall be tested by the company as outlined in SOP 400-23 prior to being placed back in service.

D. Hose and Compartment Covers

1. Hose compartments shall have either a cover or cargo strap on them at all times, if so equipped.

E. Pierce Engine Hose Load Configuration

1. Front bumper – 150' of 1 3/4" attack line with 175/50 fog nozzle
2. Crosslays x 2 – 200' of 1 3/4" attack line with 175/50 fog nozzle, both flat loaded
3. Rear hose bed from left to right:
 - a. 500' of 1 3/4" attack line flat loaded with 15/16" smooth bore nozzle
 - Modified-Minuteman, or Horseshoe

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- b. 500' of 1 3/4" attack line flat loaded with 15/16" smooth bore nozzle
 - Modified-Minuteman, or Horseshoe
 4. 500' of 3" supply line
 5. 1000' of 4" supply line
 6. 250' of 2 1/2" attack line with 1 3/16" smooth bore nozzle

SECTION 7: SALVAGE COVERS

- A. Covers used at fires shall be thoroughly examined, washed and immediately hung to dry after use.
- B. When covers are found to be in need of repair, Company Commanders shall email firesupply@baltimorecountymd.gov with a description of the damage, and the OIC of Logistics shall determine if a repair kit will be sent to the station, or if the cover will be replaced. Covers shall be taken from apparatus, hung for 24 hours and refolded every four (4) months
- C. Salvage covers shall not be left at the scene for greater than 48 hours. After 48 hours, the salvage covers can be retrieved.

SECTION 8: AERIAL AND GROUND LADDERS

- A. Aerial ladders shall be cleaned/inspected weekly, and lubricated per manufacturers' recommendations, all maintenance and weekly inspections shall be documented in OPERATIVE IQ – FRONTLINE.
- B. The weekly aerial inspection will include:
 - Verify aerial PTO engagement inside cab works properly
 - Verify all communication systems operate properly
 - Verify outrigger controls and switches work properly
 - Verify level indicators at front of body are not damaged and function properly
 - Remove caps at waterway inlets and lubricate
 - Check caps and chains are secure and in place for waterway inlets
 - Exercise the valves at all waterway inlets
 - Verify turntable console controls function properly
 - Check lighting at turntable and controls works properly
 - Visual check of the pivot pins and securement bolts
 - Verify intercom at turntable to tip works properly
 - Inspect aerial for cracked or damaged welds
 - Check ladder rungs and rung covers for damage
 - Aerial track/walkway lighting is operating properly
 - Check waterway nozzle operation and function
 - Inspect waterway for damage
 - Lubricate waterway
 - Check equipment in fly section to ensure it is secure
 - Visual check of hydraulic cylinders, lines, hoses and fittings for leaks NOTE: If leaks are present check hydraulic fluid level
 - Visual check of aerial cables for damage and tightness
 - Visual check of ladder slides and rails for damage or debris
 - Check waterway for operation and for damage when extending and retracting ladder

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- Check operations of manual backup systems
 - Check the energy track for excessive slack or damage
 - Check hydraulic fluid level
 - Check that fast idle is operating properly with aerial operation
 - Check turntable alignment indicator is properly aligned
 - Check aerial pivot pin keepers (bolts)
 - Check tip camera for function, if equipped
 - Check any and all of the special features unique to the vehicle
- C. The monthly aerial inspection will include:
- Aerial ladders and outriggers are to be cleaned and lubricated to the manufacturer's specifications each month
- D. Aerial Ladder Trucks - both tractor-drawn and straight-chassis - - all maintenance shall be performed as outlined in the operator manual located on the Fire-Rescue Academy website under *Driver Training > Resource Material*.
- E. Ground ladders shall be inspected and cleaned quarterly and after each use as follows:
- Check Heat Sensor labels for expiration or a change indicating heat exposure
 - Ensure all labels are in place and readable
 - Inspect all rungs for snugness and tightness
 - Inspect all bolts and rivets for tightness
 - Inspect welds for cracks or apparent defects
 - Inspect beams and rungs for cracks, breaks, gouges, wavy conditions, and deformations
 - Inspect butt spurs for excessive wear or other defects
 - Inspect halyards for proper tension, fraying and kinks
 - Inspect pulleys and associated hardware for proper operation and condition
 - Inspect roof hooks for sharpness and proper operation
 - Inspect ladder slide areas for galling
 - Inspect pawl assemblies for correct operation
 - Inspect wire rope on 3- and 4-section ladders for snugness when ladder is in bedded position to ensure proper synchronization of upper sections during operation
 - Check that all labels and appropriate markings are present and legible
 - Check the diagonal brace on the base of a folding ladder for damage
 - Inspect the hinge assembly and locking pins on a multipurpose ladder for damage
 - Ensure ladders are clean with no buildup of grease, dirt, or grime
 - Ladders are to be lubricated with spray graphite, not WD-40

SECTION 9: PUMPS

- Lubricate pump control handles
- Lubricate pump controls behind pump panel by opening panel and utilizing spray lubricant
- Remove and lubricate any valves attached to intakes
- Clean and lubricate master stream appliances
- Exercise all drains

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- Exercise all valves, intake and discharge
 - Verify the operation of all primers
 - Lubricate buckles of hose restraint system
 - Check and verify function of Humat restraining device

SECTION 10: ROPE AND RELATED HARDWARE

A. Care

1. Rope should be cleaned and allowed to dry completely before being stored.
2. Washing rope by hand will suffice. Place the rope into a utility sink filled with water and a mild detergent. Scrub the rope with a soft bristle brush. When the rope is clean, rinse it thoroughly in clean water to remove detergent. Gear extractors and washing machines are not to be used for cleaning rope under any circumstance.
3. Any rope not able to be cleaned as described above should be sent to Station 17 for evaluation.
4. Wet rope should never be left where it may freeze.
5. Wet rope should be hung up or laid in a loose coil, in a dry place, out of direct sunlight, until thoroughly dry.
6. Rope should not be left in contact with any sources of heat or in an acidic environment with acid fumes.

B. Inspection

1. Rope shall be inspected quarterly, and after each use.
2. Rope shall be inspected, by examining the entire length of the rope, checking for fraying, wear, abrasions, broken or cut fibers, glazing, discoloration and rotting.
3. Rope that has failed inspection or has lost faith should be sent to Station 17 for evaluation.
4. Rope inspection and cleaning shall be recorded in Operative IQ - FRONTLINE. This is completed under each individual rope Asset for the unit to which it is assigned by selecting "Perform Maintenance" within the Assets tab.

C. Complement of rope carried on each engine:

One (1)- 50 foot section of 1/2 inch nylon utility rope

D. Complement of rope and hardware carried on each ladder truck:

1. Two (2) sections, 300 feet each, Static Kernmantle - 1/2 inch Life-Safety Rope
2. One (1) section, 150 feet, Static Kernmantle - 1/2 inch Life-Safety Rope
3. Two (2) sections, 100 feet each, 3/8 inch nylon tag lines
4. One (1) - 100 foot section of 1/2 inch nylon utility rope
5. Four (4) - Class-3 Rescue Harnesses
6. Ten (10) - Auto-Locking Carabiners
7. Six (6) – Single Pulleys
8. Two (2) – Double Pulleys
9. Two (2) – Multi-Purpose Devices (decent/progress capture)
10. Four (4) – Anchor Straps
11. Two (2) – Sets of each: 1" webbing color/length; 30' Black, 20' Green, 15' Red, 12' Blue, 6' Yellow

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- 12. Five (5) – Prussik Sets
 - 13. One (1) – Stokes Basket with bridal and tie-ins
- E. Rescue Rope, harnesses, and hardware from apparatus needing replaced must be sent to Station 17 and inspected by ATR 1 or their designee for disposition.
- F. See *SOP Tactical 18 – Rapid Intervention Team* for additional rope and hardware complements.

SECTION 11: FIRE EXTINGUISHERS

- A. Fire extinguishers on apparatus are to be sent to Logistics for refilling.
- B. Each station shall maintain no more than one (1) dry chemical extinguisher, and one (1) Co2 extinguisher as spares.
- C. All Co2 extinguishers in the on the apparatus are to be evaluated after use to determine if they need to be refilled.
- D. Do not send Co2 extinguishers to Logistics unless they are at least half empty.
- E. Do not discharge the entire contents before sending it to Logistics. (Unless entire contents have been expelled in an emergency.)
- F. All dry chemical extinguisher shall have the vision gauge checked weekly.
- G. . No apparatus or station number will be affixed to these cylinders.

SECTION 12: APPARATUS AND EQUIPMENT, GENERAL

- A. All apparatus will be parked in quarters at all times with the air parking brake engaged.
- B. Shore lines will be used for units parked in stations to ensure proper charging is maintained.
- C. Every piece of Fire Department apparatus regardless of type shall have an EZ PASS Maryland Transponder affixed to the windshield at all times.
- D. Refueling Apparatus: During refueling of apparatus, extreme caution shall be exercised.
- E. Refilling Diesel Exhaust Fluid (DEF): Extreme caution shall be exercised when refilling DEF into a vehicle. Positive identification prior to dispensing will avoid any errors and prevent accidental cross-contamination. DEF containers are usually labeled with clear indications that it is not for use in the fuel tank. Fuel caps and DEF filler openings are also labeled. Positive identification of the proper openings and products prior to dispensing is imperative. DEF shall be filled when the DEF gauge reads ½.
- F. During freezing weather, 32 degrees F or less, all brush unit tanks and pumps shall be drained and remain drained until the Spring. That does not place the unit out of service. It is either filled prior to leaving quarters or filled at the scene.

G. Rotary saws, Chain Saws, and all gas-powered equipment:

1. Blades will be utilized according to manufacturer specification and task.
2. On Sunday of every week, all gas-powered appliances will be started and test run until they reach their normal operating temperatures.
3. The first Sunday of each month, the blade, the backing plates and nut on all power saws must be loosened as much as possible without removing and then tightened securely.
4. Extreme caution shall be exercised at all times when operating gas powered appliances.
5. Note: at no time shall a carbide tip blade be used on a Stihl rotary saw.

H. Salt Water: Pumping mechanisms and engine cooling systems in which salt water has been used must be thoroughly flushed with fresh water. All other equipment where salt water has been used shall be thoroughly cleaned with fresh water. Notify Fire Maintenance immediately.

SECTION 13: CARE AND MAINTENANCE OF THE HUMAT VALVE

- A. Testing of the Humat valve shall consist of operating the control valve manually and by making a visual inspection of the unit by members of the oncoming shift on their first day of duty.
- B. Every April 1st and October 1st, the unit shall be placed on a hydrant and pumped through and noted in the pre-trip.
- C. For repairs to Humat valves, the appliance shall be tagged, and transported to Logistics so that a loaner Humat can be issued during the repair.

SECTION 14: BACK-FLUSHING FIRE PUMPS

- A. The objectives of back-flushing the fire pumps are to:
 1. Reverse the normal direction of water flow through the fire pump and relief valve.). NOTE: Do not exceed 50psi.
 2. Flush out contaminates, corrosive materials, abrasive materials, and debris that may be lodged within the impellers, piping and valves.
 3. Fire pumps are to be back-flushed prior to the annual pump test, and after the following operations (training or fireground):
 - i. Drafting (fresh or salt water)
 - ii. Water shuttles
 - iii. Foam operations
- B. Procedure to back-flush a fire pump.
 1. First, flush out the fire hydrant until the water flows clear.
 2. Connect a line from the hydrant to the highest 2 1/2" DISCHARGE usually the deck gun.

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3. Open all 2 1/2", 4", 5" and 6" intakes and discharges, removing caps, screens and appliances.
Disconnect preconnected front suctions or remove caps.
 4. Control the pressure and flow with the discharge valve for the line connected to the hydrant.
 5. Check for debris that has collected behind the screens on intakes.
 6. Operate relief valve (on-off). Repeat several times.
 7. Operate the transfer valve (if equipped). Repeat several times.
 8. Flushing operations should continue for approximately 5 minutes or more.
 9. After flushing operations have been completed, return all appliances, pre-connects, transfer valve and relief valve to the normal operating positions and refill the fire pump with water.

SECTION 15: SNOW CHAINS

NOTE: Always follow the manufacturer's instructions

A. Installation

1. The cable chain should be draped at least 4 inches over each side of the tire from the edge of the tread.
2. The round hook connector should be on the inside of the tire: flat hook connector should be on the outside of the tire. Smooth portion of the connectors and cross members hooks should be against the tire. (Marked "TIRE SIDE").
3. At the outer end fastener, the end hook should be connected to the second lug from the end of the side cable (if fitment allows). The first or end lug is primarily intended to help during installation.
4. At least one rubber tensioner should be installed one each chain and hooked into each of the seven-side cable tightening hooks.
5. All rubber tighteners should be "seated" down into the side cable tightener hooks on the side cable.
6. Manufacturers of cable chains recommend a maximum speed of 30 miles per hour. Do not drive with cable chains on dry pavement. In addition, running on bare pavement for extended periods can also damage tires.
7. In the event that a side chain or cable chain breaks stop and REMOVE the chain, order a new complete set. Should more than half of all cross-links/members become worn, a complete replacement set should be obtained.

8. All chains shall be inspected and tested on apparatus during the month of August as part of monthly station duties.

B. Ordering Chains.

1. Each year during the month of September, chains are to be ordered from Logistics.
2. All chains/cables for vehicles maintained by EM will be ordered in Operative IQ – FRONTLINE from Logistics.
3. When ordering radial cable chains and cross cables for trucks and engines, you must specify tire size, singles or duals, and the apparatus.
4. Two (2) sets of tire chains will be maintained for each piece of apparatus. One as a primary set, and one as a spare.

APPENDIX B

Definitions

Adjust. To maintain or regulate, within prescribed limits, by setting the operating characteristics to specified parameters.

Alignment. To adjust components to bring about optimum or desired performance.

Authority Having Jurisdiction. The organization, office, or individual responsible for approving equipment, materials, and installation, or a procedure.

Calibrate. To correlate the reading of an instrument or system of measurement with a standard.

Collector Rings. A means of transmitting electrical power to the aerial device turntable from the main power supply; usually, concentric rings made of brass that are contacted by brushes to make the transfer to the specific electrical functions.

Component. A constituent part of a mechanical or electrical device.

Defect. A discontinuity in a part or a failure to function that interferes with the service or reliability for which the part was intended.

Defective. Having a defect, or faulty.

Deformation. Abnormal wear, defects, cracks or fractures, warpage, and deviations from the original condition that would affect safe and correct operation.

Documentation. The process of gathering, classifying, and storing information.

Failure. A cessation of proper functioning or performance.

Fire Apparatus. A vehicle used for fire suppression or support by a fire department, fire brigade, or other agency responsible for fire protection.

Combination Fire Apparatus. A vehicle consisting of a pulling tractor and trailer.

Single Fire Apparatus. A vehicle on a single chassis frame.

Frame. The Basic structural system that transfers the weight of the fire apparatus to the suspension system.

Inspect. To determine the condition or operation of a component(s) by comparing its physical, mechanical, and/or electrical characteristics with established standards, recommendations, and requirements through examination by sight, sound, or feel.

Interlock. A device or arrangement by means of which the functioning of one part is controlled by the functioning of another. **Ironing.** Damage in the form of wear or indentations caused to the bottom of the aerial device base rail material by misalignment or malfunction of the rollers.

Leakage. The escape of a fluid from its intended containment, generally at a connection. The three classes of leakage are defined.

Leakage Class 1. Seepage of fluid, as indicated by wetness or discoloration, not great enough to form drops.

Leakage Class 2. Leakage of fluid great enough to form drops, but not enough to cause drops to fall from the item being inspected.

Leakage Class 3. Leakage of fluid great enough to cause drops to fall from the item being inspected.

Maintenance. The act of servicing a fire apparatus or a component within the time frame prescribed by the authority having jurisdiction, based on manufacturer's recommendations, local experience, and operating conditions in order to keep the vehicle and its components in proper operating condition.

Preventive Maintenance. The act or work of keeping something in proper condition by performing necessary preventive actions, in a routine manner, to prevent failure or breakdown.

Manufacturer's Recommendation (Specification). Any requirement or suggestion a fire apparatus builder or component producer makes in regard to care and maintenance of its product(s).

Modification. An alteration or adjustment to any component that is a deviation from the original specifications or design of the fire apparatus.

Operator Alert Device. Any device, whether visual, audible, or both, installed in the driving compartment or at an operator's panel, to alert the operator to either a pending failure, an occurring failure, or a situation that requires his or her immediate attention.

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- Optical Source.** Any single, independently mounted, light- emitting component in a lighting system.
- Overhaul.** To inspect, identify deficiencies, and make necessary repairs to return to component to operational condition. **Power Train.** The parts of a fire apparatus that transmit power from the engine to the wheels, including the transmission, split shaft power takeoff, mishap pump transmission, drive shaft(s), clutch, differential(s), and axles.
- Powered Equipment Rack.** A power-operated device that is intended to provide storage of hard suction hoses, ground ladders, or other equipment, generally in a location above apparatus compartments.
- Proper.** As recommended by the manufacture.
- Qualified Person.** A person who, by possession of a recognized degree, certificate, professional standing, or skill, and who, by knowledge, training, and experience, has demonstrated the ability to deal with problems relating to a particular subject matter, work, or project.
- Repair.** To restore to sound condition after failure or damage.
- Replace.** To remove an unserviceable item and install a serviceable counterpart in its place.
- Severe Service.** Those conditions that apply to the rigorous, harsh, and unique applications of fire apparatus, including but not limited to local operating and driving conditions, frequency of use, and manufacturer’s severe service (duty) parameters.
- Shall.** Indicates a mandatory requirement.
- Should.** Indicates a recommendation or that which is advised but not required.
- Steering Axle.** Any axle designed such that the wheels have the ability to turn the vehicle.
- Test.** To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.
- Operational Test.** A test to determine the operational readiness of a component on a fire apparatus by observing the actual operation of the component.