TOLEDO FIRE & RESCUE DEPARTMENT

D Manual - Maintenance Procedures

Date Revised: 07/01/2018

Last Modified: 09/03/2024 10:00

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MAINTENANCE BUREAU RESPONSIBILITIES

General

The Toledo Fire Maintenance Bureau is a working combination of Fire Department technicians supervised by the Fire Maintenance Officer and Fleet Operations mechanics and a service worker supervised by a Fleet Supervisor.

The Maintenance Bureau is responsible for the mechanical condition, repair, maintenance, and replacement of Department vehicles, apparatus, tools, and other equipment. In addition, the Maintenance Bureau is responsible for the testing for safety, performance, and reliability of such equipment as directed by TFRD procedures and NFPA standards.

This bureau participates in the writing of specifications and evaluation of new apparatus and equipment.

Apparatus, Vehicles, Tools and Equipment

The Fleet workers at the Maintenance Bureau are responsible for the maintenance and repair of all vehicles assigned to the Fire Dept. The Bureau-assigned firefighters are responsible for maintaining tools and equipment assigned to those vehicles.

In an effort to keep the number and seriousness of vehicle repairs to a minimum, a “maintenance day” schedule is in place, Monday — Friday. This schedule allows each rig to cycle through maintenance approximately every 6-8 weeks, except for the Aerial Devices and Heavy Squads that are scheduled monthly. This allows for a high level of apparatus reliability, Also in place is a PM program that can be

performed on the same day, when called for by the vehicle mileage.

Ladders

The Maintenance Bureau ensures that ground ladders meet or exceed NFPA 1932 (Standard on Use, Maintenance, and Service Testing of In-Service Fire Department Ground Ladders). The tests are conducted to meet NFPA 1932 standards and are performed for the annual testing requirement, after any ladder repair, when heat stickers indicate excessive heat or if the ladder is under any suspicion of being unsafe. Ground ladders and aerial ladders are tested and certified annually by an independent contractor.

High Pressure Breathing Air and Related Equipment

The Maintenance Bureau is responsible for the inspection, repair and general maintenance of the department’s SCBA’s, including facepiece, harnesses and the air bottles used with the SCBA.

To evaluate effective performance and correct any deficiencies, the Bureau performs annual flow tests on all SCBA’s, individual facepieces, along with facepiece fit testing in accordance with NFPA 1852 (standard on selection, care and maintenance of self contained breathing apparatus).

Inventories

The Maintenance Bureau maintains an inventory of firefighting equipment, parts for repairs, station supplies and Fire Personal Protective Equipment. These inventories are maintained on an excel spreadsheet and submitted yearly to the Chief Financial Officer.

Supplies

The Maintenance Bureau provides all the stations and bureaus with many types of requested supplies. The supply request form includes over sixty (60) items, from ant spray to wax applicators. The request forms (300-4) are received, filled and delivered monthly.

Personal Protective Equipment

Another aspect of the Maintenance Bureau is the issuing, testing, repairing and replacement of fire turnout gear. When turnouts arrive at the Maintenance Bureau, the proper disposition of the gear is determined and completed in an appropriate and timely manner.

Miscellaneous Items

Other duties include the repair and custom fabrication of hoses, nozzles, and other specialty tools and equipment.

APPARATUS AND MOTOR VEHICLES

General Operations

If any TFRD apparatus fails to start, or experiences a mechanical breakdown, notify dispatch immediately. Dispatch will notify the Maintenance Bureau and the appropriate Battalion Chief.

If needed, Chief Officers will make provisions to pick up extra apparatus in storage at the shop.

If the siren or emergency lights fail during response, Continue Code 2 and notify dispatch.

1. If the engine stalls and fails to restart (not pumping)

- Notify Incident Command via radio; IC will notify dispatch and dispatch will notify the Maintenance Bureau.

> **IF TEMPERATURE IS BELOW 32 DEGREES, ALSO DO THE FOLLOWING:**

- Open **all** drain valves.
- Remove **all** discharge and intake caps and adapters including both big ways.
- Open all discharge and intake valves.

2. If engine stalls and will not restart (while pumping)

- Notify Incident Command and Attack crews via radio; IC will notify dispatch and dispatch will notify

the Maintenance Bureau.

- Keep water flowing using hydrant pressure.
- **NOTE: If lines off the engine are still in use, the first priority is to interior attack crews and the fire. Continue flowing water from the hydrant to the nozzle using hydrant pressure allowing crews to withdraw if necessary.**
- Put pump in road gear.

> **IF TEMPERATURE IS BELOW 32 DEGREES, ALSO DO THE FOLLOWING:**

- Open **all** drains and remove caps from all intake and discharge ports not in use.
- When you are no longer flowing water and are able to shut down, complete any steps listed above in item 1, for "**Temperatures below 32 degrees**" that have not been accomplished.

Diesel Emission Control

All diesel engine powered vehicles in the TFRD fleet with a manufacture date of 2008 or later are equipped with Diesel Emission Control systems that include Diesel Particulate Filters (DPF). Vehicles manufactured in 2013 or later also utilize Diesel Exhaust Fluid (DEF) in combination with DPF. Both DPF and DEF are part of the diesel emission control systems, and require system monitoring of the DPF, and a daily level check of the DEF. All diesel vehicles added to the TFRD fleet will be equipped with both DPF and DEF systems.

Diesel Particulate Filters are part of the exhaust system and utilize the high temperature of the exhaust gases to more thoroughly burn off the products of diesel combustion before they are released to the atmosphere. These filters periodically require a self-cleaning regeneration process, (Re-Gen). This is accomplished by activating the Re-Gen system switch, and allowing the vehicle to automatically go through cycles of high idle. Over a 15-30 minute period, sufficient heat will be developed for the system to clean the filter.

When the dashboard indicator alerts that a Re-Gen is needed, initiate a Re-Gen as soon as possible. The indicator will change from constant to flashing as the urgency increases.

Re-Gen is disabled if the check engine light is on. Notify Fire Shop for instructions.
Re-Gen is also disabled if engine temperature is less than 150 degrees.

Parked Re-Gen Process

On level ground, set the parking brake and activate the Re-Gen system. During a Re-Gen the exhaust output will be extremely hot. Adequate clearance for people and objects shall be maintained. Re-Gens **SHALL** be done outdoors, and the vehicle shall not be reconnected to the Plymovent system until the

High Exhaust System Temperature (HEST) warning has returned to normal.

Emergency Re-Gen Process

A flashing indicator ***plus*** an audible alarm requires an immediate on the spot Re-Gen. Notify dispatch of your location, initiate Re-Gen process and then update dispatch with the results of the Re-Gen. If the alarm still sounds after Re-Gen, or if the STOP immediately indicator is **EVER** activated, keep vehicle where it is, shut off engine, and notify the Fire Shop. In the event of an after-hours emergency shutdown, notify dispatch and your Battalion Chief.

Diesel Exhaust Fluid

Referred to as DEF, it is atomized into the DPF system when the engine is running and is used to keep the particulate filter clean and require a Re-Gen less often. The level of the DEF shall be checked every morning as part of the 0700 vehicle inspection, and added as needed; maintaining a minimum 1/2 tank at all times. DEF is supplied to stations in 55 gallon drums. Notify the Shop ASAP when empty.

It is the responsibility of officers and vehicle operators to familiarize themselves with these systems as they are introduced into the fleet. Vehicle specific instructions are posted on the driver’s side visor and fully explained in the vehicles’ manual.

VEHICLES / DRIVING

Air Brake Maintenance

Every week on tool day, every driver of an apparatus equipped with an air braking system shall purge the petcock on the reservoir of the air brakes to rid the system of accumulated moisture. If this is not done, especially during cold weather, the system could easily freeze and render the brakes useless.

The Maintenance Bureau has installed dryers on the apparatus with air brakes, but the driver must still drain the reservoirs every week on tool day.

Additional care must be given to the air braking system in cold weather as detailed in "Cold Weather Operations - Apparatus and Equipment Concerns - Additional".

Vehicle Fuel Management

The use of Fire and Rescue Department vehicles is to be limited to essential trips. Avoid single errand trips by trying to combine more than one objective into one trip. If possible, substitute telephone contact, e-mail or use Fire and Rescue Department mail for correspondence.

Enforce proper driving habits (non-emergency).

- Observe all posted speed limits,
- Avoid abrupt starts and stops. These abrupt actions are very hard on all components.
- Avoid “foot to floor” high-speed accelerations.

Officers and Chief Officers will be held responsible for implementation and enforcement of these measures.

Check Engine Light

If the check engine light comes on look for a serious problem that requires immediate attention. Check your dashboard gauges and lights for indications of low oil pressure or overheating. These conditions mean you should return to the station and shut off the engine as soon as you can. Contact the shop as soon as practical. If after hours contact your Battalion Chief who will contact the shop.

Stop Engine Light

Stop Engine Light means the on board computer system (ECU) has detected an potential serious problem that if continued would do damage to the engine. The next possible level above that warning is the engine shutting itself down. Pull the vehicle over ASAP and shut it off. Contact the shop before returning to the station. If after hours contact your Battalion Chief who will contact the shop.

Vehicle Checks/Fuel Levels

At the 0700 check, all tools and equipment carried on each response vehicle shall be inventoried and compared to the apparatus inventory form. The completion of the inventory is to be noted in the journal. The Officer on duty is responsible to assure that the same complement of tools and equipment is present on the vehicle after each response and at the end of the shift.

Any loss of tools or equipment that occurs during the shift is to be detailed on a communication and sent

to the fire shop through the Officer on duty and the Battalion Chief.

Any addition of tools and equipment made to the vehicle's inventory during the day is to be noted in the journal and added to the apparatus inventory form.

Response vehicles shall be checked daily using the 0700 check list, form 300-14 ***(See TFRDWeb station dashboards for form)**, and refueled as necessary. The fuel level in all response vehicles **shall** be kept 1/2 full or greater at all times. The only exception would be on extended or multiple emergency responses that do not allow time to refuel. In these cases, the vehicles **shall** be refueled at the next opportunity.

Staff, service and non-response vehicles should be checked for fluid levels and general safety when refueling, The fuel level shall be kept at least 1/2 full or greater. Drivers are responsible for leaving these vehicles with the necessary level of fuel.

Refueling of Apparatus

Fire and Rescue Department drivers must be present when refueling takes place and assure that the proper fuel is used. This is especially important when at the scene of a fire or other emergency and fuel must be transported to the site.

Fire vehicles and tanks that use or contain diesel fuel are clearly marked. Refueling should be done at designated places except in emergency situations.

Do not over fill fuel tanks, especially in warm months. (Fuel expands when its temperature rises.)

All personnel are issued a city fuel card. This card provides access to both diesel and gasoline pumps. When fueling, be sure to accurately enter the vehicle number and mileage.

If the fuel card reader is not allowing you to fuel, use an officer’s fuel card as they all have an override capability.

- Immediately report lost or stolen fuel card to your immediate supervisor and the Maintenance Officer.
- If your card is not working, notify the Maintenance Officer.
- To replace a fuel card; complete a “City of Toledo Employee Fuel Card Form” ***(See TFRDWeb station dashboards for form)**.

Fueling Gas Cans

- When card reader asks for vehicle ID - enter #341002.

- When it asks for mileage - Enter #1.
- Pre-mix 2 stroke fuel is at the shop.
- Top off fuel cans when at the shop for repairs or maintenance.

Maintenance Day Procedures

- If you are scheduled for maintenance day at the shop you shall be **at the shop by 0800**.
    - Call and let the wheel officer know if you are going to be late.
- Have a written list of issues you want addresses while in for maintenance day.
- You will be assigned an extra apparatus once at the shop
- If you are bringing in a ladder truck, you may need to stop and pick up a reserve on the way to the shop. Discuss this with the shop before
- Plan on returning to the shop to pick up your apparatus after 1430.
- You will be notified maintenance is complete.
- If so desired, you may use the power washer / steam cleaner to clean the apparatus, compartments and / or tools assigned to your rig when you return to pick up the rig in the afternoon.
- Advise shop personnel know if you want to do this.

Delivering and Picking-Up Apparatus from the Shop

When delivering or picking up apparatus at the Maintenance Bureau, the person or persons delivering that apparatus shall first go to the office to notify the Maintenance Bureau personnel that the apparatus has arrived or is leaving.

At this time, either the Maintenance Bureau or the driver of the vehicle will drive the vehicle into the Maintenance Shop. Do not block the overhead door leading into the building.

If the driver and/or crew are to wait at the Maintenance Bureau, they shall wait in the designated waiting area. Compliance with this procedure shall be the Company Officer's responsibility.

Backing-up Fire Apparatus

When it becomes necessary to back apparatus, drivers shall do so only after receiving a signal from a Fire and Rescue Department member or other authorized person who shall be stationed at the rear of the apparatus. The member stationed at the rear shall continue to provide direction to the driver until the apparatus has completed its backward movement.

Recognizing that under fire ground or other emergency conditions there may be times when this is impossible and no one is available, it shall be the Driver's responsibility to exercise all due caution when backing apparatus. Under these conditions, the driver shall dismount and check the rear area for clearance and safety before proceeding to back the vehicle.

Drivers of sedans shall exercise a turnaround for rear view inspection before backing. If a Fire Department member is available, they shall be used as a backer in these instances.

At no time shall the speed exceed **four (4)** miles per hour when backing. Failure to observe these safety requirements may result in disciplinary action.

Reference the Non-Emergency Procedure B-2 'Backing of Apparatus' for further information.

Backing up Fire Apparatus — Night time

Spotlights on the rear of the apparatus (if so equipped) should be turned on before the apparatus begins backing. A hand light should be carried by the guide to aid in backing the apparatus. At no time will the light be directed toward the driver's mirror. If there is ever a doubt as to the safety of the guide or the apparatus, stop the maneuver until proper adjustments are made.

Movement of Apparatus Notification

Apparatus status is maintained in the Fire Dispatch office showing the number, status, type, and location of all line and extra apparatus. It is important that when apparatus is changed from one station to another, either for repair or for storage, that the information be given to the alarm office.

It is the responsibility of the Officer on duty at the station to inform the dispatcher of any change of equipment in his/her station.

If equipment is moved from a station when the company is out of quarters, it is the responsibility of the individual moving the equipment to notify the dispatcher and note in the company journal.

COLD WEATHER OPERATIONS

Driving Procedures

From November 1 through April 1, these extra precautions shall be followed:

- Keep all pump discharge drains open.
- Circulate tank water through pump using the **wet-pump method** detailed below in Cold Weather Operations - Apparatus and Equipment Concerns.
- Purge the air brake system of moisture on tool day.
- Report hydrants used at an incident to dispatch before you leave the scene.

Be certain to give extra attention to driving for the conditions!

Apparatus and Equipment Concerns

Maintenance concerns while operating at fire scenes.

- Handling hose after use.
    - One firefighter can break, drain, and roll 2 lengths of hose without the hose freezing.
    - If reloading; break, drain, and reload one attack line at a time.
    - If hose is frozen, do not roll. Place hose in the bed of a Ladder Truck and return to the station to thaw.
- Engines not pumping (**at any fire or EMS run when the temperature is 32 degrees F or below**).
    - Engage pumps.
    - Open tank to pump valve.
    - Open tank fill valve.
    - Open drains on discharge ports.
    - Throttle to 800 RPMs.
- Engines used for pumping (November | to April | and any time the temperature drops to 32 degrees F or below).
    - After you obtain a hydrant supply, top off your booster tank if you pumped from it.
- Iced up Aerial Ladders
    - Shut down and drain the waterway **while elevated**

- Contact the Maintenance Bureau before attempting to retract or move unless the apparatus or crew is in immediate danger.

Apparatus and Equipment Concerns-Additional

Freezing water is an apparatus! biggest enemy during cold weather operations. These additional precautionary steps are to be followed in cold weather.

- When shutting down lines, open all bleeders to drain any water that might still be in lines. Also, drain all pressure and intake relief valve drains, if so equipped.
- For monitors with drains, open the drain. If not so equipped, upright the device.
- Pump freezing can be avoided by using the volume of water stored in your water tank to your advantage. The combined pump and tank water has sufficient volume that it would take a significant amount of time to get to freezing temperature. Also, with pump re-circulation, moving water will resist freezing. Re-circulating water also creates heat. The faster the water moves, the more heat is created, a good reason for using fast idle controls.
- To make sure the pump is full when the apparatus is not in use, is sitting in quarters or driving down the highway, leave both tank valves open (tank fill and tank-to-pump). This procedure, called the **wet pump method**, induces movement through convection that will tend to equalize the temperature of the water in the pump to the water in the tank. When arriving on a fire scene, tank water will always be accessible even if the tank valve or leakage freezes because it will freeze in the open position. If the tank fill valve should freeze open, proper discharge pressure could probably still be obtained.
- The engine cooler knob mounted on the pump panel should remain in the “off” position because running with this valve open would keep the engine from heating up. In the winter, many diesel engines will not even get to operating temperature at idle. Fast idle will help keep the engine warmer.
- The biggest concern about the braking system in cold weather is water in the brake system. If ice should form in an air brake line, the ice may block the air supply in the system. If ice blocks the supply to the air storage tanks, low-air warnings will engage and warn the driver/operator of a problem. If ice forms in the parking brake lines, there would be no low-air warning, and the parking brakes could engage without warning. If ice should block the air delivery in the service brake system (regular foot brake), the brakes may not operate on one, two, or all of the wheels without warning from any low-air warning system. This could create a situation where the only way to stop the apparatus would be to manually engage the parking brake. To help avoid these problems, make sure you purge air tanks on tool day.
- To separate frozen fittings, liquid de-icer, road flares or vehicle exhaust can be utilized.
- Apparatus will **not** be washed when the temperature is lower than 15 degrees F. Apparatus, however, may be washed at the discretion of, and under the direct supervision of, the Officer on duty. Only for the purpose of removing a buildup of salt.

The **wind-chill factor** is the measurement of the effects of the outside temperature combined with the wind speed on bare human skin. The temperature of a piece of steel will go no lower than the outside real temperature whether the wind is blowing at 0 mph or 50 mph but the wind does affect the time it takes equipment to cool down. The higher the wind speed, the faster equipment will lose its heat. However, the temperature of the equipment will not fall below the real temperature. Apparatus are most directly affected by the wind when driven down the road, hence the concern when responding long distances. The apparatus and all its equipment (including the water in the tank) will cool down at a much faster rate at highway speed than while sitting still and should be taken into account when making cold weather decisions.

Warm Weather Operations

- Check the front side of the radiator for debris such as leaves, pine needles, mud, and dirt. If air cannot get through the radiator fins, the coolant cannot cool the motor. Apparatus with center-mounted radiators suck the air from the road. This problem is commonly overlooked.
- Check both engine temperature gauges, There is one gauge on the pump panel and one gauge on the dashboard. Watch the gauges during startup and warm-up, making sure that the motor warms up gradually to operating temperature (180 degrees F) and then maintains that temperature. Compare the gauges against each other to make sure they are within 10% of each other.
- Normal motor operating temperature is 195 degrees F. The motor (and all its components), oil, and diesel fuel, are all designed to run at 195 degrees F. This is where the horsepower curve is rated, where torque is measured, and where the least bearing and piston wear occurs. It is the optimum temperature for a diesel motor.
- Because of its design, a diesel motor will also lose power operating with an ambient (outside) air temperature of 90 degrees F. or higher. At this temperature, the diesel motor has to work even harder to perform the same, and the demands on the cooling system are even greater.
- When the temperature reaches the coolant's boiling point, all cooling ability completely disappears. Remember, there are no automatic shutdowns on fire apparatus: The motor remains running for firefighter safety at the expense of the motor. However, with the proper coolant mixture, the boiling point is increased to approximately 230 degrees F, a point in favor of the motor. A pressurized system will also slightly raise the boiling point.
- Check the Auxiliary Cooler Valve which may also be called the Engine Cooler or the Motor Cooler. This cooler valve mounted on the panel is a very misunderstood component.
    - By leaving the motor cooler on at all times or by turning the motor cooler on before the operating temperature is reached, a delay or even motor damage (a result of improper engine warm-up) may occur.
    - Turn on the motor cooler only after the motor reaches 180 degrees F, and make sure that the motor does not overcool.
- During hot weather pumping operation, turn off all unnecessary accessories such as the A/C, emergency lights, and headlights. The alternator will now use less horsepower, thus generating less heat by the motor. Running at higher RPM will help cool the motor. This can be accomplished

by increasing RPMs and controlling hose discharge pressures by gating and feathering rather than using the throttle.

- The pump also needs the same special care. Keep the water flowing; never let it churn inside the pump. During overhaul operations, when less water is flowing, let the water re-circulate, overflow the tank, open a discharge or flow water in some manner to keep the pump cool. Feeling the temperature of the steamer port is a good indication of pump temperature. If your apparatus has a pump temperature warning device, learn how to use and test it.
- Cavitation happens at higher water temperature. The magic number for incoming water temperature is **60 degrees F**. Theory says that the water will easily cavitate at above 60 degrees F, when combined with the high pump temperatures. **Keeping adequate incoming residual pressures is even more important in hot weather.**
- Drafting with warm water can pose real problems, especially if a high “pull” is needed. If you have the choice between warm pond water and cool lake water, opt for the cool lake water. When drafting, always keep the water flowing, and recirculate the water back to the source constantly so that when the lines are shut down the draft is not lost. With warm water and a warmer pump, the prime is easily lost. Sometimes getting a prime back into a hot pump is impossible.
- While driving the apparatus, watch motor temperatures in heavy traffic. The use of transmission retarders can quickly heat up transmission fluid. The instrument panel has a transmission temperature gauge for just this reason. The transmission will start overheating at 330 degrees F. and could self-destruct at 360 degrees F. or above.

With warm weather, brake pads and shoes heat up quicker and stay hot longer. The driver-operator should know the apparatus’ limitations and drive accordingly.

*Portions of these procedures have been taken from “Media for Fire Engineering” written by Terry Eckert.

PUMPS

Relief Valves

Once a week on tool day, the relief valve shall be exercised all the way in and out, with the pump under pressure, to prevent it from seating in one position. The relief valve should then be preset to 150 psi. The correct procedure to set the relief valve follows:

- Put pump in gear.
- Open the tank to pump valve fully.
- Open the tank fill valve 4 of the way or so.
- Turn relief valve counter clockwise to the closed position, then clockwise to the full open position.
- Throttle pump up to 150 psi.
- With water circulating from the tank to the pump and back to the tank, set the relief valve to 150

psi.

Relief valves will tend to stick if not used frequently. Engaging the pump and working the relief valve several times each week will eliminate sticking.

Discharge Gate Valves

Lubrication of the discharge gate valves is most important. Some manufacturers provide grease fittings for this purpose. There are some ball-type gate valves, however, for which no provision has been made. It is recommended that light oil such as WD-40 be used to lubricate the gate valves.

Monthly Big Way Intake Threads

A bit of grease on the threads will help reduce friction and protect the threads on the engine from corrosive problems.

Flushing and Cleaning Pumps

- Pumps shall be back-flushed once a month and noted on form 300-3.
- Pumps will be flushed from a hydrant after drafting
    - The back flushing of the pump is conducted by connecting a 2.5“ or 3” hose, supplied from a hydrant, and connected to a discharge port of the apparatus.
    - Big way valves and caps are removed.
    - The hydrant is opened, forcing water into the top of the pump, flowing water and any debris out of the big way ports.
    - This should be done for a minimum of five (5) minutes.

Drafting Water

Drafting from ponds, creeks, etc., for training purposes is not recommended. Sand, silt, and dirt can damage pumps and priming pumps. Draft from these sources only in emergency situations.

TOOLS AND EQUIPMENT

Tools and Equipment — Identification

All tools and equipment should be marked with the apparatus designation by painting, stamping, etching or burning.

Hand Tools/Forcible Entry Tools

Proper cleaning, maintaining and storage of hand tools and forcible entry tools is very important. The proper care of these tools will increase their service life depending upon the intensity of their use. These tools should be cleaned and inspected after every use and on tool day.

- Wooden Handles
  - If handles are cracked the tool should be sent in to the Maintenance Bureau for repair.
  - Splinters on wooden handles must be sanded to make handles smooth.
  - All wooden handles should have a varnish or linseed oil finish. Wooden handles should never be entirely painted as cracks and defects would be difficult to detect.
  - Check to see that the head is on tight.
- Cutting Edges
  - Check to see if edge is free of nicks.
  - File the edges. Grinding takes the temper out of metal.
- Painted and Plated Surfaces
  - Keep painted surfaces painted.
  - Inspect for damage.
- Plated surfaces should be wiped clean or washed with soap and water.
- Unprotected Metal Surfaces
  - Keep clean of rust.
  - Keep lightly coated with oil.
  - Do not completely paint; it hides cracks.
  - Should be free of burred or sharp edges. File off when found,
- Collapsible wheel chocks shall be cleaned, rinsed and all pivot points lubricated every tool day.

Gas Powered Tools

All gasoline powered devices shall be carried on the vehicle with the fuel valve in the off position. This prevents fuel from siphoning from carburetor into the oil crankcase

contaminating the oil.

When using for ventilation, PPV fans should be placed so that debris is not sucked through the blades, and properly secured if used on an elevated surface, i.e.; porches.

Maintenance considerations for power tools:

Gasoline powered equipment should be **operated weekly on tool day** to check the operation of the engine and equipment to which it is connected.

Included are:

- Generators: plug in flood lights to check generating capability.
- Saws: Do not store abrasive cutting blades in areas where gasoline vapors are present.
    - These vapors have been known to dissolve the glue and resin that are used to bond these blades.
    - At high speeds the blades could fly apart.
- Hydraulic pumps:
    - Connect the associated tools to the pump and operate the tools.
- Maintain proper oil level when applicable
- Check engine pull-starter for recoil and rope condition.
- Make sure tank is full with the proper fuel or fuel/oil mixture. Inspect fuel lines or carburetor for signs of leaking.

Ventilation chain saw

- Carbide tipped chain will cut through most asphalt and wood type roofs but will not cut metal, tile or masonry.

Guidelines for all chain saws:

- Chain saws shall be thoroughly cleaned after each use.
- As a matter of chain saw daily maintenance, check the throttle trigger for smooth operation.
    - If any binding occurs, or if engine fails to return to idle, remove saw from service.
- Clean the chain brake and check its function according to the manufacturers' instructions.
    - Make sure that the chain catcher is undamaged.

- The chain bar should be turned frequently for more even wear.
    - Check the lubrication hole in the bar to be sure it is not clogged.
    - Clean the bar groove.
- Check the function of the chain lubrication system to be sure the bar and chain receive proper lubrication.
    - Whenever the bar oil reservoir is refilled, aim the tip of the saw at a light colored surface about 8 inches away and run the saw with 3/4 throttle.
    - You should see a distinct line of oil on the light surface.
- Check the chain's tension and condition.
    - Lift up on chain with a gloved hand,
    - You should not be able to see light between the chain and bar.
    - If so, tighten chain and recheck
- Replace the chain if missing **7** carbide teeth or more.
    - New chain will stretch.
    - After installing new chain, start saw and run at % throttle to heat the chain up.
    - Shut saw off and recheck tension and adjust as necessary.
- Check the starter cord for wear or damage.
- Clean the air intake slots on the starter housing.
- Check for any loose nuts and screws and retighten, if necessary.
- Test the stop switch to be sure it shuts off the engine.

Tree saw - standard chains that are for cutting clean wood only such as trees and branches.

Rotary type multi-purpose saws - Cut wood, metal, masonry/concrete, etc. If the saw does not have a Diamond tip blade, make the proper selection of blade or abrasive cutting wheel for the material to be cut.

- Diamond tip blades
    - Needs to be checked regularly.
    - Watch for cracks or potential breaks on edges.
    - Make sure blade is not bent.
    - Make sure blade has protruding segments before cutting.
    - If build up of debris on blade or the blade glazes over and cuts poorly. Make a few cuts in an abrasive material such as asphalt or cinder block.
- Handle abrasive cutting wheels carefully
    - They may break if nicked, scratched, subjected to heavy side pressure, or contaminated with moisture or certain fluids.
    - Store straight up in a dry atmosphere.
- Examine cutting wheels before each use.
    - The wheel should have no cracks, nicks, or flaws.
    - The Center hole should be undamaged.
    - Clean the wheel and both wheel flanges when installing the wheel.

    - If a wheel shatters, carefully examine the wheel guard for damage. A damaged wheel guard must be replaced to protect the operator.
    - Never operate unit without the safety guard.
    - Avoid getting in direct line with the wheel.
    - When setting the saw down after use, make sure the wheel does not come in contact with the ground or any other surface.

Always keep the equipment in good, clean, serviceable condition.

For powered equipment used at the stations such as lawn mowers, snow blowers and string trimmers, maintain fuel/oil levels per the manufacturers' instructions. Copies of the manufacturers' instructions can be obtained from the Maintenance Bureau.

Electrical Equipment - Care and Maintenance

- Check for efficient operation of electrical tools.
    - Problems include arcing or sparking, grinding noise, or loose connections,
- Check cords for any damage or deformities and loose, bent or damaged sockets.
- For battery operated devices such as reciprocating saws, drills and saws.
    - Batteries should not be charged until they have been substantially discharged.
    - You should stop using a battery as soon as you feel a substantial decrease in power from the tool.
    - Completely running down a battery may damage it.
- As of this writing most cordless tools on the department are DeWalt. The DeWalt chargers have a maintenance mode which allows batteries to remain in the charger.
    - This maintains a fully charged pack until the user is ready to work.
    - If the batteries are stored outside of the charger they will discharge naturally;
        - 15-20% the first 24 hours
        - 7-10% the next day
        - 1% every day there after

Nozzles and Appliances - Care and Maintenance

- Nozzles and appliances shall be inspected daily as part of the 0700 check, and after each use. This will ensure that they are maintained in good operating condition.
- As of this writing every nozzle should be an AKRON Assault Nozzle.
    - These nozzles feature the simplicity of a fixed orifice, and provide enhanced stream performance at a variety of nozzle pressures.
    - Every nozzle on a 1 3/4" line is rated to flow 200 GPM at 75 psi nozzle pressure.
    - Nozzles on the 2 1/2" line are rated to flow 250 GPM at 75 psi nozzle pressure.

    - Make sure that the pattern change sleeve and the bail operate freely.

- Conditions that indicate nozzle repair is in order include:
    - Controls that are either inoperable or difficult to operate
    - Excessive wear
    - Poor discharge and/or stream performance
    - Water leaks

- All nozzles, appliances, and hydrant connections added to hose lines and apparatus ports should be **disconnected for cleaning and lubrication on tool day**.
    - The threads on all nozzles and appliance connections should be cleaned and lubricated before they are re-connected. Pay special attention to the threads on exposed apparatus ports during the winter months.

- On tool day, nozzles should be soaked in hot soapy water.
    - After soaking, nozzles should be rinsed with clean water to remove grit and dirt from around exterior moving parts. This will allow the nozzle to operate properly.
    - The nozzle should also be checked for internal debris and obstruction.
    - If anything is found it should be flushed out, if possible. Open the bail and run warm water through the nozzle opening, rinsing debris out the open end.

- After **any** foam operation, it is necessary to flush both the eductor and nozzle thoroughly for at least five minutes after each use. Soaking as described above is also recommended.

- If any issues are encountered that cannot be resolved at the station level, the nozzle or appliance should be taken out of service and sent to the Maintenance Bureau with form 300-15 describing in detail the problem found.

Hydrant Connections/Wrenches

- The Water Department and the Fire and Rescue Department have developed specifications for the replacement of hydrants. These new hydrants have a STORZ fitting in place of the conventional threaded large discharge of the hydrant barrel. They continue to have two threaded 2 1/2” side ports.

- The installed replacement hydrants are randomly located throughout the city and are increasing in number as the replacement program proceeds.
    - When responding to a fire it is imperative that firefighters visually observe the hydrant style to assure that they take the proper wrench(es) from the rig to make the hydrant connection.
    - When a hydrant with a STORZ connection is present, the threaded hydrant adapter carried on the last section of LDH must be removed. This will allow the STORZ coupling on the LDH to be attached directly to the STORZ equipped hydrant.

- During the 0700 check, the hydrant adapter should be removed from the LDH and inspected. Clean and lubricate as needed, then check for ease of connecting and disconnecting adapter to the LDH.
    - It is crucial that the action of disconnecting the adapter can be done by hand. This will ensure that connecting LDH to a STORZ equipped hydrant poses no unnecessary problems or delays,

especially as the number of these hydrants increases.

HOSE

Definitions

- **Fire Hose** is a flexible conduit for moving water. It is constructed with one or more jackets, (internal layers), and an approved non-permeable lining.
- **Supply line** is defined in operational usage as a line from the water source to a pump.
- **Attack line** hose is designed to supply water to handline nozzles, master stream appliances, manifolds, standpipes, sprinkler systems, and fire pumps.
- **NST** - indicates National Standard Thread coupling.
- **HP** - indicates High Pressure.
- **LDH** - indicates Large Diameter Supply Hose.

Note: The terms Supply Line and Attack Line Hose can be used differently in operational usage, as opposed to the NFPA definitions relating to design, design verification, and testing of new fire hose.

To clarify language usage:
Supply Hose and Attack Hose are designators that the NFPA assigned in order to categorize fire hose by pressure. Per the NFPA designations, Supply hose is used at or below 185 psi; Attack hose is used at pressures above 185 psi.

These titles are confusing to many fire departments, as in operational usage, you can attack with NFPA defined supply hose and supply with NFPA defined attack hose.

- The standard vernacular of the Toledo Fire and Rescue Department categorizes and describes fire hose in accordance with its operational use.
    - **Attack line** - Any fire hose connected to the discharge of a pump that is used to apply water or other fire fighting agent directly to a fire or burning substance. The hose will ultimately terminate using a combination or smooth bore nozzle. The TFRD primarily uses 1 3/4” and 2 1/2” for attack line.

    - **Supply line** — Any fire hose used to transport water from one source to another, such as from a hydrant to a fire engine or from one engine to another apparatus. TFRD primarily uses 5” LDH or 3” for supply line.

Double Jacketed Hose Types

- 1 3/4” Attack Line
  - 75' lengths with a 1 1/2” NST Couplings
  - Normally pre-connected; 2 banks of 1 4” line carried on engines
    - First bank with 2 lengths for a total of 150'
    - Second bank with 3 lengths for a total of 225’
- 2 1/2” Attack Line
  - 50' lengths with 2 1/2” Non-National Standard Coupling (Toledo Thread)
  - Engines carry a pre-connected bank of 200'
    - Can also be used to supply from pump to pump or pump to appliance.
- 3” Supply Line
  - Attack line to supply pump to pump or pump to appliance.
  - 50’ with 2 1/2” Non-National Standard Coupling (Toledo Thread)
  - Various shorter lengths called “Cheaters”
  - Engines carry 500’
- 5” High Pressure LDH Double Jacketed, Woven Outer Jacket, PVC/Nitrile rubber lined.
  - 25' and 50’ lengths with 5” Storz couplings
  - This hose is NFPA designated as Attack Line and is used in the operation of **supplying** water from an engine to an aerial. This hose is carried on TFRD trucks only. Generally used between the supply engine through the manifold to the aerial apparatus. The high burst strength of this hose provides extra protection for personnel operating on or around a working aerial.

Single Jacketed Hose Types

- 5” LDH Single Jacketed Supply Line (Rubber Outer Jacket) 100' lengths with 5” Storz couplings.
  - Engines carry 1000’ of LDH and assorted short lengths called “cheaters”. These are used for supply operations when only a short length is required.

ANNUAL HOSE TEST

All fire hose assigned to fire companies is to be tested under the direction of the Battalion Chiefs. The annual testing of hose shall be completed during the month of May.

- Test all hose assigned to line and reserve apparatus.

- All hose shall be physically inspected before testing. Check for:
  - Damage to couplings and threads and swivels
  - Debris on hose (remove, to prevent chafing)
  - Rot/Mildew
  - Burns or abrasions
  - Chemical damage
  - Gaskets in place

If hose fails physical inspection, it shall be removed from service and sent to the Maintenance Bureau.

- Individual Hose Reports (300-2) shall be forwarded to the Maintenance Bureau for each section of hose failing test.
- Suction hose test shall consist of a careful examination of jacket, swivels, gaskets, and threads.
- Hose I.D. numbers engraved into male couplings shall be examined for legibility.

It must be recognized that development of test pressures as high as 250 psi, used for service testing, introduces a serious accident potential. It is imperative that all members maintain a high level of situational awareness, and that all procedures are strictly followed.

Hose Testing Procedures

- Service Test Pressures for TFRD Hose:
  - All double jacked hose including 1 3/4”, 2 1/2”, 3”, and 5” are tested at **250 psi**
  - All single jacked hose including 5” LDH are tested at **200 psi**
- The maximum continuous hose length allowed for hose testing is **300 feet**. Make sure that lines are straight and without kinks or twists. Record identifying numbers of lengths to be tested.
- All hose shall be laid out flat prior to being tested. To test 3“ or larger diameter hose, a short length of smaller diameter hose with the same or higher proof pressure shall be used to connect the pressure source to the hose being tested.
- A test location shall be selected that allows connection of the hose testing pressure source (apparatus pump) to an adequate water source (hydrant).
- A hose test valve consisting of a fire department gate valve with a 1/4” opening drilled through the gate should be used between the pump and the hose test layout. The test layout shall be connected to the hose test valve. The hose test valve shall not be connected to any discharge outlet at or adjacent to the pump operator’s position. A test cap with a bleeder valve shall be attached to the far end of hose line in test layout. If a test cap is not available, a nozzle can be attached to the end of the hose being tested. Both ends of the hose shall be secured to prevent whipping in the event of a hose burst. Contact the shop for all testing supplies.

- Fill hose with water using hydrant pressure. After the hose is filled with water and all air has been expelled from the hose, close the nozzle or test cap valve slowly, then the hose test valve (if used) shall be closed. If test valve is not used, cut back the discharge gates to almost nothing. If a section should burst, the hose should not whip as much as it would with the gate fully open. Check all couplings for leakage and tighten couplings with a spanner wrench where necessary. Mark hose at edge of the coupling to determine if the coupling has slipped after testing.
- Raise pressure slowly to 250 psi for Double Jacketed hose (Woven Outer Jacket), 200 psi for standard Single Jacketed (Rubber Outer Jacket) LDH. After the correct pressure is obtained, hold the test pressure for **five (5) minutes**. During this time, walk down the line and inspect for coupling leaks or pinhole leaks. NEVER straddle a hose under pressure. Personnel should keep a distance of at least fifteen (15) feet from the hose, except as necessary to inspect couplings.
- After five (5) minutes, reduce engine to idling speed, close hydrant, disengage pump, and open drain valve on engine to reduce pressure in lines under test. When pressure drops below 100 psi, open nozzle slowly to finish relieving pressure, close gates, and disconnect lines.
- Any burst lengths, leaking couplings, slippage of couplings, pin holes, or lengths with weak spots should be taken out of service; identify affected area by tying a rag around the area and send to the Maintenance Bureau, along with the Hose Repair Request (300-2).
- After testing, hose should be properly drained and dried.
- After hose has been tested and drained, it shall be checked for proper marking. Hose should be marked on both ends of the coupling and marked within 2 feet of the coupling on the hose.

Retesting of Hose That Has Been Repaired

All hose that has been repaired shall be tested ASAP and the results recorded. All hose returned from repair shall be tested in a safe manner following the previously described procedures. The Maintenance Bureau does not have the facilities or the manpower to test all hose that is repaired. It is, therefore, the station Captain’s responsibility to see that this is completed and recorded on the previously mentioned inventory form 300-1.

Annual hose inventory

- Annual hose inventory shall be completed after all testing is complete within the station.
- Hose inventory form which includes inventory, testing and repair of all fire hose can be found on TFRDWed under Station Dashboards and Bureau Forms.
- Testing and Inventory shall be completed by June 1st.

PERSONAL PROTECTIVE EQUIPMENT

General

All Turnout/ PPE Gear worn by TFRD members must be NFPA approved. It is the responsibility of each individual member to maintain their fire gear, and to seek repairs when needed.

Inspection

PPE/Turnout Gear should be inspected before and after use. Examine for dirt, discoloration, thin spots, holes, tears, chemical damage, cracking, burns, abrasions and worn spots, Company officers shall monitor and record a bi-annual inspection of PPE belonging to all members under their command. In January and July, per Policy B-23, these records shall be entered in the TFRDWeb under the Station Dashboards or Bureau Forms.

Repair

If turnout gear is in need of repair, bring cleaned gear to the Maintenance Bureau. Gear will be repaired in-house or sent out for more extensive repairs. Any defect in the outer shell which exposes the liner/moisture barrier is a mandatory repair. The fire shop has developed a loaner gear program. When the expected return date of fire gear that's at the shop for repair will extend beyond the members next scheduled shift, the member can request the use of a loaner coat or pant. The loaner gear is located in the upstairs inventory room, and can be accessed after hours by Battalion Chiefs and the Safety Officer if needed.

Cost Guidelines

Where fire gear that is worn, damaged, or contaminated, we have determined if it would be more appropriate for the item to be repaired, decontaminated, or replaced. The general guideline is if the cost of the repair or decontamination is greater than the cost of the replacement of the fire gear as compared to the age, replacement should then be considered.

The Maintenance Bureau uses a cost depreciation factor of 10% per year. This is used in a cost/benefit analysis to justify repairing or replacing the item.

> For example, if a new coat cost $1000, a 5 year old coat would have a depreciated value of $500 for necessary repairs. Repair costs beyond that amount would justify replacement. Fire gear 10 years old has a depreciated value of $0 and will not be repaired.

Extractors

- Stations have been supplied with extractors for the primary purpose of cleaning turnout gear.
- Turnout gear can be washed as often as needed, and is essential to maintaining the thermal performance of the gear.
- Outer shells and liners must be washed separately. Fasten all closures on outer shells before washing, and turn all liners/moisture barriers inside-out with cloth side out for washing.
    - Recommended cycles for different gear are posted near the extractor.
- Due to the cross contamination threat of the dirty fire gear, it is recommended that station personnel not use the extractors for other washing needs.
- If there is any problem with the extractor, the Building Maintenance Bureau should be notified to answer any questions or schedule repair.

Cleaning

Refer to the Non-Emergency Procedures manual for further information on Cleaning of PPE/Turnout Gear (B-9) and Fire Gear Inspection (B-23).

Retiring of Fire Gear

- It is the responsibility of TFRD members to see that all Fire Gear taken out of service for any reason shall be brought to the Fire Maintenance Bureau.
- It is the responsibility of the Fire Maintenance Bureau to record the retirement and arrange for proper disposal of retired gear per NFPA 1851 and TFRD Policy B-23.
- Upon retiring a firefighter shall bring all fire gear to the shop. We will repair anything that needs to be repaired and use gear in our loaner program.
- No gear shall ever be ‘handed down’ to another member,

- NFPA standards recommend a service life of **10 years** for structural firefighting equipment.
- The TFRD policy allows exceptions for gear of this age, recognizing that some gear can have a useful service life beyond 10 years. Gear that is older than 10 years must pass biannual inspection and be affirmed to be in useable condition through the normal member/company officer/ Battalion Chief sign-off per TFRD Policy B-23.
- Any gear that is visually compromised, regardless of age, should be removed from service and sent to the Fire Gear Maintenance office for testing.

GROUND LADDERS

Ladder Types

- Aluminum Roof Ladders
- Aluminum Extension Two Section Ladders
- Aluminum Extension Three Section Ladders
- Aluminum Combination Ladders
- Aluminum Folding Ladders

Ground Ladder Loading

The total weight on the ground ladder, including persons, their equipment, and any other weight, such as a charged fire hose, shall not exceed the duty rating load given in the table below:

MAXIMUM LOAD

Ladder Type	Maximum Weight Load
Folding Ladders	350 lbs.
Single and Roof Ladders	750 lbs.
All Extension Ladders	750 lbs.
Combination Ladders (Dinky)	750 lbs.

The design criterion assumes the weight of a firefighter with protective clothing, SCBA, and equipment to be 250 lbs. Ladders rated for 350 lbs. or less are designed for **one** person. Ladders rated for 750 lbs. are designed for a maximum of **three** persons on the ladder at any time. On a three-person ladder, no more than two persons should be grouped together, such as a rescuer and a victim.

General Maintenance

Ladders should be cleaned with soap and water, taking care to flush the inside of the rungs and pawl assemblies to remove debris, road salt, etc. Use caution near the labels so as to not remove the outer label coating. On extension ladders, paraffin wax or candle wax can be applied to the friction (slide) areas to lubricate the contact areas. This shall be done on every tool day.

Visual Inspection

After every use and on tool day, a visual inspection should be performed. Ground ladders must pass the inspections and tests listed in this section, for use. If the equipment fails to meet any of the inspections or tests, the condition must be corrected before using the equipment. Any deficit in the function of any component of the ground ladders will necessitate that ladder's removal from service. The Battalion Chief shall be notified and the faulty ladder taken to the Fire Maintenance Bureau with an Equipment Repair form 300-15.

A visual inspection shall include, but not be limited to, the following:

- Check heat sensor labels for a color change indicating heat exposure. If there is a color change or if the expiration date on the heat sensor label is past due, the ladder should be removed from service and taken to the Maintenance Bureau to be checked and the labels to be updated.
- Check all rungs for tightness
- Check all bolts and rivets for tightness
- Check welds for any cracks or apparent defects Check beams and rungs for cracks, breaks, gouges, checks, wavy conditions, or deformation.
- Check butt spurs for excessive wear or other defects
- Check halyards for fraying or kinking
- Check roof hooks for sharpness and proper operation
- Check rungs for punctures, wavy conditions, worn serration or deformation
- Check surface corrosion
- Check proper operation of the pawl assemblies
- Check wire rope on 3 section ladders for snugness when the ladder is in the bedded position to ensure proper synchronization of upper sections during operation.

Any signs of damage or defect during a visual inspection shall be cause to remove the ground ladder from service. Scratches and minor dents shall not be cause to remove a ladder from service if there are no problems as listed above.

Required Service Testing

All ground ladders should be service tested by the Fire Maintenance Bureau any time the following conditions exist:

- When a ladder is suspected of being unsafe.
- After the ground ladder has been exposed or is suspected of being exposed to direct flame contact.
- Whenever the heat sensor label has changed color to indicate heat exposure.
- When the ladder has been subjected to overloading, impact loading or unusual conditions of use.
- Annually.

If service testing is required, the Officer on duty should notify his Battalion Chief and the Fire Maintenance Bureau.

GENERATORS AND ELECTRICAL EQUIPMENT

Station Generators

All stations have portable generators to supply emergency power for crucial station equipment such as garage doors and communications equipment. Most stations' generators do not have the capability to power all circuits in a station. A list of the circuits and the equipment supplied with power by the generator shall be created and maintained by station personnel and should be readily available in the station. A copy of this list should be forwarded to the Maintenance Bureau at the creation of the list and any time the list is modified due to changes in the station's electrical system.

Station Generators - Tool Day Inspection

These generators shall be inspected and run every tool day. The station personnel shall assure that the pig-tail and security chain necessary for connection to the station electrical system are present and undamaged. A 300-3 form shall be filled out and sent to the Maintenance Bureau for this equipment on the first Saturday of the month.

Station Generators - Quarterly System Test

On the first tool day of the months of January, April, July and October the generator shall be connected, using the pig-tail, to the station electrical box and used to power station equipment to assure proper operation, as if there were a power outage situation. Prior to this test, power sensitive equipment such as computers or electronic equipment should be shut down properly to avoid potential damage.

It should be noted that any time the generator is used outside it must be locked to the eyelet provided near the station electrical hookup by using the security chain.

The on-duty Captain shall assure that all personnel assigned to the station are familiar with the power outage procedure. The 300-3 filled out for the first tool day of these months should indicate that the test occurred and note any problems or circuits that were not properly supplied.

BREATHING AIR AND RELATED EQUIPMENT

Visual Inspection of Cylinders (SCBA, 02 and SCUBA)

SCBA, OXYGEN or SCUBA cylinders carried on the air wagons or on other apparatus should be visually inspected daily, using the **0700 Hour Check** procedure, detailed below, Certain problems or conditions, as noted in the 0700 check, would be cause to place a suspect cylinder out of service. Faulty equipment should be depressurized and sent to the Maintenance Bureau with SCBA Equipment Repair Form 300-16 for SCBA equipment or Repair Form 300-15 for OXYGEN and SCUBA cylinders. LINK

WARNING: If a high pressure cylinder is known to have been subjected to any unusual treatment, accident, or condition, it should be immediately placed out of service, depressurized and sent to the Maintenance Bureau.

Procedures for Filling SCBA Cylinders

- Officers on duty at Stations #3, #4, #5, #6, #15 and #18 are responsible for assuring that proper procedures are being used for filling air cylinders.
- Verify the rated capacity of cylinders to be filled.
- All Toledo Fire and Rescue Department SCBA cylinders, both 30 and 60 minute sizes, are rated at 4500 psi. In a mutual aid operation, always verify and double check the rated capacity of the cylinder being filled if it is not from TFRD.

- Before filling cylinders, you must do a visual inspection. Check the hydrostatic test date and the rated capacity in psi. DO NOT FILL A CYLINDER THAT IS OUT OF DATE FROM THE LAST HYDROSTATIC TEST DATE (See “COMPRESSED GAS CYLINDER SERVICE LIFE AND HYDROSTATIC TEST INTERVAL” (table below). Steel, aluminum and gray carbon fiber cylinders

are tested every five (5) years. For air cylinders, this information should be on a label attached to the body of the cylinder. For oxygen and SCUBA cylinders, this information is stamped near the neck of the cylinder.

COMPRESSED GAS CYLINDER - SERVICE LIFE AND HYDROSTATIC TEST INTERVAL			
CONSTRUCTION	**TYPE**	**HYDRO-TEST EVERY**	**SERVICE LIFE**
STEEL	SCUBA,OXYGEN, ETC.	5 YEARS	INDEFINITE*
ALUMINUM	SCBA, SCUBA, OXYGEN, ETC.	5 YEARS	INDEFINITE*
CARBON FIBER, COMPOSITE	SCBA GRAY	5 YEARS	15 YEARS

> * INDEFINITE AS LONG AS CYLINDER PASSES VISUAL INSPECTION AND HYDROSTATIC TESTING AT PRESCRIBED INTERVALS

- Open the valve of the cylinder to be filled briefly (approximately 1/4 turn) to blow out any foreign material in the valve. Do the same with the compressor fill valve while holding the hose connector. **CAUTION:** Do not discharge compressed air toward any person. Make sure the bleeder valve on the filling station hose is closed. Connect fill hose to air cylinder valve and **HAND TIGHTEN ONLY**. Open cylinder. Open valve on cascade cylinder #1.
- If needed, adjust the pressure regulator on the control fill panel to the proper pressure by dropping the pressure 500 psi below the pressure needed, then adjust upward to the correct pressure. Never adjust hand wheel of pressure regulator fully in or out as this will damage plastic threads and/or seat, placing the compressor out-of-service.
- Open the fill control valve slowly. The recommended fill time should not exceed 500 psi per minute. If they are filled more quickly, the air and cylinder will heat up and the cylinder will not be full, when cool (when air cools, its volume is reduced).If #1 cascade cylinder does not fill the cylinder, close cascade valve #1 and open cascade valve #2. Proceed until the cylinder is filled to the rated capacity.
- Close air fill control valve and air cylinder valve. These fill stations have bleed valves for relieving pressure from the fill connections. Bleed off pressure in the fill hose and then remove cylinder.
- When filling two or more cylinders at the same time, the above procedure will be used while gating air fill control valves according to residual pressure in the cylinders being filled. Never try to fill cylinders with different pressure capacities at the same time.
    - **NOTE:** TFRD compressors are rated at 5000-6000 psi. **ALL** compressors shall be regulated to a maximum of 4500 psi output for filling SCBA cylinders.
    - Only Water Rescue Team members are authorized to fill S.C.U.B.A. cylinders.

SCBA Air Compressor

- Check oil level. Reading should be between indicators at bottom of dipstick. Don't overfill. One cupful will raise the low-level reading to overfill.
- If system has separate CO monitor, observe carbon monoxide monitor gauge, moisture pickup tube and green light. All should be functioning properly.
- Open all cascade cylinder valves two (2) complete turns, only.
- Turn compressor power switch on. The compressor will start. Observe oil pressure gauge, it should read 950 psi. The knocking noise heard when first starting is normal until back-pressure builds up in the final stage piston. Any other suspicious noise would be cause to shut down the unit.

Drain the condensate reservoir from the compressor weekly on tool day.

SCBA 0700 Hour Check

SCBA equipment must pass the tests listed below before use. If the equipment fails to meet any of the tests, the condition must be corrected before using the equipment. Observed deficit in the function of any component of the SCBA equipment will necessitate that component’s removal from service. Faulty equipment should be sent to the Fire Maintenance Bureau with a SCBA Equipment Repair form 300-16. Spare harnesses are available on the air wagons or through the Fire Maintenance Bureau.

Air Cylinder Inspection

Inspect cylinders before use, and check for problems or conditions detailed as follows. If any are present, drain air and send to Maintenance Bureau. **DO NOT REFILL**.

Check for:

- Service life/date last hydro-tested (see table above)
- Cuts or abrasions
- Make sure cylinder knob is not bent and turns easily
- Signs the cylinder has not been well cared for and maintained
- Signs the cylinder was not stored properly or shows signs of damage
- Signs or knowledge that cylinder dropped, fell or was struck or was in an accident
- Signs or knowledge that cylinder was exposed to chemicals or extremely corrosive atmosphere/environment

- Check for gouges, dents, scrapes, cuts, loose fibers, missing resin or other damage such as severe abrasion
- Evidence that cylinder was stored with water, material or matter inside the cylinder, or was stored in a place where exposed to chemicals or corrosive materials
- Signs of exposure to fire or high heat, including any one or more of the following:
    - Charring or blistering of the resin, paint or protective coating
    - Melting or charring of the metal
    - Distortion of the cylinder and/or any cylinder accessory
    - Removal of any resin resulting in loose fibers being visible
    - Melting of fuse plugs, valve hand wheel, valve protector, and/or any valve component or cylinder accessory
    - Has been partially or fully repainted or treated to hide suspected damage and/or fire damage
    - Is known or suspected to be leaking
    - Is known or suspected of having a crack
    - Was found empty (when it should have been full) and there is no known reason for it to be empty
- Check for other signs of damage

If a cylinder is known to have been subjected to any unusual treatment, accident, or condition, it should be immediately placed out of service, depressurized and sent to the Maintenance Bureau.

Facepiece Inspection 0700

- Inspect the facepiece for rubber deterioration, dirt, cracks, tears, holes, or tackiness.
- Check the head straps for breaks, loss of elasticity, missing buckles or straps.
- Check the straps for signs of wear.
- Inspect the lens for cracks, any deep scratches, and a tight seal with the facepiece rubber.
- The exhalation valve must be clean and operate easily. Reach into the facepiece. Push and release the valve stem several times. The valve must move off the seat and return when released.
- To check the exhalation valve, hold facepiece up to your face, breathe in and out quickly and sharply a few times. Listen for the valve disc to flutter. For inhalation valve test, hold facepiece up

to your face, put your hand on the inlet connection, breathe in and hold for 10 seconds. The facepiece should collapse to your face for a good, tight seal.

- Inspect the facepiece coupling for damage. Also check to be sure the valve spider and valve disc are present.
- Observe the operation of the I-HUD in the following steps.

MSA Firehawk M7 I-HUD Light Patterns

The I-HUD has lights on the unit that indicates different functions and measurements.

The following is a description of each:

RIGHT SIDE LED's	
3 green LED's	Air cylinder tank is full to 3/4 full
2 green LED's	Air cylinder tank is 3/4 to 1/2 full
2 flashing yellow LED's	Air cylinder tank is 1/2 to 1/4 full
1 flashing red LED	Air cylinder tank is 1/4 full to empty
LEFT SIDE LED's	
Flashing yellow LED — low battery	Single flash is I-Hud, Double flash is Module
Single orange LED	PASS Pre-Alarm
RED and Orange LED	Evacuate the structure

Air Cylinder and Harness Pressure Gauges

- Slide a full air cylinder into the metal cylinder band. Tighten the latch wing to secure the cylinder. Connect the alarm bell coupling nut to cylinder and hand tighten.
- Make sure the shut off button on the second stage is pushed in.
- Make sure there is a minimum of 4000 psi in the high-pressure air cylinder. Open the cylinder valve fully to pressurize system, then close the cylinder valve and watch the harness pressure. If the needle drops more than 100 psi in 10 seconds, there is a leak,
- Open the cylinder valve fully to pressurize system.
- Be sure you can see both the gauge needles and dial face clearly through the lens. Also be sure the gauge is not bent or damaged.
- Verify that the difference between the regulator gauge and the gauge on the cylinder is no more than 450 psi. If the difference is more than 450 psi, try a different bottle before taking the SCBA out of service.
- Leave PASS device motionless to check for three (3) stages of pre-alarm and final full alarm.

- Open the by-pass knob fully. Listen for air flow. Close the by-pass knob.
- Bleed the main line slowly. Watch the pressure gauge and note when the audible alarm sounds. This should be at approximately 1050 psi.
- Make sure the low air pressure warning on PASS is visible and audible.
- Inspect the harness gauge hose for any visible damage.
- Check battery level on Control Module
    - Anything below 1/4 replace batteries. 4- C cell batteries
- Tag in to system.
    - Hold green button until ‘TAG’ appears in the display
    - While ‘TAG' is displayed, position the ID tag within 2 inches of the control module.
    - Tag procedure is complete when ‘OK’ briefly appears within 2 seconds.

Audible Alarm

- Check that the bell is in the proper alignment and on tightly.
- If the bell is loose, remove the harness from service.
- Unscrew the Audi-Alarm coupling nut from the cylinder valve. Inspect the coupling nut for thread damage. Also be sure there is an O-ring, and that it is not damaged. It is hand-tightened and should not require tools.

High Pressure Hose

- Check the high pressure hose between first stage regulator and the pass device.
- Check the high-pressure hose between the alarm bell and the first-stage regulator. Look for cuts or sever abrasions. If present, have the Fire Maintenance Bureau replace the hose.

Harness

- Straps open.
- Adjust waist strap.
- Check buckle.
- Check cylinder clamp.
- Check chest straps.

General

- Check for cleanliness and dryness.
- Check extra cylinders.
- Any deficit in the function of a mask will necessitate the removal of the mask from service.
- Check all high pressure hoses for loose fittings.
- Check for O-ring on second stage inlet-to-facepiece connection.

Cleaning and Disinfecting Facepiece

- Clean and disinfect the facepiece.
- **It is recommended, but not necessary to remove the HUD.**
  - Remove the mask-mounted regulator from the facepiece.
  - If the facepiece is equipped with a voice amplifier, it should be removed before washing the facepiece.
  - Thoroughly wash the facepiece and nose cup in mild cleaning solution. A soft brush or sponge can be used to scrub the soiled facepiece.
  - Allow the facepiece to air-dry only. Using any type of heat source, including direct sunlight, will deteriorate the rubber.
- Operate the exhalation valve by hand to be sure it works properly.
- Make sure that the facepiece regulator inlet is clean.

Cleaning the Harness

Check the harness pressure gauge and, if necessary, release any pressure trapped in the system by opening the bypass knob. Loosen and remove the Audi-Alarm coupling nut from the cylinder. Lift and turn the latch wing to loosen the cylinder band and latch and slide the cylinder out.

- Wipe off all surface dirt with a sponge dampened (not soaking) in mild cleaning solution. Rinse the sponge and squeeze it dry.
- Work up a thick lather on the sponge with mild soap. Thoroughly wash the harness with the lathered sponge, being careful to use the lather only. Do not allow water to enter the second stage regulator.
- Wipe dry with a clean cloth.
- Let the harness air-dry.

Cleaning the Cylinder

Breathing apparatus cylinders should be recharged as soon as possible. **Cylinders should be stored completely filled only.**

- Clean exterior with mild soap solution. Assure that cylinder interior remains dry.
- Check for damage.
- If damage is found, drain the air from the cylinder and place the cylinder out of service. Send to the Maintenance Bureau with form 300-16.

FORMS

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Note: 300-12 Building Maintenance and Repair Request is no longer sent to Fire Maintenance Bureau. Routing instructions are listed on the form.

Forms and Reports for Fire Maintenance Bureau

300-1 Hose Assignment Inventory

This form is to be completed after the hose testing is complete in May. This form can be found on TFRDWed under Station Dashboards and Bureau Forms.. This is to be completed by June 1st and anytime hose is added or removed from the station inventory.

Hose Test Record When a length of hose is sent in for repair along with form #300-2, HOSE REPAIR FORM, a copy of the repair form will be sent back to the station with completed repairs noted. The repairs detailed on the form can also be found on the hose inventory under the repairs tab.

300-2 Hose Repair Request

This form is to be filled out and sent to the Fire Maintenance Bureau when reporting hose that is in need of repair. It is to be filled out in triplicate with the white and yellow copies accompanying the damaged hose to the Fire Maintenance Bureau. The last, or pink copy, is to be retained at the station. When hose is repaired it will be sent back to the station along with the white copy of the 300-2 indicating the repairs that were made.

300-3 Apparatus Inspection Form

The 300-3 form will be filled out on the first (1st) Saturday of each month. The items listed on the form that are found to be unsatisfactory are to be marked with a check mark in the ‘Fire Shop’ column, and an explanation of the defect given in the remarks section. Those items that are checked O.K. should be listed in the ‘Job Done’ column by having the person making out the form put his /her initials on the proper line. There shall be a 300-3 form filled out for any apparatus / vehicle in service or stored in the fire station. A 300-3 will also be filled out for station generators on the first (1st) Saturday of each month. The completed 300-3 for should be kept at the station for review if necessary. Send the 300-3 form to the

shop only if any defects are found during the inspection.

300-4 House Supply Requisition Form

This form is for station supply requests and should be sent to the supply officer at the Fire Maintenance Bureau. Office supplies are requested through the Administrative Assistant's office by memo. First Aid supplies are requested through the E.M.S. Bureau on the First Aid Supply Form.

300-7 Apparatus Inventory, Engine

To be completed annually no later than January 31 by the On-duty Captain. This form also applies to Extra Engines that are in storage at stations.

300-8 Fire Station Inventory

To be completed annually no later than January 31 by the On-duty Captain. ONLY items that are City Property are to be listed.

300-9 Apparatus Inventory, Truck

To be completed annually no later than January 31 by the On-duty Captain. This also includes Reserve Trucks in storage at the stations.

300-11 Vehicle Repair Request

One Request for Repair Form is to be used for each individual apparatus. List all items on this form; use back of form, if needed.

300-15 Equipment Repair Request

This form is for repair of tools and equipment. Use one form for each item that needs repair. Attach form to item in need of repair when possible.

300-16 SCBA Equipment Repair Request

This form is for repair of all SCBA related items. An explanation of problem found is required in detail. Attach form to item to be repaired.

300-17 Fire Boat Inventory

This form is to be filled out and sent in annually no later than January 31, by the On-duty Captain.

300-18 Rescue Squad Inventory

This form is to be filled out and sent in annually no later than January 31, by the On-duty Captain.

DISPOSITION OF UNWANTED ITEMS FROM STATIONS

The Fire Maintenance Bureau does not have a dumpster for station trash.

For City Property which is no longer useful, contact the Buildings Maintenance Bureau to inform them about the unwanted items. A determination will be made by the Buildings Maintenance Officer where the items need to be sent or if they should be discarded with the station's trash. Larger items may be picked up when warranted.