



**Tower Ladder – Quint In-Service  
Inspection (Sample)**

For

**Any Town Fire Department**  
**Any Town, U.S.A.**

**Your Name**  
*Fire Chief*

Prepared by

**Big Red Trucks Fire Apparatus Consultants Inc.**  
Tel: 1-866-723-1075

**DATE**



DATE

Your Name, Fire Chief  
Any Town Fire Department  
123 Firehouse Lane  
Any Town, U.S.A. 00000

Dear Chief Your Name,

Big Red Trucks Fire Apparatus Consultants (**BRTFAC**) has inspected Tower Ladder 1, a 2001 Blaze Fighter 95', rear mount, aluminum tower ladder, quint operated by the Any Town Fire Department. This apparatus was inspected for overall physical condition, general maintenance and compliance with current operating and safety standards. In conjunction with the inspections and maintenance records the annual test records were also reviewed.

The National Fire Protection Association (NFPA) publishes NFPA 1901 Standard for Automotive Fire Apparatus which sets the minimum design and construction standards that manufacturers must meet or exceed for any emergency service apparatus with a gross vehicle weight of 10,000lbs or more. In the 1991 version of the NFPA 1901 standard, several design mandates that concentrated on operator and occupant safety were incorporated into the standard. As the standard continues to evolve, safety has become a major focus of apparatus design and construction.

In 2007, NFPA 1911, Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus was published. This standard consolidated several older standards that governed in-service testing of apparatus and their major components into one standard. New to this standard is the inclusion of criteria on apparatus inspection and maintenance, guidelines to service life of apparatus, establishment of out-of-service conditions, and recommendations for the retirement of apparatus. In conjunction with and often referenced in the NFPA standards are Department of Transportation (DOT), Federal Motor Vehicle Safety Standards (FMVSS), Society Of Automotive Engineers (SAE), along with other nationally recognized standards. The New Jersey state motor vehicle regulations must also be adhered to. The inspection of this apparatus and recommendations made as to maintenance, retirement and

replacement are based on these NFPA standards, several industry standards and generally accepted industry practices.

The Insurance Services Office (ISO) sets and grades Fire Departments on their ability to respond and mitigate emergencies in their community. They have wide ranging criteria that in part reviews response times, apparatus needed, location of fire houses, water supply, communications, written mutual aid agreements and miscellaneous other criteria. In addition to their own criteria, ISO relies heavily on NFPA standards, codes and other referenced national codes in their risk assessment. Based on this analysis, the ISO then creates what they consider to be the minimum necessary resources for the community to mitigate fire and other property damaging events. Insufficient grades received as a result of an ISO review can cause an increase in insurance costs for property owners and renters.

When purchasing new equipment and maintaining existing apparatus, it is important to make sure ISO recommendations are followed so that the community's rating is maintained or improved.

A detailed report on this vehicle follows and recommendations pertinent to it are at the end of section. Overall recommendations are in the summary at the end of the report.

It is anticipated that this report will assist you with making fleet management decisions. If you have any questions or need any additional information on any of the points illustrated in this report please do not hesitate to contact us. Thank you for selecting **BRTFAC** to perform this inspection for you.

Sincerely,

Jeffrey D. Gaskin  
President

**Any Town Fire Department**

**Tower Ladder 1**



Figure 1

1995 Blaze Fighter 95' Rear Mount Tower Ladder – Quint

Manufactured: 2001

VIN #: 1BFTL234567898765

Registration #: 98765

Mileage: 90,990

Engine Hours: 8,400

\*Information from 2020 Pump Test

<b>Vehicle Weight Chart</b>		
	<b>Rated</b>	<b>Actual</b>
<b>Gross Vehicle Weight</b>	73,000 lbs.	70,720 lbs.
<b>Front Axle</b>	21,000 lbs.	20,880 lbs.
<b>Rear Axle</b>	52,000 lbs.	49,480 lbs.

\*Actual Weight information from 5-9-2014

This vehicle is a Blaze Fighter II custom cab and chassis assembly powered by a Detroit Diesel 60 Series diesel motor and an Allison 4000 series automatic transmission. The apparatus cab and body are extruded aluminum in design and construction. The front axle is equipped with a spring suspension with disc brakes, and the rear tandem axle also has a spring suspension and is equipped with drum brakes.

Inspection of this vehicle indicates that it is in overall fair condition. The apparatus cab and compartment body are in fair condition with most of the problems apparent being cosmetic. The chassis assembly is in good condition. No severe structural defects were detected during the inspection and all of the issues noticed with this apparatus are commensurate with the age of the vehicle.

## Cab & Body

Both appear to be in good condition structurally. There is “white” rust around the vehicle in varying degrees. “White” rust is aluminum deterioration caused by atmospheric conditions similar to what causes steel to rust, figures 2 & 3.

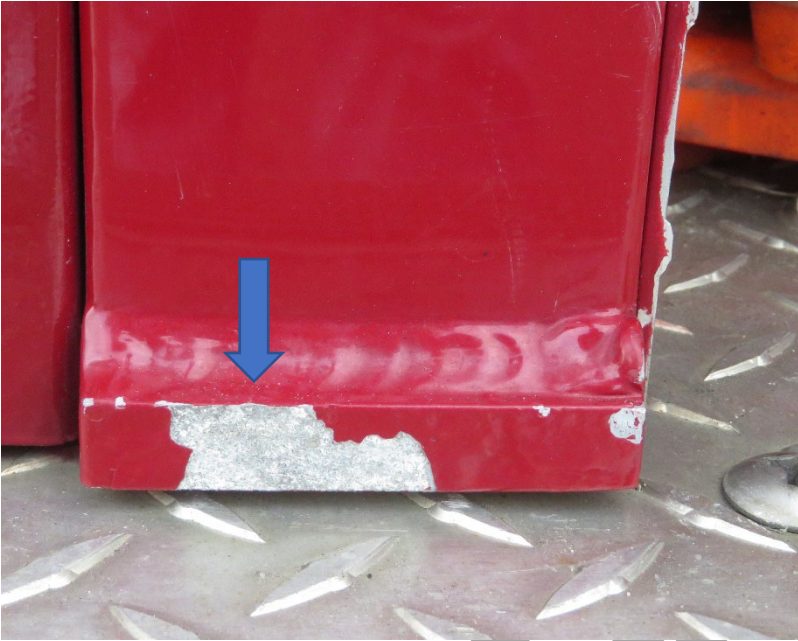


Figure 2

This type of deterioration can be seen at various locations around the cab and body assemblies of aluminum apparatus. This can include but would not be limited to; wheel wells, compartment door hinges, mounting for grab handles and light fixtures.



Figure 3

White rust is most often caused by a process referred to as electrolysis and reaction when two dissimilar metals come into contact with each other, such as when stainless steel bolts are used to mount accessories on an aluminum truck body. There are chemical coatings available and some physical barriers that greatly reduce and, in some cases, eliminate this condition. White rust can also be caused when water or other foreign chemicals particularly road deicing chemicals come in contact with the aluminum body material. The condition can grow under the paint as shown by the blistering of the paint in figure 3.

While white rust is generally not as severe as rust in steel, it spreads quickly causing more cosmetic damage than structural damage to the vehicle. White rust can and in some case does cause structural damage, but that condition does not appear to be an issue on this apparatus at this time. White rust is time consuming to repair and if the root cause is not corrected the condition will return.

There is some cracking in each the front bumper hose troughs as shown in figures 4 and 5. There is no cracking in the gravel shield surrounding any of these troughs so this condition may just be related to chassis flex and not a cause for concern. The structural support for the front bumper assembly should be thoroughly inspected for structural integrity when it is disassembled.

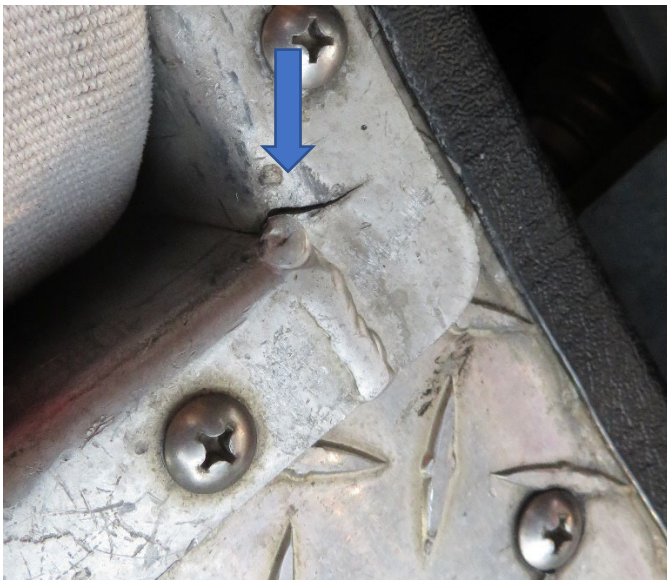


Figure 4

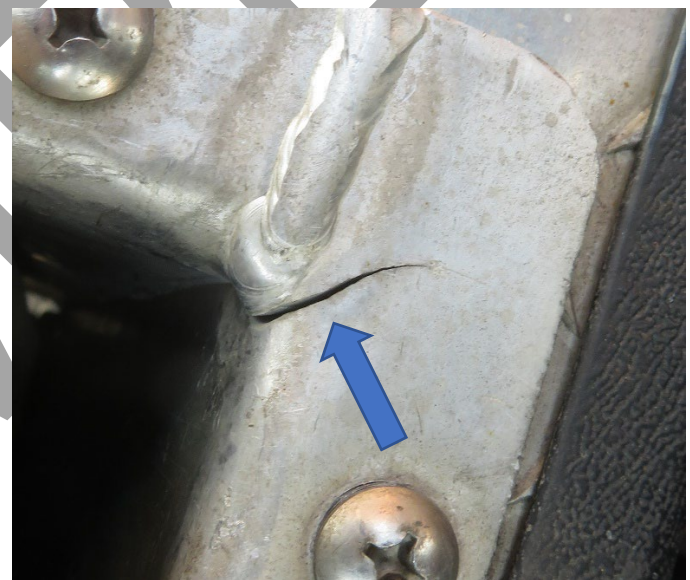


Figure 5

There is some paint blistering, white rust evident, and cracking in various locations of the pump enclosure as detailed in figures 6, 7, and 8. This is in locations where cracking has occurred on other Blaze Fighter vehicles. The conditions observed on TL-1 are not as severe as other vehicles inspected but these will need to be addressed and corrected during any type of refurbishment.

These cracks are in locations where the structural skeleton is joined and welded. The issues causing these cracks are generally not catastrophic and repairs can usually be done without major complications. But this is a prime example of the types of issues discovered during the refurbishment process. The severity of the defect(s) and the scope of the repair(s) needed to correct the issue(s) that are discovered are not clear until the unit is disassembled and a complete picture of what is going on is able to be seen.

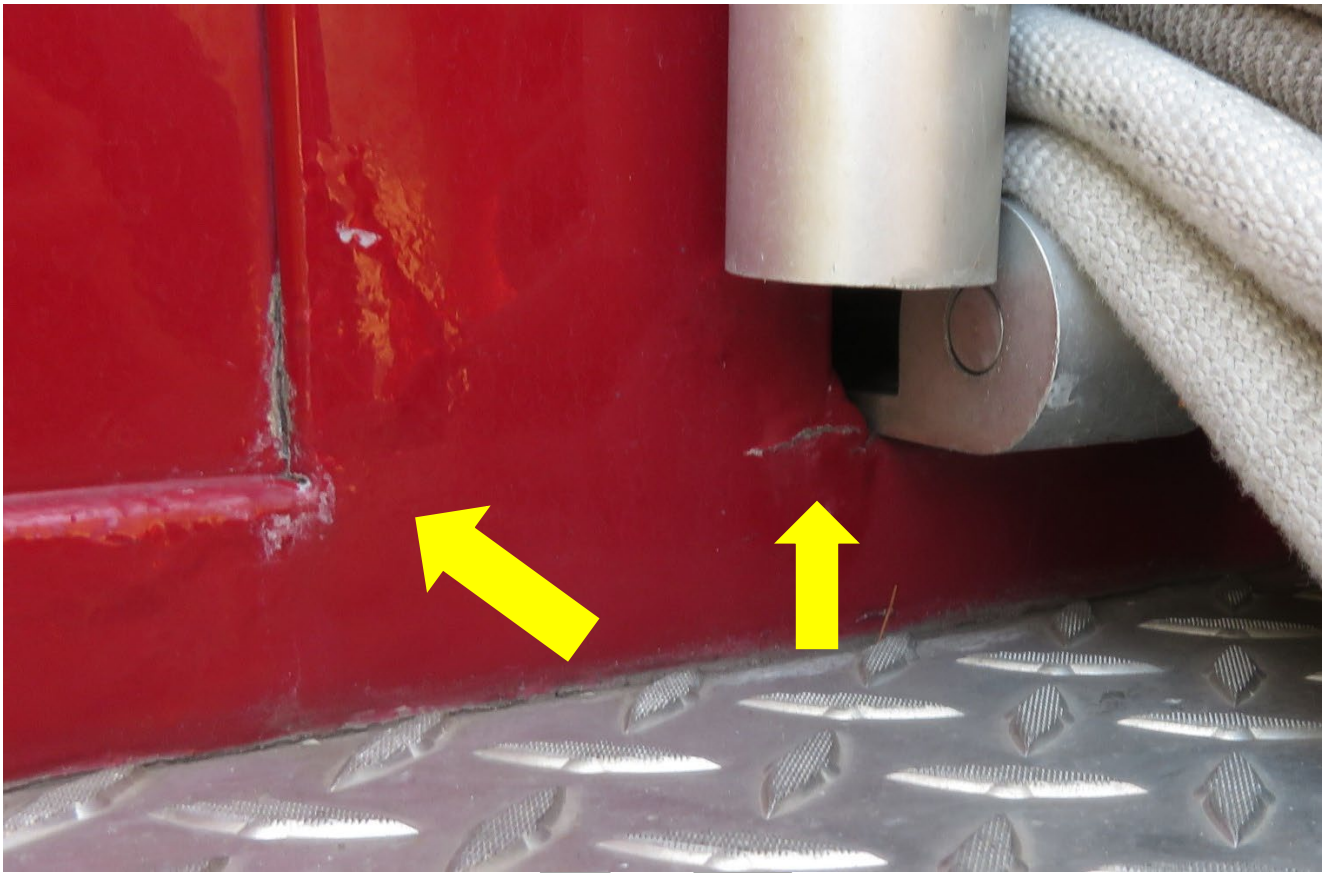


Figure 6

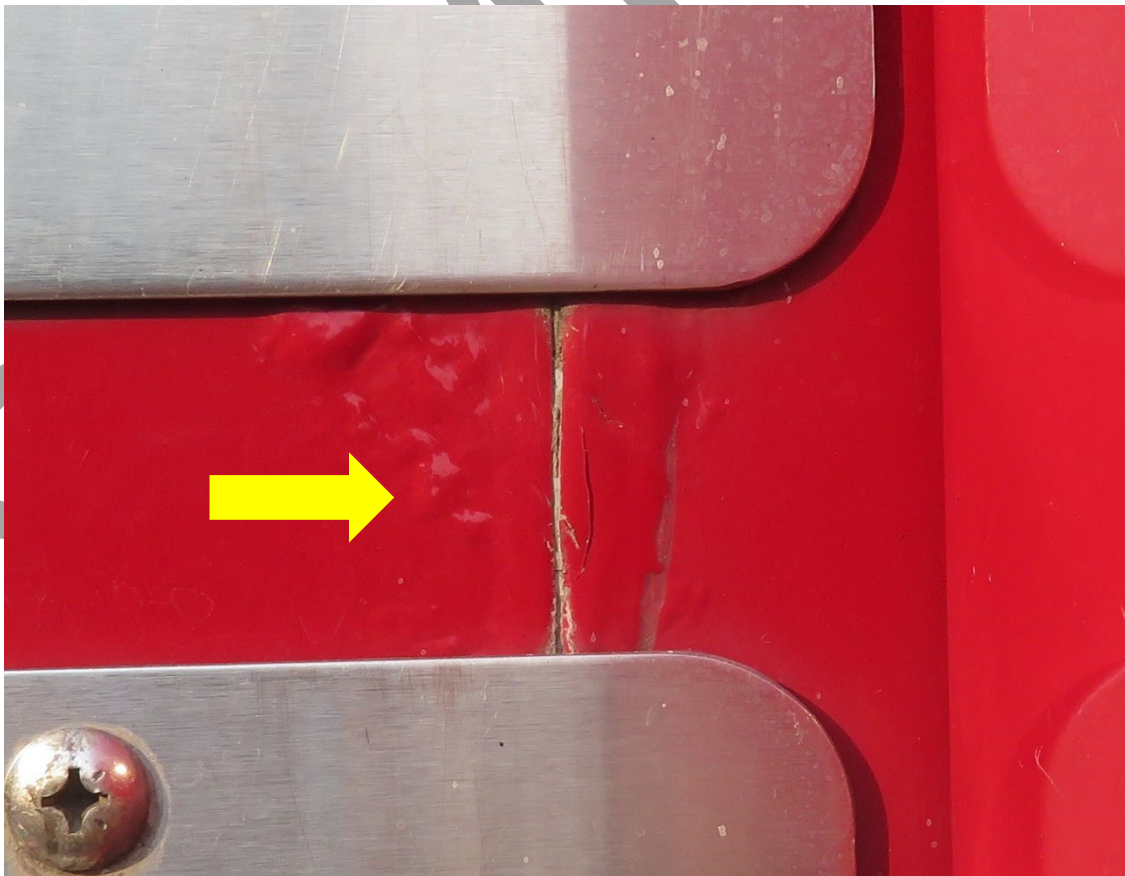


Figure 7



Figure 8

There is paint damage around the compartment door sills from deploying and stowing tools and equipment, paint nicks and scratches from operations and driving all in line with age and use of the vehicle and cosmetic, figures 9 and 10. These can create entry points for water and road chemicals that may ultimately make the problems worse.



Figure 9



Figure 10



## Chassis

The tower ladder support structure for the aerial device which is intergral to to the chassis and the chassis both appear to be in good condition. None of the rust visable on the chassis assembly appears to be be severe or structural and is in line with age of the vehcile and its service life, figure 11. There was no rust jacking visable on the chassis assembly.



Figure 11

The chassis assembly will need a much more thorough inspection when the compartment body is removed from the vehicle when visibility and access is much greater but initial observations are that the foundation of this apparatus is a good candidate for refurbishment.

The steering box has a class 3 leak, figure 12.

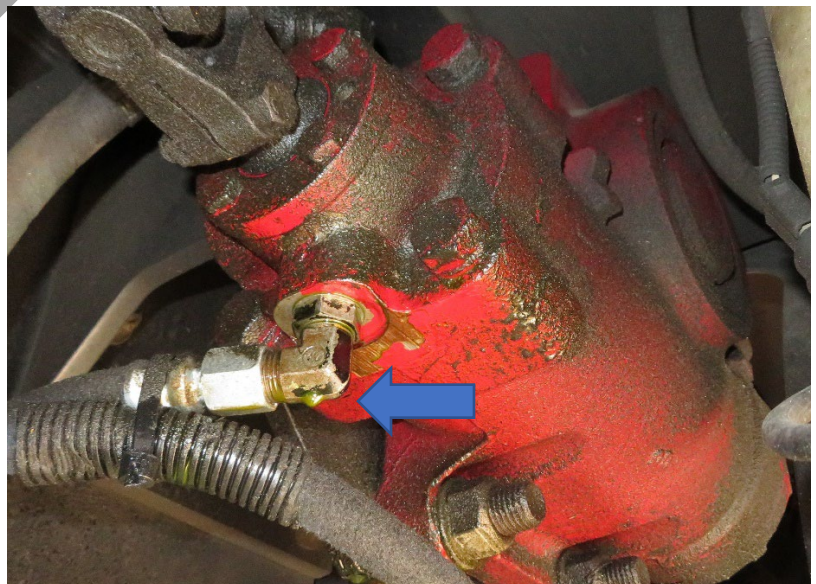


Figure 12



Figure 13

A bump stop for the rear suspension is in need of replacement, figure 13.

Most of the conditions observed on the chassis of TL-1 that need to be addressed are with bolt on components and assemblies. All of these (and more) will need to be accessed and decisions made as to repair, replace, or leave as is during a refurbishment and each of those decisions will impact the scope of work and therefore cost.



Figure 14

Figure 14, deteriorating insulation/sound deadening material in the engine compartment.

Bad wiping seals indicated by the oil residue left on the extending portions of the hydraulic cab lift cylinder, figure 15.

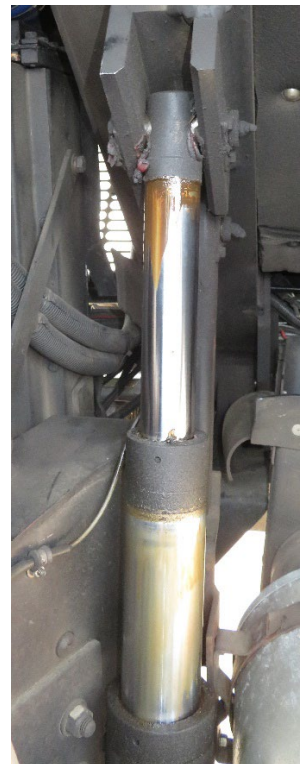
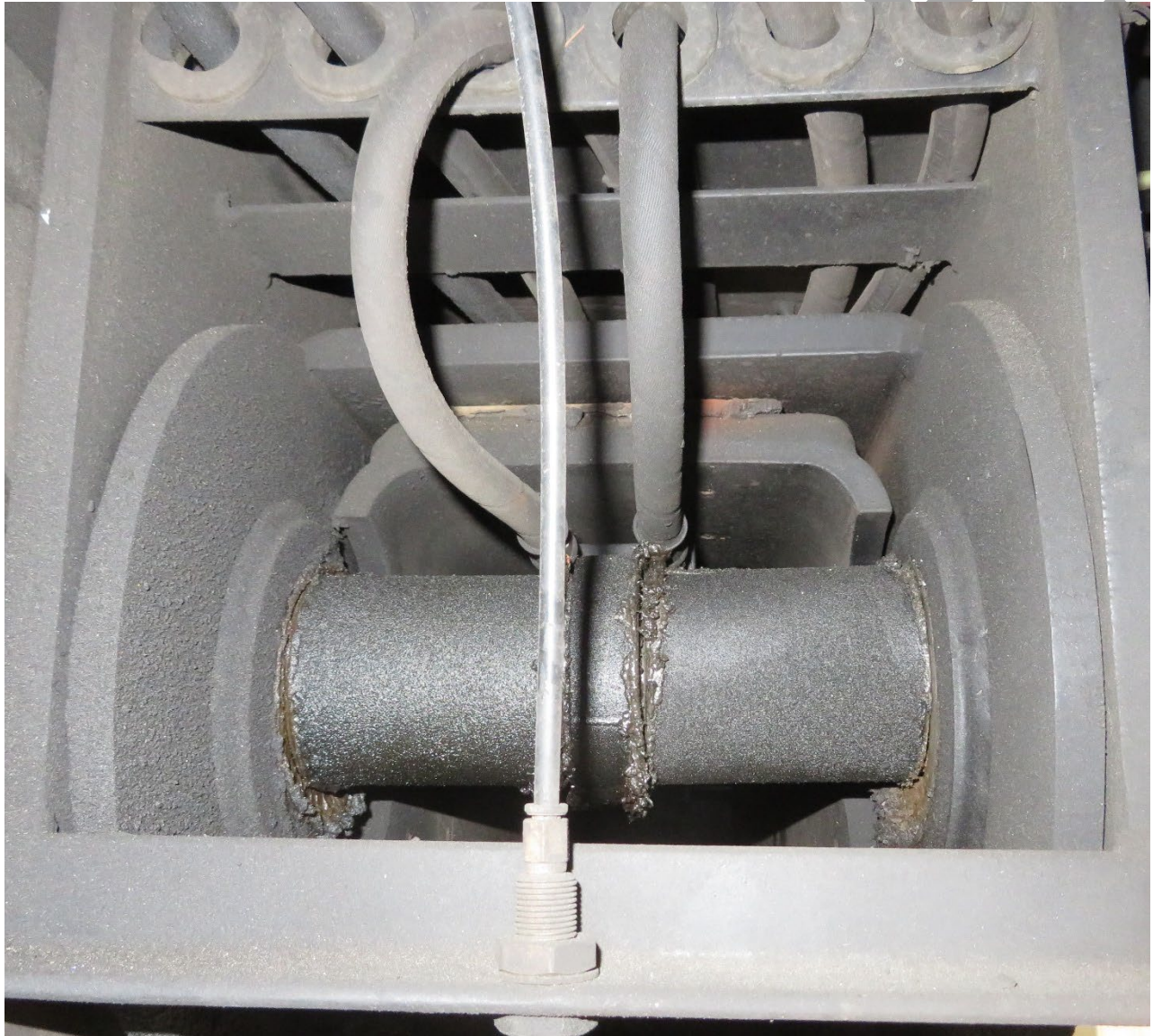


Figure 15

## **Aerial Assembly**

The aerial assembly inspection begins underneath the truck with the torque box assembly and outriggers/jacks that support the aerial device and the hydraulic system that makes all of this function. Structurally there were no noticeable defects in the aerial device, torque box assembly, or the outrigger/jack assemblies. Review of the annual ladder tests conducted by Underwriter's Laboratories (UL) for years 2016 and 2018-2020 do not indicate and structural problems or repairs needed to these assemblies.

There were hydraulic, electrical and waterway issues noted in the annual ladder test reports. Inspection of the aerial device, torque box and outrigger/jack assemblies show conditions in line with what are cited in the annual test reports. Some of the hydraulic assemblies are dry and others are wet indicating hydraulic fluid leaks, figures 16, 17 and 18.



**Figure 16**

Outrigger tube, dry and free of any hydraulic leaks.

A hydraulic shut-off valve assembly wet with hydraulic fluid, figure 17. Figure 18 down pressure assembly, wet with hydraulic fluid.

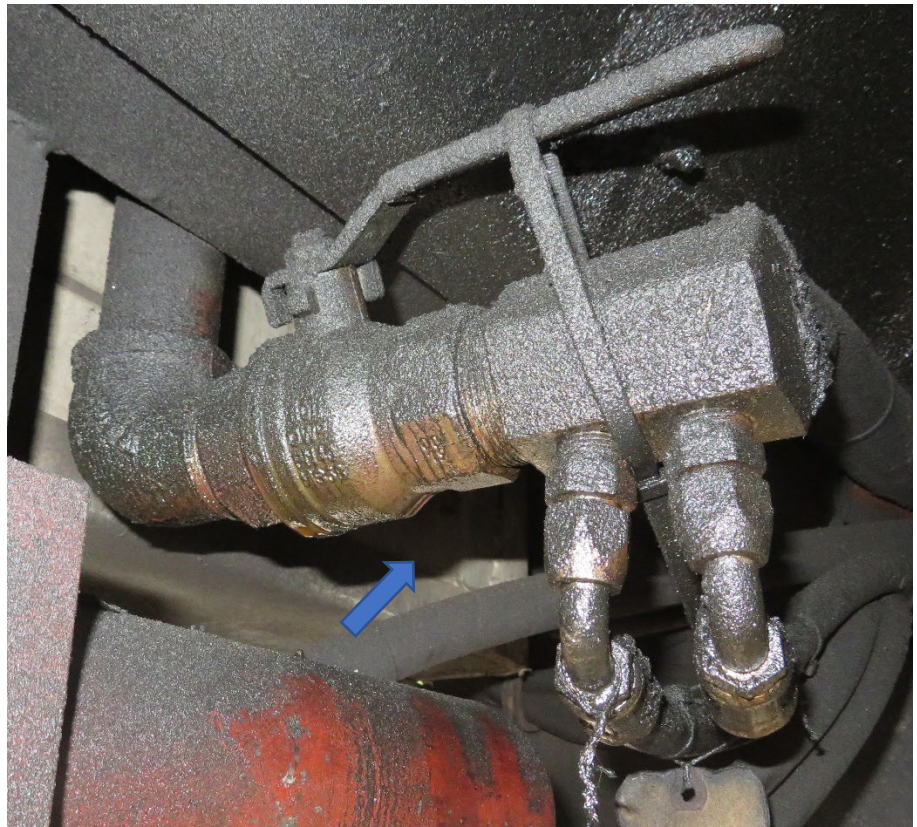


Figure 17



Figure 18

None of the hydraulic leaks observed in the aerial hydraulic system were severe or need immediate attention. They should be monitored and addressed if they leakage shows any signs of worsening.

During a refurbishment of a vehicle of this kind all of the hydraulic cylinders should be rebuilt, all of the flexible hydraulic lines should be replaced and any of the electric over hydraulic wiring should be replaced. Rebuild or replacement of hydraulic controls, actuators, shut off valves, rigid lines and the rotational motor should be done according to the recommendations of the aerial manufacturer.

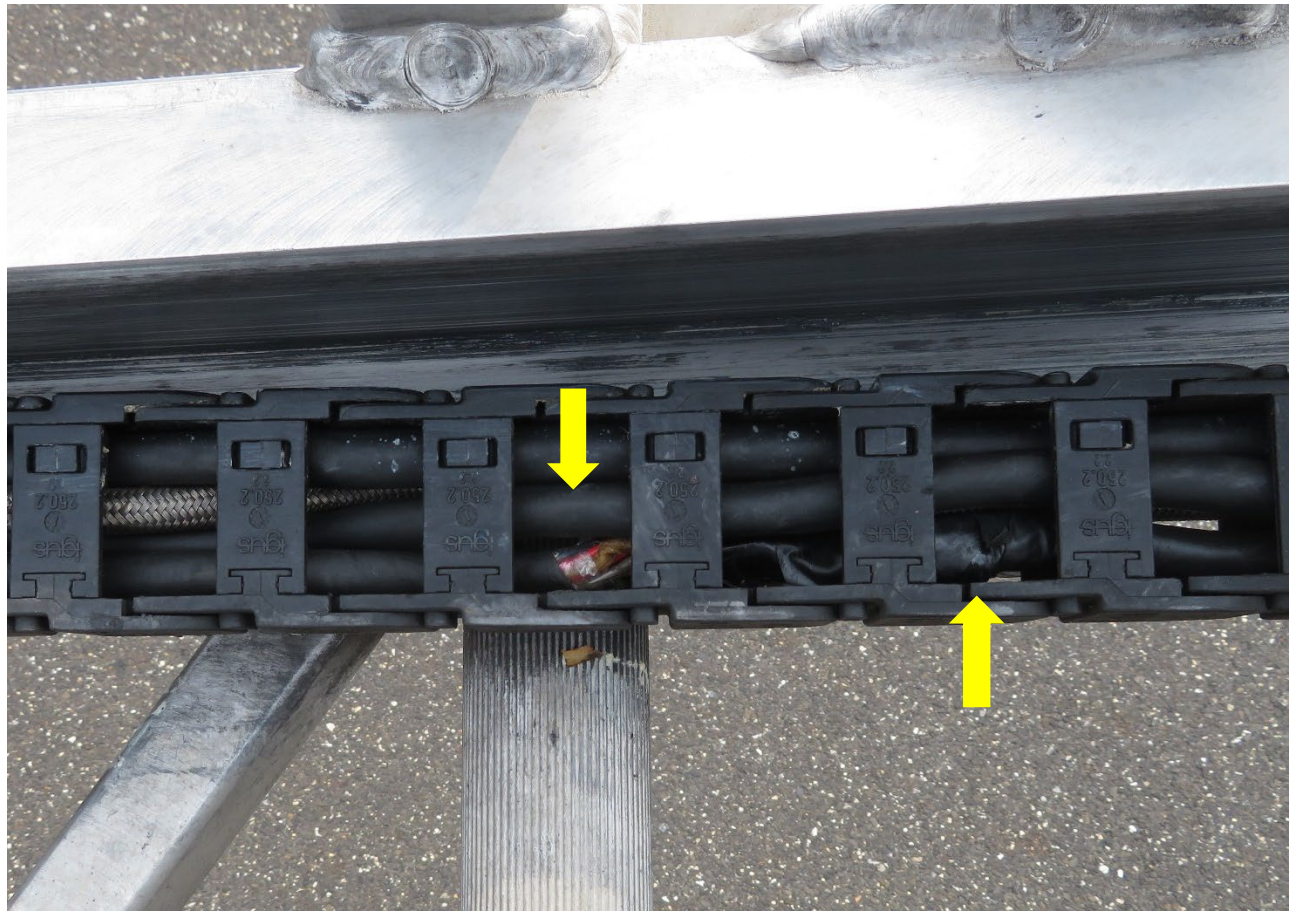


Figure 19

The wire repair noted in the UL inspection reports, figure 19. Wiring and hydraulic lines between the turntable pedestal and the personnel platform should be replaced as part of refurbishment.



Figure 20

Side area, figure 20 show the grease build up and some through annual cleaning of the aerial device and it components is critical to reliable aerial device performance. This also helps reduce wear and tear on the aerial device and its components minimizing expensive repairs and downtime.

Aerial device consumables, sheaves, cables, slide pads, waterway seals, etc. should all be replaced as part of a refurbishment.



Figure 21

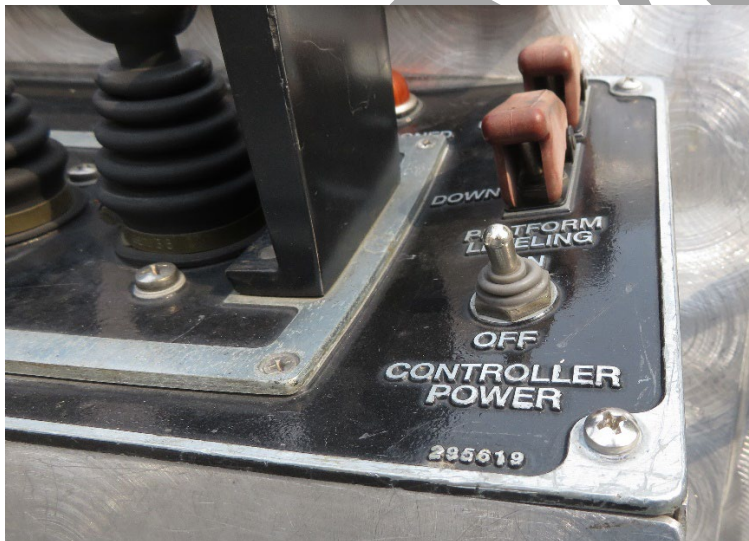


Figure 22



Figure 23

Both the platform operation station, figure 22 and the turntable pedestal operation station, figure 23 show signs of being bent and this should be addressed during refurbishment.

## **Fire Pump**

Fire pump test records for years 2016 – 2020 were reviewed and show that the pump performance was strong and consistent. The pump primed well and performed well in each of the three (3) performance tests available for review. Engine temperature, transmission temperature and engine oil pressure were all in normal operating ranges. The fire pump did not perform well in the vacuum retention test losing over 10" of vacuum each year. This is an indication that there are some pump issues that will need to be addressed.

## **Hydraulic Generator**

The hydraulic generator controls engaged and disengaged the PTO well. There PTO engagement and disengagement was smooth with no grinding or excessive vibration. Generator output with engine at idle with a load applied was consistent:

- 240 Volts AC Output: 242.8 VAC
- 120 Volts AC Output: 121.2 VAC
- Cycles: 61.8 Hz

## **General Observations and Recommendations**

Tower Ladder 1 structurally appears to be in good shape especially given its age and the duty cycle. There were no visible structural problems with the chassis frame, torques box assembly or outrigger/jack assemblies. It is important to keep in mind that these were visual inspections and that more detailed inspections will be needed as the refurbish process is underway. With the apparatus body removed and as assemblies are disassembled there may be problems that could become evident.

The cracking in the pump enclosure detailed is not as extensive as seen in similar apparatus but these conditions almost always are worse than meets the eye. While I do not think it is a reason not to continue to explore the refurbishment option keep in mind that there are some issues here that will need to be addressed.

The front axle weight rating is the single biggest concern I have with this apparatus moving forward with a potential refurbishment. The front axle weight rating for this vehicle 21,000 pounds. There was a note that the axle loads with water is:

- Front 19,640
- Rear 46,180
- Total 65,820

There is also a weight receipt from Cat Scales dated May 2014 that show the axle loads at:

- Front 20,880
- Rear 49,840
- Total 70,720

Both of these weight calculations shows the vehicle below its gross vehicle weight rating. But in either scenario with all six (6) seats in the cab filled the front axle is operating above its weight rating. There are options to deal with this situation moving forward and to make sure that the

department does not spend a substantial amount of money refurbishing a truck only to find out it will be operating over-weight when it goes in service. The first step in the process is to get a current and accurate weigh of the apparatus with:

- A full complement of hose.
- The booster tank full.
- All tools and equipment normally carried on the vehicle when it's in service on the vehicle in its normal location/compartment
- Full ground ladder compliment
- The number of seats occupied when the apparatus is weighed and which ones they were.

With this information solutions can be explored.

There are a couple of minor items that can be addressed now or during the refurb process should the department decide to continue.

- The drain for the front bumper discharge runs uphill. Disconnect this from a manual activated drain valve and replace it with an auto drain.
- The rear pull-out tool board in the L-2 compartment does not latch in open position.

The following are items that the department may want to include in the refurb process. The cost of these items varies, and each should be looked at and considered as a separate item:

- Replacement of apparatus DOT and warning lights with upgrades to LED units.
  - Some of the fixtures used on this apparatus are no longer available and LED lighting is much more efficient.
- Replace scene lighting both 12-volt DC and 120-volt AC with LED lighting. Operationally more efficient especially at the 120-volt level, less problems with bulb burn out and breakage, better overall lighting.
- Additional compartment shelving, pull-out trays, and /or tool boards. Make deploying and stowing equipment easier. Better inventory control.
- Improved compartment lighting.

## **Summary**

This inspection is the first step to determine whether or not the apparatus is a candidate for refurbishment. However, much more information needs to be gathered before a final decision is made. Paramount importance is that you keep in mind the items referenced in this inspection report are noted for your reference and to assist you in determining the best course of action moving forward. As mentioned previously several times, these items are the visible items that need attention and as is typical, other items probably will become apparent if the vehicle is disassembled during the refurbishing process.

The next step in the process should be fluid sampling, engine coolant, engine oil, transmission fluid, hydraulic fluid from both the ladder hydraulic system and the generator hydraulic system, fire pump gear box, and gear oil from both rear axle units should be collected and sent out for testing. This will give you a better idea of the internal wear that the main mechanical components of this truck are experiencing and possibly any potential problem occurring.



Diesel engine rebuilds are usually offered in two levels. The less expensive option is an in-frame overhaul which is usually done on an engine that is running well but needs overhaul due to wear. The second option is removing the engine completely for a rebuild. A local Detroit Diesel shop should be able to provide pricing for either option. Given the age and mileage/hours on this apparatus I would recommend that the radiator assembly be removed and sent out for service regardless of which engine option is selected. I suspect that a transmission fluid analysis will indicate that the transmission should also be rebuilt, which should be done as part of a refurbishment process.

As the department moves through the information gathering process and defines the scope of work and pricing add 25% to the final cost estimates for the scope of work planned. It has been my experience going through several apparatus refurbishments that there is always unforeseen work that needs to be done. Having a budgeted contingency keeps the process moving along and limits the financial challenges that can interrupt the process.

It is anticipated that this information will help with fleet decisions. **BRTFAC** is available to discuss this report in detail and answer any questions you may have. If you have any questions or need any additional information, please don't hesitate to contact us. Thank you for selecting **BRTFAC** to perform this inspection for the Any Town Fire Department.