Safety In and Around “Texas Raiders”

Safety Around The Hanger

Watch your head - There are lots of places where you can hit your head when you are walking under or inside the plane. We have padded some things like the exhaust pipes, but there are still plenty of hazards.

Ladders – Ladders should always be stabilized by someone holding them while another person is on the ladder. Ladders that are used on top of work platforms must be tied off to the platform securely to stabilize the ladder.

Look out for dropped objects/tools when people are on maintenance ladders, platforms, or on the wing.

Personnel Lifting - Many maintenance operations around the hanger involve lifting heavy things. You must be sure that you are lifting correctly – always using your legs, not your back. Be especially careful with aircraft tow bars because these are heavy and awkward to lift. Be aware of pinch points when installing tow bars on aircraft or tug.

When using cranes/hoists - Many heavy pieces of equipment on TR, like engines, require the use of cranes. The maintenance head on-site for the lift should always review a lifting plan with the lifting crew to make sure everybody knows what is going to happen and what their role in the lift is.

Always think about what could happen if the crane or lifting cable/strap failed. Never allow yourself to get under a load while it is in the air. Always stay far enough away to be safe if lifting equipment should fail.

Heavy pieces of equipment like engines should always be stabilized using a tag line, a rope tied to the load and held by someone on the ground, to keep the load from twisting.

Wet hanger floor - The concrete floor in Tomball Jet Center can become very slippery when wet. Even a heavy dew will make the floor slick. Be careful when walking on wet floors.

Oil Spills/Leaks - TR engines routinely leak oil. Oil can also be spilled during some maintenance operations. Promptly clean up all oil leaks or spills to prevent someone from slipping. Spill kits and kitty litter are located by the water cooler in the hanger.

Oily rag/paper towel disposal - Oily rags and paper towels present a potential fire hazard if simply put into ordinary trash cans. Please use the red oily rag waste cans located around the hanger.
Personal Protective Equipment (PPE) - PPE is there to protect you during certain kinds of activities in the hanger. The following types of PPE are provided in the hanger for your use:

- **Safety Glasses** (various locations in the work room and hanger) – These are needed to protect your eyes from damage by objects. Always use safety glasses when grinding or drilling. Use them during any other type of activity that could potentially damage your eyes, for example, using a cold chisel and hammer.

- **Face Shields** – (located in the work room) - These will protect your face from objects. They are typically used during grinding when hot sparks may be directed at your face. **NOTE:** face shields should always be used in conjunction with safety glasses, not as a replacement for safety glasses because particles can get to your eyes through open areas of face shields.

- **Goggles** (located near the parts washer) - They can be used in place of safety glasses. They should also be used when there is a hazard from splashing liquids. Typical operations around the hanger where goggles should is when using the parts washer.

- **Chemical Gloves** (located near the parts washer) – These should be used to protect your hands from liquids and solvents. They should be worn when using the parts washer or handling other potentially hazardous materials like paint strippers.

**Respirators and Dust Masks** (located in the white cabinet near the water cooler) - These should be used to protect your lungs from particulates or harmful chemicals. Paper dust masks should be used during sanding or any other activity that generates dust or small particles. Dusk masks should be used when operating the glass bead blaster to prevent ingesting dust from the glass beads. Respirators should be used to protect you from breathing harmful chemicals or solvents. Always wear a respirator when painting.

**Off-Limits**

TR is off-limits (STERILE in aircraft speak) during the following operations:

- Fueling

- Fuel transfer

- Any maintenance operation involving open fuel tanks, like changing fuel boost pumps

- When on jacks
“Off-limits” means only essential crew directly involved with the aircraft are allowed in, on, or near the plane. This means that no public (or private) tours are allowed. No rev ride passengers aboard, no non-essential crew aboard.

TR should be cordoned off using the cones and pylons when off-limits. Maintenance other than the above listed operations may require that specific areas of the airplane are cordoned off – for example when oiling, the immediate area should be secured because of the potential for oil spillage onto crew of the public.

**Tour Safety**

**Static tours** - When TR is on tour, one of the ways we raise money is by selling tours to the public (static tours). There are several safety issues involved in static tours that must be managed.

The aircraft should be cordoned off using cones and rope to limit public access to the aircraft to the front gate. The public should enter the plane through the front hatch – which requires a ladder. The ladder should be manned at all times to ensure it does not tip and to assist tourists that need help getting up the ladder. Tourists should be reminded to use the yellow grab bars located in the plane and to hold onto the ropes going through the bomb bay. This is especially important for small children crossing the bomb bay catwalk.

The nose area must be cordoned off using bungee cords to prevent tourists from entering the nose.

There MUST be a crew member stationed in the cockpit to prevent tourists from tampering with instruments, switches, controls, etc.

There should be a crew member stationed in the radio room or waist to assist tourists as they transit the aircraft, especially around the ball turret.

There should be a crew member at the rear door to assist tourists exiting the aircraft. Again, this is especially important for small children and tourists that are not very mobile.

**TR on display to the public** – At many air shows, the public can freely roam around TR because it is not cordoned off. This presents its own set of safety issues:

- Engine oil – the engines leak oil so the public should be encouraged to not stand directly under engines or engine cowlings and avoid oil puddles on the ground. Keep oil puddles to a minimum by wiping them up periodically. Some fuel depots have hydrocarbon absorbing mats that can be placed under the engines.
- Hot surfaces – if TR has recovered from a flight, the engines will be hot. Keep the public away from the engines, and brakes until things cool off. Keep them away from Props until 30 minutes after shutdown as discussed later.

- Maintenance – many times, we will have to perform maintenance on TR during a period when it is not cordoned off. People are naturally curious about a bunch of folks in green suits crawling all over an engine. Make sure that the area is cordoned off if there is anything about the maintenance operation (like oiling or dropped tools) that could pose a hazard to the public.

- Smoking – smoking is widely prohibited on ramps, however, don’t assume that everyone will take heed. Be aware for someone smoking around TR and ask them to stop or move away. No smoking is allowed inside TR as well.

- Head Injuries – as already mentioned, there are a lot of places to hit your head. Encourage the public to be careful when around the aircraft because of the threat of hitting their heads.

- Control surfaces – control surfaces (ailerons and elevators) are fabric covered. Do not let anybody touch control surfaces.

- Props – the public should not be allowed to lean on or push props.

Often times a crew member will bring a support vehicle to the aircraft to assist in handling luggage, parts, etc. Be aware not only of the public when moving a vehicle near TR, but do not allow the vehicle to touch any part of the aircraft.

**Safety In The Air**

When you are flying on TR, make sure you are belted in on take-off and landing. Always keep yourself steadied as you move around the aircraft. Hold onto only solidly mounted equipment, yellow grab bars, or the overhead conduit in the waist. Never ever touch the control cables while in flight. Do not stick your head out of waist windows. Do not crawl into the tail gun position on take-off or landing. Only move to the tail gun position if cleared to do so by the PIC.

Emergency exits on TR are shown below:
The front hatch and rear door have safety nets that should be covering them in flight. The netting is easily unlatched with one hand.

If you are a Loadmaster or Scanner on an air show flight, be constantly looking for air traffic and warn the PIC if something looks too close. When traveling on TR in general, inform the PIC if “sightseers” in their personal aircraft approach TR.

Essential crew (PIC, SIC, FE, LM) must wear sage tan Nomex flight suits when in flight. This should include Nomex gloves as well. Remaining crew members are encouraged to wear Nomex when flying.

When flying aboard the B-17 wear ear plugs or headset.

Watch for fuel or oil leaks on or under the wings and inform the PIC of them immediately.
**Revenue Ride Safety**

The safety of passengers on revenue rides is paramount. The Loadmaster is responsible for passenger safety. Loadmasters will brief the public before they board the aircraft. Specific briefing and safety issues for revenue rides are covered in Loadmaster training.

**Props**

Props are “dressed” after a flight by pulling the prop so that one blade is vertical pointing down. Props should not be dressed within 30 minutes of engine shutdown to eliminate the risk of a “kick” due to detonation of residual fuel in a hot engine. Also, do not walk between the props or between the props and fuselage within 30 minutes of shutdown.

Props are not back rests – don’t use them as such.

When pulling props prior to engine start, use both hands and pull or push the blades **SLOWLY** while feeling for a hydraulically locked cylinder. Only one person should be on a blade to minimize the risk of damaging the engine if there is a hydraulic lock.

**Installing or Pulling Chocks**

You may have to insert the chocks under the main wheels after landing if there is not ground crew support at your destination. The aircraft will taxi to its parking spot on the ramp as directed by marshalers. The PIC will continue to run engines after stopping for a couple of minutes. **DO NOT** exit the aircraft until after the engines are cut off. Grab the chocks and approach the wheels from the rear. **DO NOT** chock until props are stopped and it is safe. You do want to hurry as much as you safely can because brakes are hot and need to be released as soon as the wheels are chocked. After inserting the chocks, walk AROUND the wing – never near or through a prop arc, and signal the PIC or SIC that chocks are installed. You may have to get their attention with your whistle. The chock installed signal is:

![Chocks Inserted](image)

You may have to remove chocks before a flight if there is no ground support. Our policy is to remove chocks **BEFORE** engine start if at all possible. Position yourself in front and on the right
side of the aircraft so that you are in full view of the SIC. The SIC will give you the signal to pull chocks after the parking brake is set:

Note that sometimes it is necessary to pull chocks with the engines running because they are stuck under the tire. This can happen when the chocks are set tight to the tire and the plane is fueled. The increase in weight causes the tire to flex and trap the chock. Always leave a couple of inches between the chocks and the tire so that they don’t get stuck because of fueling. Sometimes, the rear chock will be stuck because the plane has rolled backwards slightly on an inclined ramp.

Make every attempt to pull the chocks lose. Pulling, kicking, screaming, and cussing are all suitable approaches – each with various degrees of effectiveness. The front chock must be pulled somehow no matter what. If the rear chock is stuck, and the front one is removed, the engine can be started and the aircraft pull away from the chock so it can be removed. A better way is to put the front chock to the side of the wheel. Then engines can be started and the plane taxi away from the chock. You can then recover it when the plane is a safe distance away and you are not near a turning prop.

**Flight Line Safety**

The “Flight Line” refers to where TR, and possibly other aircraft are parked. If you are on the ramp with other aircraft, especially at air shows, pay attention to taxiing aircraft and stay clear.

Some crew members are on the flight line when TR is “hot” - during engine start, taxiing, and aircraft recovery from a flight. There should only be 4 (maximum) crew members on the flight line when TR is hot: 1 fireguard, 1 crew member signaling prop rotation and fuel condition on start-up, and 2 crew pulling chocks.

These crew members should wear fluorescent lime green safety vests (sherbies). If you are not wearing a sherbie, you do not belong on the flight line.

**Fire Safety and Fire Extinguishers**
Fires are one of the greatest threats to TR. It is important that every crew member understand fires, fire extinguishers, and how to attack an airplane fire should one occur. The following material will provide you with basic information about fires and their control. It is NOT a comprehensive guide to all fire situations. Common sense and good judgment must still be practiced.

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**Fire Basics**

Elements of a fire: Fire is the result of a chemical chain reaction. There are three basic elements needed to obtain fire. These three elements are:

**OXYGEN**

**FUEL**

- Any substance that will burn
- Solids (coal, wood, paper, cloth, etc.)
- Liquids (kerosene, mineral spirits, gasoline etc.)
- Gas (propane, butane, fumes)

**HEAT**

- Fuel needs a heat/ignition source to raise its temperature to, or above, ignition point (spark, match, lit cigarette, friction etc).

The elimination of any one of these three elements will stop the chemical chain reaction and the fire will cease. That is what fire extinguishers are designed to do.

**Classifications**

There are four basic classifications of fires:

CLASS A - Ordinary combustibles: Coal, wood, paper etc.

CLASS B - Flammable liquids: Gasoline, kerosene, grease, etc.

CLASS C - Electrical: Electrical wiring, electric apparatus, motors, etc.

CLASS D - Flammable metals: Magnesium, titanium, zinc, aircraft aluminum

**Types of Fire Extinguishers**
To control or eliminate a fire, specific classes of fire extinguishers have been engineered to eliminate one or more of the three basic fire elements.

**CLASS “A” - Water**

These extinguishers contain water and compressed gas, and should only be used on Class A (ordinary combustibles) fires. Do not use this type on electrical fires! A shock hazard exists. TR does not carry any of these extinguishers.

**CLASS “BC” – Carbon Dioxide (CO$_2$)**

CO$_2$ extinguishers are most effective on Class B and C (liquids and electrical) fires. Since the gas disperses quickly, these extinguishers are only effective from 3 to 8 feet. Since the fire could re-ignite at hot spots after the CO$_2$ dissipated, be prepared to continue to apply the agent even after the fire appears to be out. Be careful -- CO$_2$ extinguisher components become very cold and can cause freezing damage to skin! Be careful using CO$_2$ extinguishers in confined spaces like, for example, the Radio Room because the CO$_2$ will displace oxygen presenting a hazard to your breathing.

**Most of the fire extinguishers on TR are CO$_2$. Locations are shown below.**

**CLASS “ABC” –**

Dry Chemical extinguishers are usually rated for multiple purpose use. They contain an extinguishing agent (powder) and use a compressed, non flammable gas as a propellant. TR carries one 25lb dry chemical exchanger located at the rear of the waist area.

Halon extinguishers contain a gas that interrupts the chemical reaction that takes place when fuels burn. These types of extinguishers are often used to protect valuable electrical equipment since they leave no residue to clean up. Halon extinguishers have a limited range, usually 4 to 6 feet. There is one 5lb Halon extinguisher on TR in the radio room. Similarly to CO$_2$, Halon will displace oxygen so it should be used carefully in confined spaces.

**CLASS “D” –** Specialized for flammable metals. The only flammable metals on TR are the Magnesium wheels. However, we have no specialized metal extinguishers.
Using Fire Extinguishers

Even though fire extinguishers come in a number of shapes and sizes they all operate in a similar manner. Always use the appropriate class of fire extinguisher on the fire.

An easy acronym to remember the steps in using a fire extinguisher is..... **P.A.S.S**...

**P**ull the Pin at the top of the extinguisher. The pin releases a locking mechanism and will allow you to discharge the extinguisher.

**A**im at the base of the fire, not the flames. This is important in order to put out the fire, you must extinguish the fuel.

**S**queeze the lever slowly. This will release the extinguishing agent in the extinguisher. If the handle is released, the discharge will stop.

**S**weep from side to side. Using a sweeping motion, move the fire extinguisher back and forth until the fire is completely out.
Operate the extinguisher from a safe distance, several feet away, and then move towards the fire once it starts to diminish. Be sure to read the instructions on your fire extinguisher - different fire extinguishers recommend operating them from different distances.

**Note:** IF YOUR CLOTHING IS ON FIRE (and the ground/floor is not) STOP, DROP and ROLL on the ground to extinguish the flames. If you are within a few feet of a safety shower or fire blanket, you can use these as well. If one of your coworkers catches fire and runs in panic, tackle them and extinguish their clothing using the appropriate fire extinguisher.

Disclaimer: These pages contain guidelines for the use of fire extinguishers and are not meant to be a comprehensive reference. There are many circumstances that these guidelines cannot foresee and you should recognize the inherent danger in relying solely on this information.

**Information Specific to Aircraft Fires**

Immediately notify PIC/SIC of a fire. The pilot will try to put out an engine fire by shutting off the fuel and can operate an extinguisher located inside the engine cowling.

**Engine Fire** - If there is an engine fire, approach from behind the engine. Do not try to extinguish the fire until the engine and prop have stopped turning.

**Brake fire** – Always approach the wheel from the fore or aft. Use dry chemical if possible. If there is smoke coming from the brakes, they may be just hot or there might be a fire. Feel near the rim to see if hot. Call crash crews for fans to cool the brakes in needed.

If a Magnesium rim is on fire, use foam if available. If not, dry powder. **DO NOT USE WATER!**

**Fuel Tank Fire** - Immediately call airport fire support because we probably don’t have enough on-board extinguishers to fight anything but a small fire.

**Wiring/interior fire** - Use CO₂ or Halon only because dry chemical can be corrosive to aluminum aircraft structures and parts.
**Life Vests**

Life vests are located at various places in the aircraft. They are commercial aircraft life vests. Locations are shown below:

**Nose:** 2  
One under Nav Table  
One behind ammo box

**Radio Room:** 3  
One under Radio Table (currently behind radio)  
One under each starboard seat

**Flight Deck:** 3  
Under PIC, SIC, and FE seat

**Waist:** 4  
Two loose on floor by each waist gun  
Two on starboard side of ball turret ammo box

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**Passengers’ Safety, Illness or Injury**

Always pay attention to the safety and care of our crew and passengers and be on the lookout for any unexpected sickness, or injury. Notify flight deck of any sickness, illness or injury immediately.
A first aid kit is located in the Radio Room in the left (port side) structure surrounding the RR hatch.

Air Sickness is the most common problem in flight. Air sickness bags are in the radio room in a green bag, but many Loadmasters carry 1 gallon zip lock bags for airsickness because you may not have time to get to the radio room.

Be very aware of heat exhaustion for both passengers and crew.

If a person is injured, stabilize the person and administer basic first aid, unless there is an emergency like an aircraft fire. If possible, wait for EMT’s to do their job.

You can try to stop bleeding using compression, but remember the universal precautions when working with injured or bleeding personnel. **Wear gloves. No skin to skin contact.**