
THE GAMGRAM

No. 66

REFUELER TRUCK DESIGN

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This GamGram is written mostly to help people new to refueler trucks, some points that even those with experience may learn from. This GamGram is not a complete education. Please read the manuals and other operational documentation available from the refueler truck manufacturer, airline, oil company and other applicable standards. Do the quality control and the preventive maintenance. Inspect the truck regularly for leaks, damage and the operation of all systems, even brake lights and turn signals.

The #1 safety device in refueling is you. Never assume a refueler truck is safe to use, be sure. Be observant, do inspections, check pressures, test equipment, calibrate gauges and never operate a refueler truck unless you have been completely checked out on safety, spill and environmental concerns. [See GamGram 23](#).

The key to safety and quality control is to be on the lookout for changes. Changes mean something may be wrong and if in doubt, don't pump fuel. Life is too important to take chances.

A refueler truck is a vehicle with a storage tank and the needed equipment to dispense fuel safely to aircraft. We will address hydrant carts, without storage tanks, in a future GamGram.

DESIGNED FOR SAFETY

To protect everyone, a refueler has safety systems. A primary safety system is the brake interlock, designed so that the truck cannot be driven when it is engaged in refueling an aircraft or when the cargo tank is being loaded at the loading rack. Most trucks have an "emergency brake override" in the cab to allow the truck to be moved in an emergency. Never bypass safety systems.

THE FUEL STORAGE/CARGO TANK

The tank on a refueler truck is an expensive part. The weight of the fuel affects the cost of the chassis, so a large capacity adds cost, but a small cargo tank means less refueling ability.

THE PUMP

The fuel pump is driven either from the transmission (PTO), from a "split shaft" in the middle of the drive shaft or from a hydraulic drive. It is important to not exceed the maximum rated rpm for the pump, and to keep it lubricated properly, follow the manual.

THE FILTER

A refueler truck may have a water absorbing (monitor type) filter or a filter separator. A water absorbing filter collects water in the element media itself, like a baby diaper. A filter separator removes the water and this water must be drained from the vessel sump and a sump water sensor should be present to stop flow if excessive water accumulates. See GamGrams [47](#), [48](#), [53](#) and [63](#). All filters must be rated for aviation fuel, properly maintained and contain the correct, latest Edition approved elements for the flow rate and vessel. See GamGrams [8](#) and [57](#).

All filters are also equipped with a differential pressure (DP) gauge. An increase in the difference between inlet pressure and outlet pressure (DP) means you have contaminated fuel. See [GamGram 26](#). Pressure drop is caused by dirt and/or water in a water absorbing type filter and dirt in a filter separator. The gauge should have a shutdown system to stop flow if DP is too high, this must be tested. See the manufacturer's recommendations and [GamGram 65](#).

Other accessories on a filter are a means to: eliminate air, relieve excessive pressure and take fuel samples from the flowing system (standard on jet fuel and optional on avgas trucks) as well as a low point drain.

SUMPS AND STRAINERS

Checking the tank and filter sump as well as all strainers is important to look for water, dirt or anything else that should not be in the system. (A true story, someone once found a small fish in a nozzle strainer after installing a new hose that had not been properly stored in a shed by a creek.)

FUELING NOZZLES

Refueling overwing is similar to fueling a car and usually the flow goes into the aircraft above the wing or high on the fuel tank. Automatic nozzles with “hold open” designs are not allowed, because there is too much spill danger from variations in the aircraft fill connection. It is best to maintain contact between the spout and fill connection at all times.

Underwing, or single point refueling is done with a nozzle that locks onto the aircraft, usually from under the wing.

All nozzles should have a strainer as a last defense against debris getting into the aircraft and to detect deterioration of the inside of the hose.

PRESSURE AND FLOW CONTROLS

If all you do is to fuel overwing, you only need an emergency fuel shutdown system to stop the pump and all valves, but if you refuel underwing, you need pressure controls, a deadman control and likely a rate of flow control. These may be hydraulic, pneumatic or electric, or a combination. See the manufacturer's instructions. Hydraulic pressure controls are defined in GamGrams [32](#) and [33](#).

A deadman control is either a handle on an electric cord, a handle on small deadman hose(s) or the trigger on an overwing nozzle (or similar design). It must be operated to obtain flow. NEVER bypass the deadman control. The deadman control may have a timer control that requires you to quickly release and re-squeeze the deadman control to maintain flow. A timer-type deadman makes “jamming the deadman” virtually impossible.

FLOW RATE

The maximum flow rate of a truck is determined by the rating of the meter and the filter, with the lowest rating being important. The flow rate printed on the filter vessel is not important, what is important is the current rating of the vessel with the specific elements in it. See your filter supplier for this rating.

HOSE REELS

Hose is stored on hose reels and must be wound in a neat way to prevent damage and allow the maximum capacity of hose. Rewinding is most commonly by electrical motor, hydraulic power or air. The swivel should be properly lubricated and have a grease vent to prevent grease getting into the fuel. Petroleum jelly (“Vaseline”) is a common lubricant to use.

REFUELING HOSE

All aircraft fueling hose must meet stringent standards. It must NEVER have a wire in it for conductivity (except lift-deck hose). It must meet the EI-1529 standard. Inspection of the hose regularly is very important. Pull the entire hose from the reel regularly and inspect it fully for any sign of cracking, splitting, flat spots and fabric showing through or bubbles. Turning a hose end-for-end can extend the life of the hose. See GamGrams [35](#) & [49](#).

STATIC BONDING

To prevent sparks between the aircraft and the truck, a static cable must be provided, usually on a reel for storage. It is important to not only keep this cable and clamp intact and conductive but use it in every refueling. Conductivity is checked between the clamp and the frame of the truck.

BOTTOM LOADING

To fill a refueler storage tank, you need to make sure the tank is not overloaded. All trucks should have a working high level shutoff with a test feature. This is separate from the fuel farm high level control, if present. Operate this truck mounted “precheck” test feature regularly not only to ensure the high level control works, but to ensure the internal valve in the bottom of the tank works.

COMPRESSED AIR SYSTEM

Most refuelers have compressed air systems that need to be maintained. See [GamGram 62](#).

OVERALL

Do the daily, weekly and all other periodic tests required by the standard that you operate under. This may be ATA-103, IATA JIG or other standards. Keeping the truck maintained includes pressure controls, water controls, filters, hoses, tires, air and oil filters, chassis lube and oil changes - and much more.

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