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HANDIFUELER™

TECHNICAL MANUAL

TR1000SEA12

SI AVIATION

Spokane, Washington

1000 GALLON HandiFueler™

TR1000SEA12

ONE YEAR LIMITED WARRANTY

Seller warrants its 1000 Gallon HandiFueler™ tank to be free from defects in material and workmanship under the normal use and service for which the unit is intended if, but only if the unit has been properly operated, maintained and stored in accordance with printed directions contained in the product manual. Our obligation under this Warranty shall be limited to the repair or exchange of SI manufactured equipment and parts which may prove defective within one year of the date the unit is put into service but shall in no event extend beyond a date three years from the date the unit is shipped from our plant. All transportation charges on parts returned to us for replacement under this warranty must be returned prepaid.

Other manufacturers' components warranties apply as their warranty reads.

This warranty does not extend to damage caused be environmental factors varying from normal design conditions, whether natural or man-made, or to units subjected to misuse, negligence or accident. This warranty likewise does not extend to the unit or any parts thereof which have been repaired or altered improperly or in any way so as to effect adversely its stability or reliability. This warranty does not cover parts or labor required to repair or replace parts whose usefulness is exhausted due to normal operation of the unit.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE NOT SET FORTH IN WRITING SIGNED BY AN AUTHORIZED REPRESENTATIVE OR SELLER. SELLER SHALL IN

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Section 1.0 Introduction

1.1 This operating manual contains information necessary for the operation and maintenance of the HandiFueler™. The HandiFueler™ is designed to provide a portable, safe, self-contained fueling system for the aviation industry.

1.2 Specifications for the HandiFueler™ are shown in Table 1.0.

Table 1.0 Specifications for TR1000SEA12

Unit Standards - (Applies to units used in the USA only)	**NFPA-407, NFPA-385 Compliant**
Overall Unit Dimensions	
Length—Imperial/Metric	276inches/ 702 centimeters
Width– Imperial/Metric	91 inches/ 231 centimeters
Height—Imperial/Metric	76 inches/ 194 centimeters
Weight—Imperial/Metric	5200 lbs / 2359 Kilograms
Tank Construction/Capacity	Dbl wall Stainless Steel/1000 Gallons/ 4546 litre
Under Carriage rating	12,000 lbs.
Brakes	Drum Style, Manually operated
Pump	Dixon Blade Master, model 1583
Motor (30 minute duty cycle)	12-Volt, with internal thermal circuit breaker
Fuel Filter, refueling	Cartridge style, 2 micron
Refueling Hose—Certified to API 1529	1-1/4 inch with refueling nozzle
Batteries	Dual, 12 Volt
Battery Box circuit breakers	Dual, 125 Amp Thermal Circuit Breakers

Section 2.0 Safety Guidelines for HandiFueler™

2.1 This manual contains guidelines and safety recommendations for use of the HandiFueler™. It is the responsibility of the end user to completely read this manual and comply with all local, state and federal laws and regulations applicable for using this equipment.

2.2 Spokane Industries Inc. is not responsible for industry specific information on safety management, employment safety, health standards, safety codes, etc. Contact your local safety manager or industrial safety representative.

NOTE: Spokane Industries Inc. is not responsible for any modifications performed on this equipment. Modifications performed by user may result in an unsafe condition for equipment or personnel and void the manufacturers warranty.

2.3 It is the responsibility of the end user to ensure persons operating this equipment:

- Are trained, authorized and permitted to use the equipment.

- Have physical and mental ability to operate this equipment safely.

- Are aware of the potential hazards associated with this equipment, including operating this equipment during adverse weather conditions.

- Do not attempt to move, service or adjust this equipment without another capable person present to provide assistance in the event of injury.

Table 2.0 Other Suggested Safety Resources

ANSI	American National Standards Institute	
OSHA	Occupational Safety & Health Admin-istration	Hazardous Materials, Material Safety Data Sheets (MSDS), Lockout/Tagout, Confined Space, Fire Prevention, Personal Protective Equipment (PPE)
CFR	Certified Federal Regulations	
FAA	Federal Aviation Administration	
FAR	Federal Aviation Regulations	
NFPA	National Fire Protection Association	

2.5 **NFPA Standards- USA Only** - This HandiFueler™ is designed and built to meet NFPA 407 & 385 standards. Safeguards must be in operational condition, if not, discontinue use immediately. No bypass of safety mechanisms is authorized.

Section 3.0 CONTROLS & INDICATORS

Table 3.0 CONTROLS & INDICATORS

Parking Brake Handle	Located at front of trailer. Used to set park brake during operation and storage.
Emergency shut off levers **See Fig. 4.1**	2 levers located lower front of tank support rails. Used to close 3 inch internal valve, by disengaging valve lever at the 3 lever operator, during an emergency situation while refueling.
Liquid level gauge	Located front, centerline of tank. Indicates amount of liquid in tank.
Low Point drain (water drain valve) **See Fig. 4.2**	Located left side of trailer, aft of rear wheels. Used to remove water buildup from inside of tank.
Battery Selector Switch **See Fig. 4.3**	Selects single (#1 or #2) or "Both" battery mode. Connects power from batteries to electric refueling motor. Located on top of battery box cover.
Battery Charge indicator **See Fig. 4.3**	Indicates battery charge condition. Located on top of battery box cover.
Battery Charger - 230 Volt input/ 12 Volt output **See Fig. 4.3**	Marine Grade battery charger. Provides "Charging" and "Ready" indicator lights to show charger status. Located on top of battery box cover.
Auxiliary Power Terminals **See Fig. 4.3**	To be used when batteries become depleted while off loading fuel, only use to finish off loading operation. Located on top of battery box cover. **DO NOT** use as power source for normal refueling practices.
Pump ON/ OFF Switch **See Fig. 4.4**	Controls electrical current to motor driving the pump
EMERGENCY STOP Switch **See Fig. 4.4**	Stops current to motor. PUSH to activate, TURN to reset (pump will resume running)
PUMP & POWER Lights **See Fig. 4.4**	POWER - indicates battery switch has been turned on, there is power to the pump switch. PUMP - Pump switch is ON, pump is running.
3 lever operator **See Fig. 4.5**	Located inside pump cabinet. "Valve" lever opens 3 inch internal valve for off loading. "Nozzle" lever sets brake and releases nozzle from holster. "Brake" lever sets Park Brake.
Fuel Meter **See Fig. 4.6**	Located inside pump cabinet. Registers amount of fuel off loaded through nozzle. Manually reset.
Differential Pressure Gauge **See Fig. 4.6**	Gives real time indication of fuel filter flow restriction condition.
Fuel Filter Housing **See Fig. 4.7, 4.8**	Located inside pump cabinet. Houses 2 micron cartridge filter element, filter housing air bleeder, filter restriction indicator and housing drain petcock.

Section 4.0 BASIC OPERATION OF HANDIFUELER™

4.1 This section contains information necessary for the operation and maintenance of the HandiFueler™. The HandiFueler™ is designed to provide a portable, clean, safe, self -contained, fueling system for the aviation industry.

4.2 **Pre-Towing the HandiFueler™.** Items in Table 4.0 need to be accomplished before towing the HandiFueler™ .

Table 4.0 PRE-TOWING SAFETY CHECKLIST

ITEM DESCRIPTION	PRE-TOWING CHECK	VISUAL INSPECTION	CORRECTIVE ACTION
Tires, Tire Pressure		Check for damage and proper tire inflation.	Replace tire if damaged. Inflate to manufacturers specifications on tire sidewall
Brakes		Ensure both "Park Brake" and 3 lever operator "Brake" are re-leased.	
Tank		Visually inspect for cracks or leaks. Ensure Manway cover is closed and latched. Ensure tank is securely fastened to the rolling undercarriage.	Repair cracks or leaks before use. Tighten fasteners if loose.
Hoses, Nozzle, Grounding Clamps and wires		Ensure all hoses and ground wires clamps are secured for transportation. Inspect hoses, clamps and wires for servicea-bility.	Replace hoses, grounding clamps or wires before use if found to be beyond repair.
Valves		Visually inspect to ensure all valves are in the closed position. Check for leaks.	If leaks are found, repair or replace item before using.
Pump cabinet doors		Ensure all cabinet doors are closed and latched. If storage boxes are installed ensure doors are latched.	

4.3 Operational Definitions.

Fuel Source	Fuel which is used to fill (load) the HandiFueler™.
Loading	Any action with the intent to put fuel into the HandiFueler™ tank.
Off Loading	Actions requiring fuel discharged through the HandiFueler™ fuel nozzle. i.e. aircraft refueling operations
Top Loading	Loading fuel by using the Manway cover for access to the tank. **WARNING: No overfill protection using this method.**
CAUTION	Indicates an operation or condition that, if not observed, could result in equipment or property damage.
WARNING	Indicates an operation or condition that, if not observed, could result in possible injury or death.

4.4 Battery Charging:

This charging system is equipped with a 230 Volt battery charger. Read all supplied original manufacturers technical data before charging batteries.

WARNING: DO NOT charge batteries during refueling operations. Charging during refueling operations will overload the charger amperage output during continuous use. The charger is **NOT** designed as an additional power supply source for extending battery operating time. Use of the charger during off loading operations could damage the chargers capabilities and result in an ignition source.

1 Set park brake.
2 Ensure Manway cover and all fuel valves are closed.
3 Set battery selector to “OFF”.
4 Connect 230 volt power supply to battery charger.

4.4.1 Auxiliary Power Terminals - See Fig. 4.3 The battery box includes auxiliary power terminals located on the top of the cover. Use the auxiliary posts only to complete a refueling task if the primary batteries becoming totally depleted. Positive (Red) and Negative (Black) terminal ends provide attachment points for connecting to a 12 volt support vehicle. Read the vehicles recommended practice for supplying 12 volt power to external battery sources.

1 Remove protective covers from auxiliary power terminals
2 Connect jumper cables from 12 volt vehicle per vehicle directions.
3 Place Battery Selector switch in the “Both” position.
4 Ensure yellow “POWER” light is illuminated at pump cabinet.
5 Ensure Pump Switch is “ON” and green Pump light is illuminated.
6 Finish refueling operations.
7 Recharge batteries to the Full Charge condition, per section 4.4

4.5 LOADING THE HANDIFUELER™.

TOP LOADING: WARNING: NO OVERFILL PROTECTION.

1 Set parking brake.
2 Ensure battery charger is not plugged in, battery switch is in the “OFF” position and the pump “ON/ OFF” switch in the pump cabinet is “OFF”.
3 Chock tires.

CAUTION: Improper grounding may result in an ignition source.

4 Connect static ground clamps to approved grounding points.
5 Open 10 inch Manway cover.
6 Ground fuel source loading hose to Manway opening of tank.
7 Fill tank to required capacity.
8 Remove hose and ground connection.
9 Close and latch Manway cover.
10 Disconnect and store static ground clamps.

4.6 Water Removal: Low Point Drain/ Fuel Filter Housing.

Verify user’s local governmental requirements for water removal before draining fuel from the HandiFueler™.

1 Ensure Park Brake is engaged.
2 Ensure battery charger is not plugged in, battery switch is in the OFF position and the pump power switch in the pump cabinet is turned OFF.
3 Chock tires.

CAUTION: Improper grounding may result in an ignition source.

4 Connect static ground clamps to approved grounding points.
5 Procure approved fuel container that will assure containment for amount of liquid to be drained and place under Low Point Drain Valve.
6 Open Low point Drain Valve, left side of trailer, aft of rear tires. **See Fig 4.2**
7 Pull Water Drain handle, located above drain valve, until desired quantity is collected.
8 Release handle.
9 Close Low Point Drain Valve.

4.6.1 Fuel Filter Housing - drain using same type of container, **See Fig. 4.8**

1 Loosen petcock located at bottom of Fuel Filter housing.
2 If no fuel flow, loosen air bleeder petcock on top of housing.
3 Close all petcocks after required draining is accomplished.

4.7 OFF LOADING FUEL FROM THE HANDIFUELER™

WARNING: Never operate the HandiFueler™ in an enclosed area. Proper ventilation must be maintained at all times. All fuels are flammable, do not allow sources of ignition within 50 feet of HandiFueler™.

CAUTION: Improper grounding may result in an ignition source.

Ensure batteries are fully charged before attempting Off Loading operations.

1 Set parking brake.
2 Connect static ground clamps to approved grounding points.
3 Chock tires if chocks are available.
4 Turn battery selector to the “Both” position
5 Open Cabinet doors and secure.
6 Ensure yellow “POWER” light is on.
7 Turn pump power switch to the “ON” position, green “PUMP” light should illuminate.
8 Pull Valve, Nozzle and Brake levers on the 3 lever operator.
9 Remove Nozzle from storage holster, pulling hose outward to desired length.
10 Connect Nozzle ground clip to receiver fuel filler port.
11 Insert Nozzle into receiver filler port, discharge fuel quantity required.
12 Remove ground clip from receiver filler port.
13 Reel hose and nozzle onto reel assembly.
14 Secure Nozzle into storage holster.
15 Turn pump power switch to the “OFF” position, green light goes out.

CAUTION: Ensure Nozzle is securely seated into storage holster before attempting to move Nozzle or Brake lever forward. Nozzle must be fully seated to override Brake lock-out device.

16 Push “Nozzle” lever forward, do not force lever.
17 Push “VALVE” and “BRAKE” lever forward.
18 Close and latch cabinet doors.
19 Turn battery selector to the “OFF” position.

4.8 **Differential Pressure Gauge** (Optional Equipment) **See Fig. 4.6**

Gives real time reading of the differential pressure, fuel must be flowing through the filter housing to give accurate indication. DP gauge is equipped with a valve to test movement of the DP gauge piston, this verifies smooth and continuous movement of the piston.

1. Turn valve handle clockwise while fuel is flowing, observe piston movement.
2. Release handle to return gauge to normal operation.

Figure 4.1

Emergency Shut Off levers

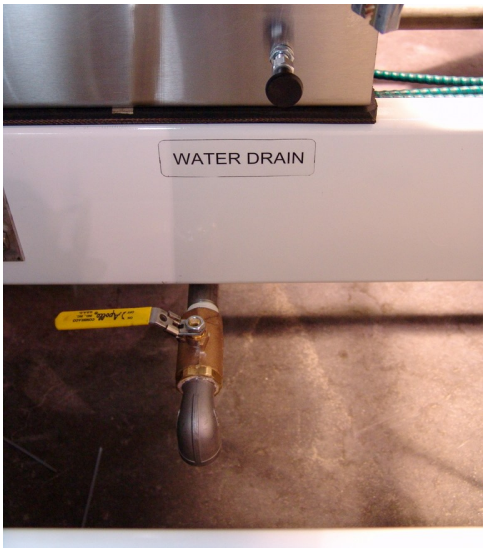
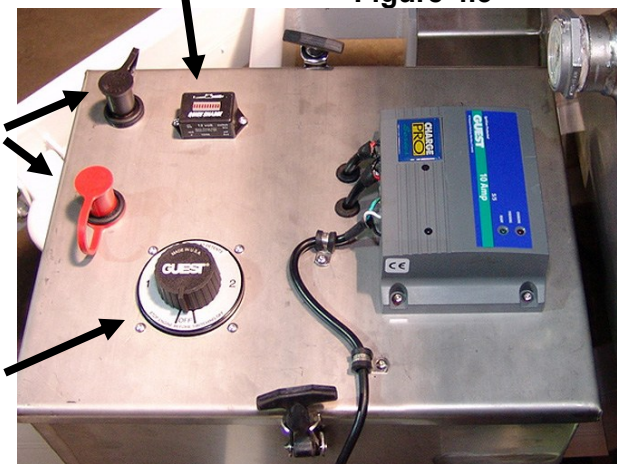


Figure 4.2

Low Point drain Valve. Pull handle located above valve

Figure 4.3



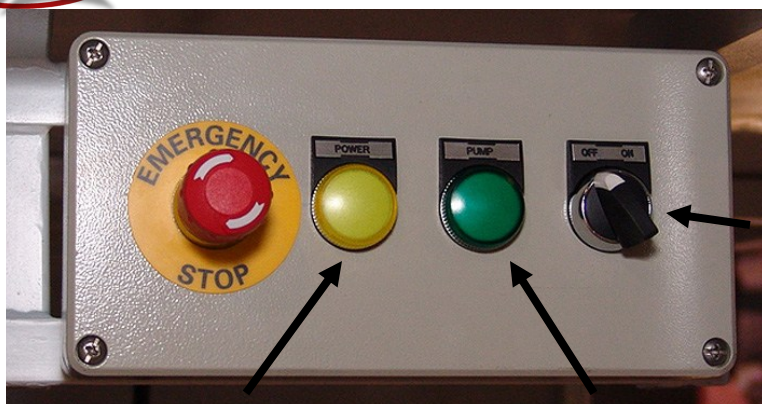


Figure 4.4
Pump Power Control Box

Pump ON/ OFF switch

POWER Light - illuminates when Battery Selector Switch is in the 1, 2 or BOTH position.

PUMP Light - illuminates when the pump switch is in the "ON" position.

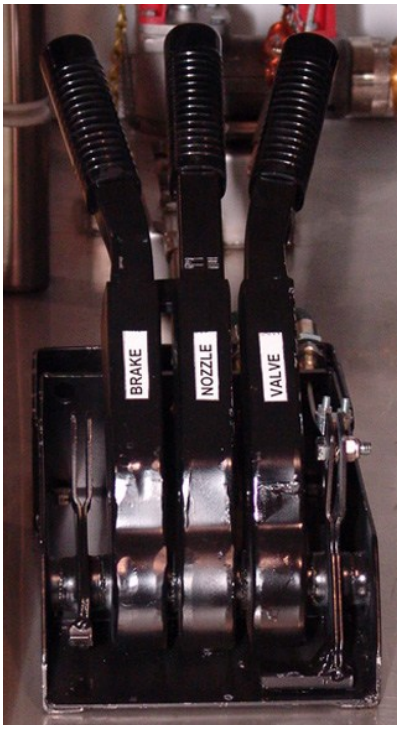


Figure 4.5
3 - Lever Operator

Figure 4.6

Fuel Meter

Differential Pressure Gauge

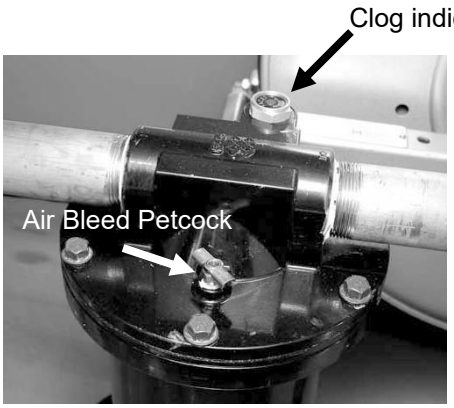


Figure 4.7

Fuel Filter Housing, view shows
Filter Clog indicator and
Air Bleed Petcock

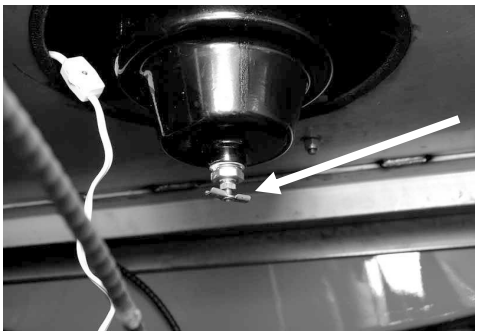


Figure 4.8

Fuel Filter Housing
Water drain

SECTION 5.0 INSPECTION AND MAINTENANCE

5.1 This section provides the basic requirements to maintain the HandiFueler™. Many parts of the HandiFueler™ are from different manufacturers and will have different intervals for Inspection and Maintenance requirements. In such cases follow the manufacturer's recommendations dictated in the specific product manual. All available product manuals have been shipped with the HandiFueler™ User Manual. Take care to store all product manuals for future reference. Some components were received without literature.

Table 5.0 Inspection Intervals and Component Maintenance Guide

Component	Interval	Criteria	Maintenance
Hose Nozzle	Each use	Cracks, leaks	Repair or Replace before using. See Product Manual for specific guidance.
Fuel Meter	Each use	Leaks	Repair or Replace before using. See Product Manual for specific guidance.
Bypass Valve	Each use	Leaks	Repair or Replace before using. See Product Manual for specific guidance.
Fuel Filter Housing	Each use	Leaks	Repair or Replace before using. See Product Manual for specific guidance.
Hose Reel	Each use, 6 months	Leaks Grease swivel joint	Leaks -Repair or Replace before using. Grease swivel joint, see Product Manual for specific guidance.
Manway seal	6 months	Cuts, tears or wear of material	Replace if seal allows fluid to leak around opening.
3 Lever Operator	6 months	Check freedom of movement.	Grease using general purpose grease. Zerks located near pivot point, open side of levers.
Wheel Bearings	2 Years	Grooves, chips, discoloration	Lubricate using approved wheel bearing grease. Replace for irregularities on bearing surfaces.

SECTION 6.0 TROUBLESHOOTING THE HANDIFUELER™

Table 6.0 OFF LOADING OPERATION - TROUBLESHOOTING

FAULT	POSSIBLE CAUSE	CORRECTIVE ACTION
Low discharge pressure at Nozzle	Engine RPM low	Check battery charge condition
	Fuel Filter Clogged	Replace Fuel Filter
	Hose nozzle screen clogged	Remove nozzle tip, clean screen
	Main tank level almost empty	Refill main tank
3 Inch Internal Valve Valve will not open		
	Operating cable incorrectly adjusted	Tighten the operating cable
	Jammed Main piston	Drain tank, remove valve, determine repair needs (possible valve replacement due)
	Main piston seal damaged or deformed	Replace Valve Assembly
Valve will not close or leaks internally	Jammed Main piston	Drain tank, remove valve, determine repair needs (possible valve replacement due).
	Main piston seal damaged or deformed.	Replace Valve Assembly
	Operating Cable incorrectly adjusted.	Loosen the operating cable.
Fuel Meter has no indication		
	3 inch valve closed	Open 3 inch valve
	Fuel Tank Empty	Refill main tank
	Fuel Meter broken internally	Repair or replace Fuel Meter
	Pump not running	See Pump Trouble Shooting
Pump Motor will not run		
	Low Battery Charge.	Charge batteries to Full Charge condition.
	Battery switch not in the 1, 2 or Both position.	Turn Battery selector switch to desired position.
	Pump switch not in the "ON" position, (cabinet area).	Turn pump switch to the "On" position.
	Battery terminals/ wiring disconnect-ed or have corrosion.	Inspect battery wiring/ connections, clean cor-rosion if necessary.
	"Emergency Stop" switch pushed in.	Turn switch to release.
	Pump motor 30 minute duty cycle exceeded.	Allow pump motor to cool sufficiently be-fore attempting next use.
	120 Amp Thermal Circuit breakers overheated. (battery box area)	Allow sufficient cool down period, circuit breakers will reset automatically.
Pump/ Power Lights do not illuminate		
	12 volt light bulbs burned out.	Replace bulbs with similar voltage, watt-age and style bulb.
	Main Battery Charge low/ depleted	Recharge Main Batteries.