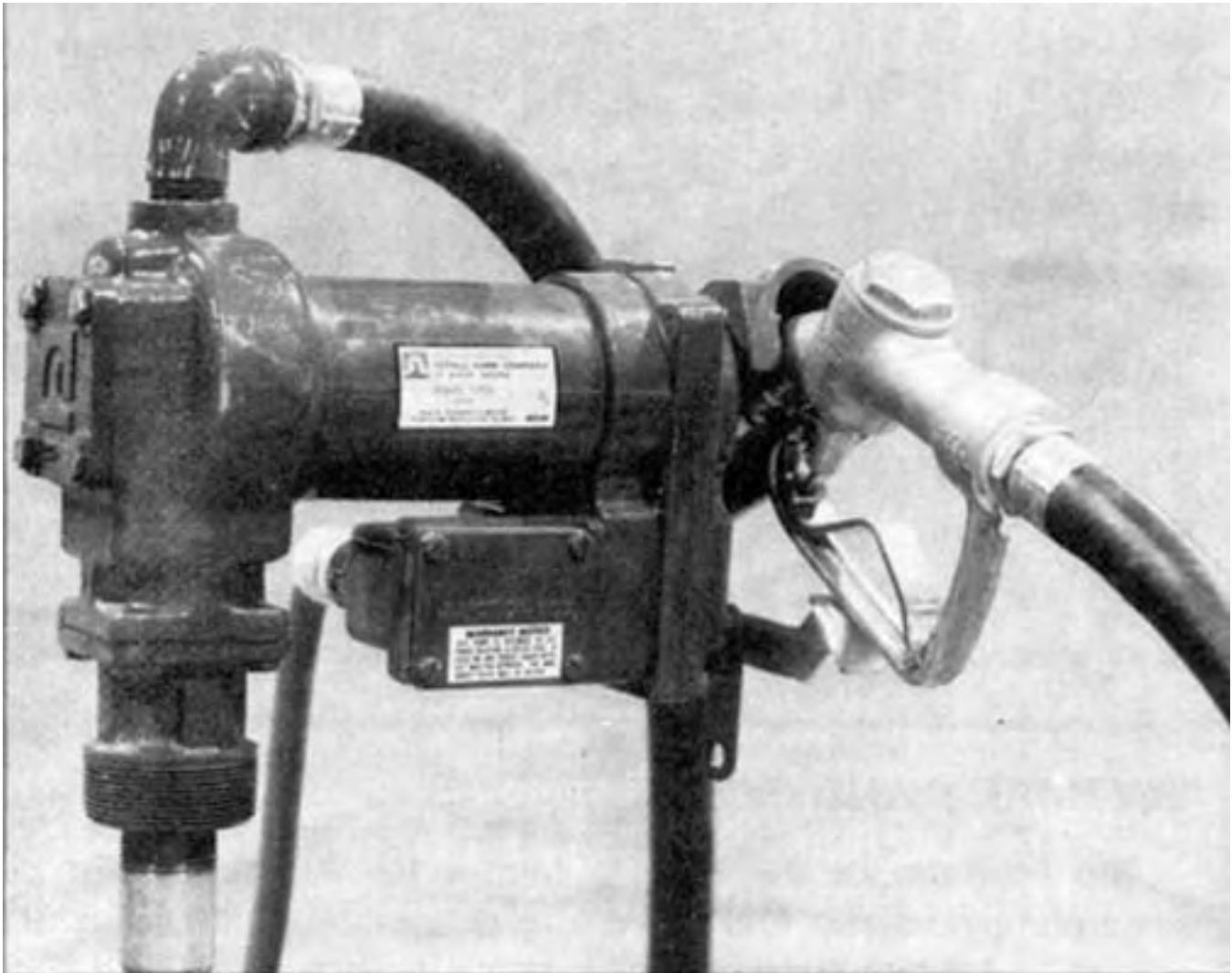


Evaluation Report

64



FILL-RITE MODEL 1210 FUEL TRANSFER PUMP

A Co-operative Program Between



FILL-RITE MODEL 1210 FUEL TRANSFER PUMP

MANUFACTURER:

Tuthill Corporation
Fill-Rite Division
BAER Field
Fort Wayne, Indiana

DISTRIBUTORS:

Westank-Willock Industries Ltd., Calgary
Westank-Willock Industries Ltd., Edmonton
Peavey Marts, Red Deer
Oliver Industrial Supply, Lethbridge

RETAIL PRICE:

\$249.00 (March, 1979, f.o.b. Lethbridge)



FIGURE 1. Fill-Rite Model 1210 Fuel Transfer Pump: (A) Telescoping Suction Pipe, (B) Pump Body, (C) Outlet Hose, (D) Battery Cable, (E) Nozzle, (F) Alligator Clamps.

SUMMARY AND CONCLUSIONS

The flowrate for the Fill-Rite Model 1210 fuel transfer pump, when pumping diesel fuel with a fully charged 12 volt battery at zero suction and discharge heads was 45 L/min (9.9 gal/min). Increasing the suction head to 0.9 m (3 ft) and the discharge head to 2.7 m (9 ft) resulted in a 9% reduction in flowrate. Maximum measured flowrate was 8% less than the manufacturer's stated capacity. It took from 5 to 5.5 minutes to fill a 225 L (50 gal) tractor fuel tank located about 1 m (3.3 ft) above a fuel supply tank.

Power consumption at 12 volts was 216 watts with a corresponding current draw of 18 amps. A fully charged 12 volt battery could operate the pump for several hours without recharging.

The Fill-Rite 1210 was very portable. The pump was difficult to install in a fuel supply tank since the bung adaptor did not rotate relative to the pump body and the entire pump body and hose had to be turned. Electrical connections were simple. During the 30 minute continuous duty cycle, specified by the manufacturer, from 1230 to 1350 L (271 to 297 gal) could be pumped.

The Fill-Rite 1210 was equipped with a suction screen that was easily serviced by removing the bung adaptor from the pump body.

The Fill-Rite was safe to operate if normal safety precautions for transferring fuel were observed.

Operating instructions and a parts list were supplied with the pump.

No mechanical problems occurred during the test.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Supplying, as an option, a fuel supply nozzle that can be locked open and which is equipped with an automatic shut-off.
2. Supplying a rotating bung adaptor.

Chief Engineer: E. O. Nyborg

Senior Engineer: E. H. Wiens

Project Technologist: L. B. Storozyński

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. Although an automatic nozzle is available, it will reduce the flow by approximately two gallons per minute. Most people prefer a standard nozzle.
2. A rotating bung adaptor would increase the cost of the pump and is not considered necessary.

GENERAL DESCRIPTION

The Fill-Rite Model 1210 is a self-priming, positive displacement rotary vane pump driven by a 12 volt DC electric motor adaptable to either negative or positive ground vehicle electrical systems. It is designed for pumping gasoline, kerosene or diesel fuel from above ground tanks and drums equipped with 50 mm (nominal 2 in NPT) openings. It is equipped with a 997 mm (39.25 in) telescoping suction pipe, a 3.1 m (10 ft) outlet hose with standard fuel pump nozzle and a 4.5 m (15 ft) battery cable. It is supplied with an automatic bypass valve to permit intermittent pumping while the motor is running. The pump nozzle when not in use is stored within a dust shielded receptacle on the pump body.

Detailed specifications are given in APPENDIX I.

SCOPE OF TEST

The Fill-Rite Model 1210 was evaluated for ease of operation, power consumption and safety. Pump performance characteristics at various voltages, suction and discharge heads were determined with diesel fuel.

RESULTS AND DISCUSSION

PUMP PERFORMANCE

Flowrates: Pump performance characteristics with diesel fuel at two suction heads over a typical range of discharge heads are given in FIGURE 2. Suction head is the distance the fuel level is below the pump and discharge head is the height the outlet nozzle is held above the pump. The suction heads of 0 and 0.9 m (0 and 3 ft) correspond to full and empty levels of typical farm truck fuel storage tanks. The flowrates in FIGURE 2 are for a pump powered with a fully charged 12 volt battery.

The maximum flowrate of 45 L/min (9.9 gal/min) was obtained at zero suction and discharge heads. Increasing suction and discharge heads reduced the flowrate. For example, increasing the suction head to 0.9 m (3 ft) and the discharge head to 2.7 m (9 ft) resulted in a flowrate of 41 L/min (9.0 gal/min). This combination of suction and discharge heads is more severe than would be encountered in transferring fuel to most farm machinery and represents a 9% decrease in flowrate.

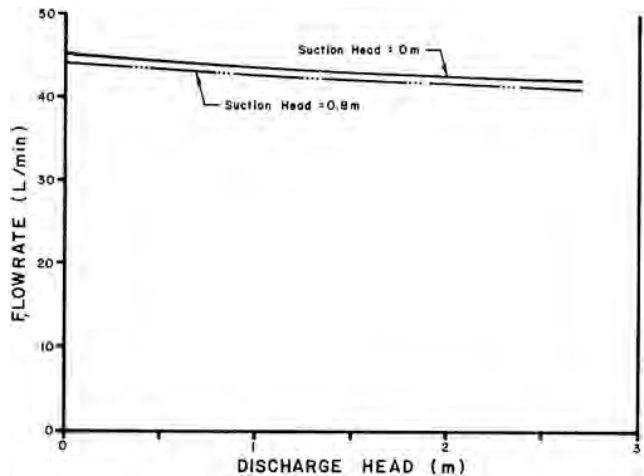


FIGURE 2. Pump Performance Characteristics with Diesel Fuel when Powered with Fully Charged 12 Volt Battery.

In filling a typical farm tractor, with filler opening about 1 m (3.3 ft) above the top of the fuel supply tank and with the fuel supply tank one-half full, flowrate would be about 43 L/min (9.5 gal/min).

The maximum flowrate of 45 L/min (9.9 gal/min) was 8% less than the manufacturer's stated flowrate of 49 L/min (10.8 gal/min).

Duty Cycle: Adequate protection was provided to prevent the pump motor from burning out due to continuous operation or operating on bypass for too long. The pump was equipped with a thermal overload protector located at the outer end of the electric motor. Tests showed that the pump, under normal operating conditions, could run longer than the 30 minute continuous duty cycle specified by the manufacturer before the thermal protector stopped the pump. The pump automatically shut-off when the temperature in the vicinity of the thermal protector reached about 55°C.

POWER CONSUMPTION

FIGURE 3 shows the effect of battery voltage on flowrates and also indicates the corresponding current draw. A fully charged 12 volt battery will deliver 12 volts. Since the current draw at 12 volts was only 18 amps, the maximum flowrate of 45 L/min (9.9 gal/min) can be expected for several hours operation with a good battery, without recharging. There should, therefore, be no need to consider charging a truck battery by running the truck motor while refueling. A running engine could result in the exhaust igniting fuel vapours.

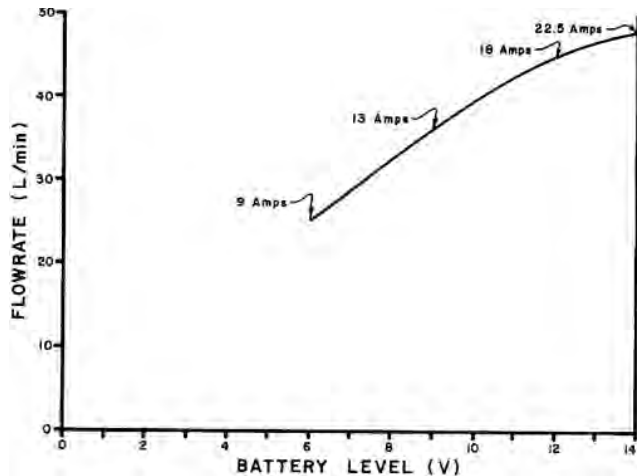


FIGURE 3. Flowrates with Diesel Fuel at Zero Suction and Discharge Heads for Various Battery Voltages.

A typical battery under charge will deliver in excess of 12 volts. At 14 volts the flowrate increased to 49 L/min (10.8 gal/min) with corresponding current-draw of 22.5 amps. This means that the flowrate increased only 9% but the current draw increased 25% while charging the battery during pumping. As a result, power consumption was increased from 216 watts at 12 volts to 315 watts at 14 volts. Since most of the additional power has to be dissipated as heat in the pump motor, operating the pump with the battery under charge would serve to decrease the pump duty cycle, due to motor overheating, with only negligible increase in flowrates. This further substantiates that the pump not be operated while vehicle engines are running.

EASE OF OPERATION

Fuel Tank Connection: The Fill-Rite Model 1210 was portable and was equipped with a 50 mm (nominal 2 in NPT) bung adaptor to fit standard fuel tank openings. The bung adaptor could not be turned relative to the pump body, making it difficult to install in a fuel tank since the entire pump body and hose had to be turned. A rotating bung adaptor is recommended to eliminate this problem.

Electrical Connection: Electrical connection's were simple. The Fill-Rite 1210 was supplied with two alligator clamps for attaching the battery cable to a battery. The pump could be operated on either positive or negative ground vehicle electrical systems. However, care had to be taken to install the black cable lead to the ungrounded battery terminal to avoid, running the pump backwards.

Filling A Fuel Tank: The outlet hose was equipped with a standard lever operated fuel nozzle. It took about 50 N (11 lb) hand force to hold the nozzle valve open. The automatic bypass valve in the pump permitted intermittent closing of the nozzle valve while the motor was running.

It took from 5 to 5.5 minutes to fill a 225 L (50 gal) tractor fuel

tank with filler opening, typically located 1 m (3.3 ft) higher than the top of a typical farm truck fuel supply tank. An optional fuel supply nozzle that could be locked, open, equipped with an automatic shut-off when the tank filled, would be beneficial for large tractors as it would free the operator to do other servicing while refuelling. During the 30 minute continuous duty cycle, specified by the manufacturer, from 1230 to 1350 L (271 to 297 gal) could be pumped.

Servicing: The Fill-Rite 1210 was equipped with a suction fuel screen. The screen could be serviced by removing the bung adaptor on the pump body. The pump and motor required no lubrication.

SAFETY

The Fill-Rite 1210 was equipped with a safety switch. The pump motor could be turned on only when the outlet nozzle was removed from its storage receptacle. The nozzle could not be returned to the storage receptacle unless the pump motor switch was turned off. A padlock ring was supplied to permit locking the nozzle in storage position.

To prevent possible ignition of fuel vapours from engine exhaust, it is advised when using the pump that the vehicle engine be shut off. Since the current draw of the pump was only 18 amps at a battery voltage of 12 volts, there was no need to charge the battery while pumping. A fully charged battery would provide several hours of pumping before recharging was necessary.

OPERATOR'S MANUAL

Installation and service instructions as well as a comprehensive parts list were supplied with the Fill-Rite Model 1210.

MECHANICAL PROBLEMS

The Fill-Rite Model 1210 was operated for about 5 hours. The intent of the test was an evaluation of functional performance and an extended durability evaluation was not conducted.

No mechanical problems occurred during the functional evaluation.

**APPENDIX I
SPECIFICATIONS**

MAKE:	Fill-Rite Fuel Transfer Pump
MODEL:	1210
SERIAL NUMBER:	670578
DUTY CYCLE:	
-- normal operation	30 minutes
OVERALL DIMENSIONS	
-- height	273 mm (10.75 in)
-- width	305 mm (12 in)
-- length	203 mm (8 in)
TOTAL WEIGHT:	12.3 kg (27 lb)
SUCTION PIPE:	
-- size	25 mm (nominal 1 in NPT)
-- telescoping length	559 to 997 mm (22 to 39.25 in)
-- storage tank bung adaptor	50 mm (nominal 2 in NPT)
DISCHARGE HOSE:	
-- size	20 mm (0.75 in)
-- length (with nozzle)	3.1 m (10 ft)
MOTOR:	
-- power requirement	12 V DC
-- polarity	either negative or positive
-- battery cable length	4.5 m (15 ft)
-- battery connectors	alligator clamps

**APPENDIX II
METRIC UNITS**

In keeping with the Canadian metric conversion program, this report has been prepared in SI units. For comparative purposes, the following conversions may be used:

1 litre per minute (L/min)	= 0.22 Imperial gallons per minute (gal/min)
1 metre (m) = 1000 millimetres (mm)	= 39.37 inches (in)
1 Newton (N)	= 0.22 pounds force (lb)
1 kilogram (kg)	= 2.20 pounds mass (lb)



3000 College Drive South
Lethbridge, Alberta, Canada T1K 1L6
Telephone: (403) 329-1212
FAX: (403) 329-5562
<http://www.agric.gov.ab.ca/navigation/engineering/afmrc/index.html>

Prairie Agricultural Machinery Institute

Head Office: P.O. Box 1900, Humboldt, Saskatchewan, Canada S0K 2A0
Telephone: (306) 682-2555

Test Stations:

P.O. Box 1060
Portage la Prairie, Manitoba, Canada R1N 3C5
Telephone: (204) 239-5445
Fax: (204) 239-7124

P.O. Box 1150
Humboldt, Saskatchewan, Canada S0K 2A0
Telephone: (306) 682-5033
Fax: (306) 682-5080