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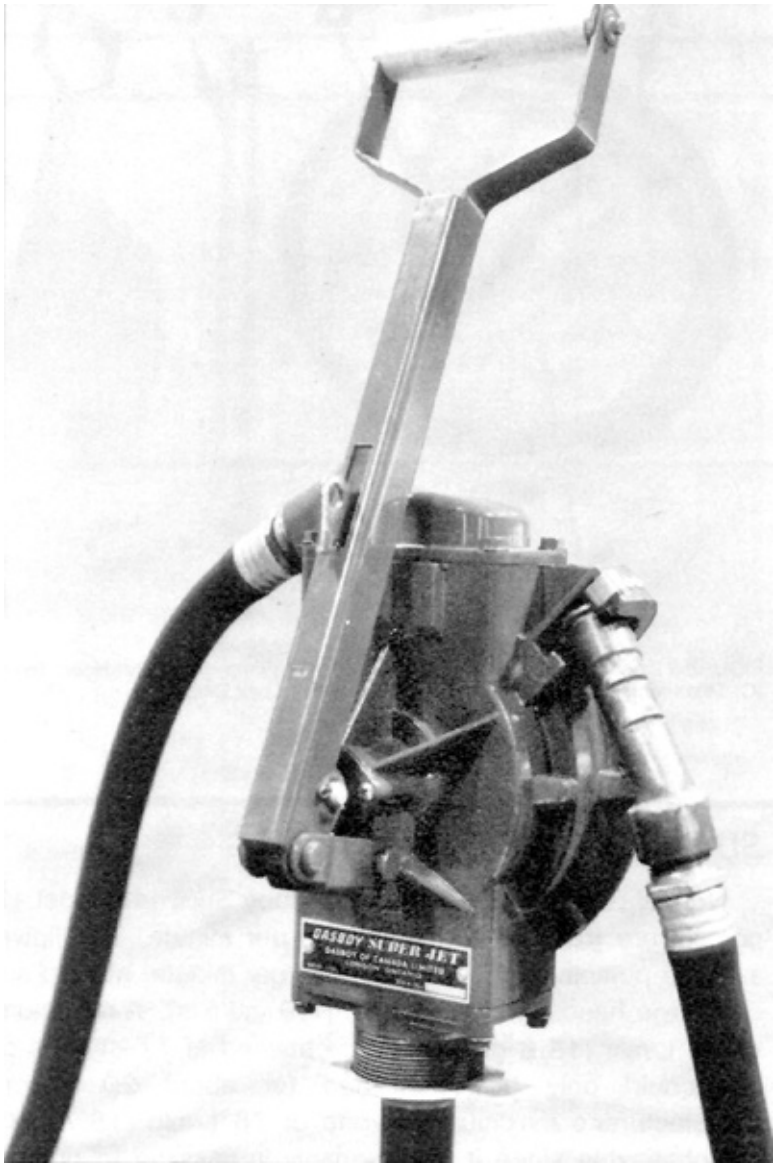
Evaluation Report 77



Gasboy Superjet Model 1720 Hand Pump

A Co-operative Program Between

ALBERTA FARM MACHINERY RESEARCH CENTRE
PAMI
PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

GASBOY SUPERJET MODEL 1720 HAND PUMP

MANUFACTURER:

Gasboy of Canada Ltd.
430 Industrial Road
P.O. Box 6185, Stn. "D"
London, Ontario
N5V 2Y3

DISTRIBUTOR:

Westeel-Rosco Ltd.
4111 - 15A St. S.E.
Calgary, Alberta
T2G 3P2

RETAIL PRICE:

$75.35 (January, 1979, f.o.b. Lethbridge)

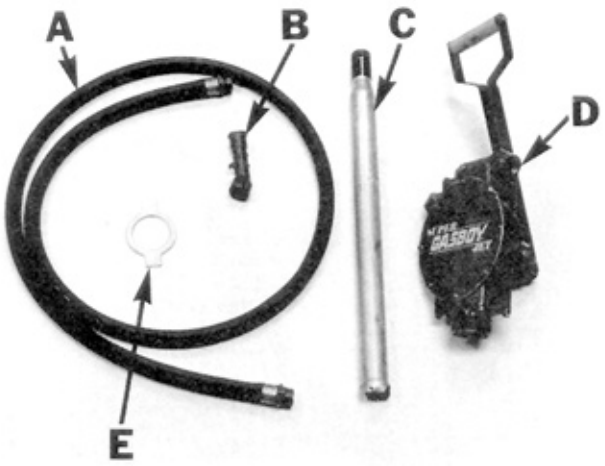


FIGURE 1. Gasboy Superjet Model 1720 Hand Pump: (A) Outlet Hose, (B) Outlet Nozzle (C) Telescopic Suction Pipe, (D) Pump Body, (E) Lock Collar.

SUMMARY AND CONCLUSIONS

Normal pumping rates for the Gasboy Superjet Model 1720 hand pump were from 35 to 55 strokes per minute. The flowrate at an average pumping rate of 45 strokes per minute, at zero suction and discharge heads, was 36 L/min (7.9 gal/min). A maximum flowrate of 62 L/min (13.6 gal/min) was obtained at 77 ,strokes per minute but could only be maintained for about 20 seconds. The manufacturer's maximum flowrate of 76 L/min (16.7 gal/min) was not obtainable since it was humanly impossible to pump that fast. Increasing the suction head to 0.9 m (3 ft) and the discharge head to 1.8 m (6 ft), at 45 strokes per minute, resulted in an 11% reduction in flowrate.

Pumping effort increased significantly with increased pumping rates, suction and discharge heads. The required pumping force at the end of the pump handle increased from 79 N (18 lb) at 35 strokes per minute to 142 N (32 lb) at 55 strokes per minute. Increasing the suction and discharge heads from zero to 0.9 m (3 ft) and 1.8 m (6 ft), respectively, increased pumping effort by 16%, when operating at 45 strokes per minute.

The Gasboy Superjet was very portable. The pump was difficult to place 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. The locking collar on the bung adaptor enabled the pump to be locked so the handle was in a convenient pumping position.

The Gasboy Superjet was relatively safe to ope'rate. The locking bracket frequently fell from its upright position and caught the pump handle. This abrupt stoppage of the pump handle could cause hand injuries. When filling a tank, care must be exercised to prevent overflow.

No operating instructions or parts list were supplied with the pump.

A few mechanical problems occurred during the test. The diaphragm ruptured and had to be replaced. Interference occurred between the pump handle and the locking bracket rivet. The locking bracket rivet sheared when the locking bracket hooked on the pump handle during operation.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Supplying a rotating bung adaptor.
2. Modifications to reduce the possibility of diaphragm rupture and deterioration.
3. Modifications to prevent the locking bracket from falling from its upright position while pumping.
4. Modifications to eliminate interference among the pump handle, the locking bracket and the locking bracket rivet.
5. Supplying operating instructions and parts list.

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Senior Engineer: E. H. Wiens

Project Technologist: L. B. Storozynsky

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. Gasboy had a rotating bung adapter. However, because most hand pumps are used in tanks on pick-up trucks, we changed to the rigid adapter. This was at the request of our distributors who claimed that the rotating adapter became loose from road vibrations.
2. This has not been a major problem. In most instances we have found that it was caused from the retaining bolts being tightened too far and cutting into the diaphragm. To rectify this we have to constantly check that the bolts are properly torqued during assembly.
3. & 4. These observations and suggested modifications are being investigated as to material and cost. Our exclusive distributor is being consulted as to whether the modifications would justify the cost and subsequent increase to the selling price of the unit.
5. A parts list will be included with each pump.

GENERAL DESCRIPTION

The Gasboy Model 1720 is a constant prime, hand operated, double-action diaphragm pump. It is designed for pumping gasoline, diesel fuel, solvents or lube oil from above ground tanks equipped with 50 mm (nominal 2 inch NPT) openings. It is equipped with a 1060 mm (41.7 in) telescoping suction pipe, a 2.5 m (8 ft) outlet hose and a 355 mm (14 in) pump handle. The top of the pump handle is equipped with a wooden grip and can be locked against the pump body to prevent theft. The pump nozzle, when not in use, is stored within a receptacle on the pump body.

Detailed specifications are given in APPENDIX I.

SCOPE OF THE TEST

The Gasboy Model 1720 was evaluated for ease of operation and safety. Pump performance characteristics and pumping effort at various pumping rates, suction and discharge heads were determined with diesel fuel.

RESULTS AND DISCUSSION

PUMP PERFORMANCE

Pumping Rate: Pumping rates from 35 to 55 strokes per minute were determined as the normal range a farmer could continuously operate this pump when filling a large tractor tank. A maximum pumping rate of 77 strokes per minute was reached but was impossible to maintain for any reasonable length of time. The pumping rate of 100 strokes per minute, upon which the manufacturer based the maximum capacity of the pump was unrealistic and virtually impossible to obtain.

Flowrate: Pump performance characteristics with diesel fuel for two different suction and discharge heads are given in FIGURE 2. Suction head is the distance the fuel level is below the pump intake valves and discharge head is the height the outlet nozzle is held above the pump. 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.

Increased pumping rates increased the flowrate by about 0.8 L (0.2 gal) per stroke. Flowrate at the average pumping rate of 45 strokes per minute was 36 L/min (7.9 gal/min).

Increasing suction and discharge heads reduced the flowrate significantly. Increasing the suction and discharge heads from zero to 0.9 m (3 ft) and 1.8 m (6 ft), respectively, at 45 strokes per minute, decreased the flowrate from 36 L/min (7.9 gal/min) to 32 L/min (7.0 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 at 11% decrease in flowrate.

The maximum flowrate obtained was 62 L/min (13.6 gal/min) at a pumping rate of 77 strokes per minute. This pumping rate could only be maintained for about 20 seconds. The manufacturer's maximum flowrate of 76 L/min (16.7 gal/min) at 100 strokes per minute could not be obtained, since the average person could not pump that fast.

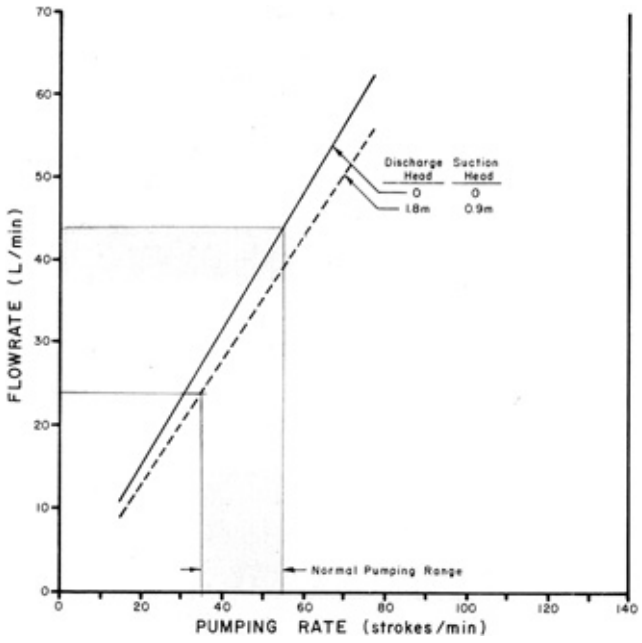

FIGURE 2. Flowrates with Diesel Fuel at Two Suction and Discharge Heads.

EASE OF OPERATION

Pumping Effort: Pumping effort is the hand force that has to be exerted perpendicular to the end of the pump handle, to operate the pump. FIGURE 3 shows the hand force needed at various pumping rates, suction and discharge heads. Pumping effort increased with increasing pumping rates and with increased head. At a pumping rate of 55 strokes per minute, with zero suction and discharge heads, pumping effort was 142 N (32 lb) compared to 79 N (18 lb) at 35 strokes per minute. At an average pumping rate of 45 strokes per minute, pumping effort increased from 111 N (25 lb) at zero suction and discharge heads to 129 N (29 lb) with suction and discharge heads of 0.9 m (3 ft) and 1.8 m (6 ft), respectively.

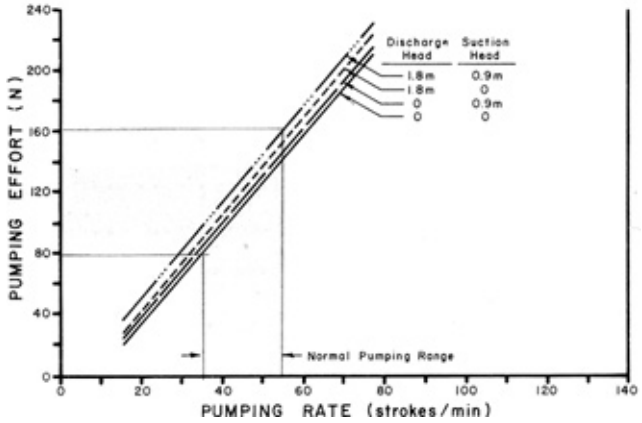

FIGURE 3. Pumping Effort with Diesel Fuel at Various Pumping Rates, Suction and Discharge Heads.

Fuel Tank Connection: The Gasboy Superjet was portable and was equipped with a 50 mm (nominal 2 inch 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. The bung adaptor was equipped with a locking collar which allowed the pump to be rotated so the handle was in a convenient pumping position.

Filling A Fuel Tank: The outlet hose was equipped with a standard fuel nozzle. An automatic shut-off nozzle is available as optional equipment. Pumping at 45 strokes per minute, it took from 6.5 to 7 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.

Servicing: The manufacturer stated that the Gasboy Superjet 1720 was equipped with a suction fuel screen. The test pump was not equipped with a suction fuel screen.

The pump required no lubrication.

SAFETY

The fuel outlet nozzle was equipped with a hook which prevented it from falling out of a filler opening when pumping. Care must be exercised to avoid overflow. To prevent overflow, an automatic shut-off nozzle is available as an option.

A locking bracket was provided to lock the pump handle in storage position. The locking bracket frequently fell from its intended upright position when pumping and occasionally hooked the pump handle. This sudden stoppage of pumping action could result in hand injuries.

OPERATOR'S MANUAL

No parts list or operating instructions were supplied with the Gasboy Superjet Model 1720. It is recommended this information be supplied with each pump.

MECHANICAL PROBLEMS

The Gasboy Superjet Model 1720 was operated for about 3

hours. The intent of the test was an evaluation of functional performance and an extended durability evaluation was not conducted.

Several mechanical problems were encountered during the functional evaluation. The diaphragm ruptured next to its attaching ring (FIGURE 4). The diaphragm also showed signs of deterioration around each bolt opening. Modifications are recommended to reduce these problems.

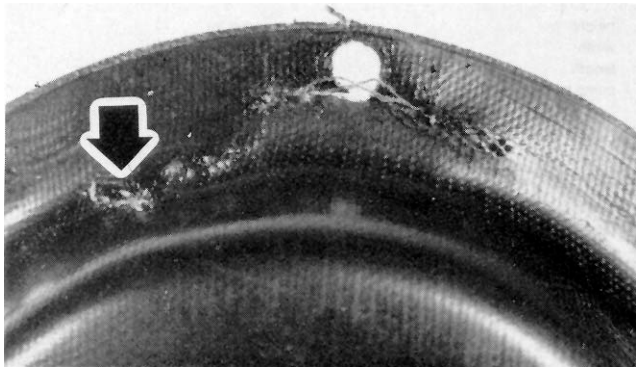

FIGURE 4. Ruptured Diaphragm.

The pump handle locking bracket frequently fell from its upright position and interfered with the pump handle. As a result the locking bracket rivet sheared (FIGURE 5) when the locking bracket hooked to the handle during operation. Modifications are recommended to prevent the locking bracket falling from its upright position while pumping.

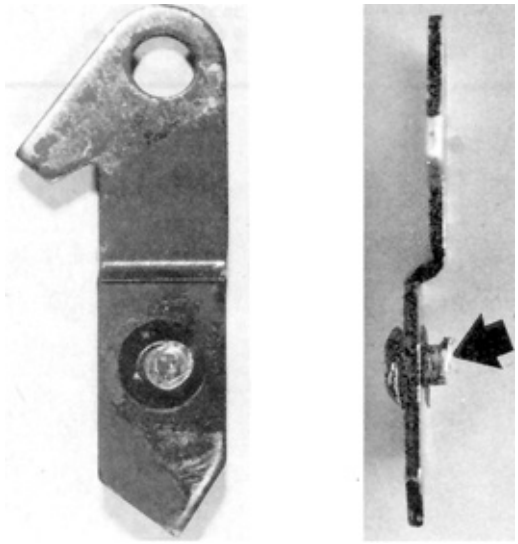

FIGURE 5. Sheared Locking Bracket Rivet.

The linkages connecting the pump handle to the pump body were loose, causing interference between the pump handle and locking bracket rivet. This interference caused the rivet to wear (FIGURE 6) and eventually shear off as mentioned above. Modifications are recommended to eliminate this interference.

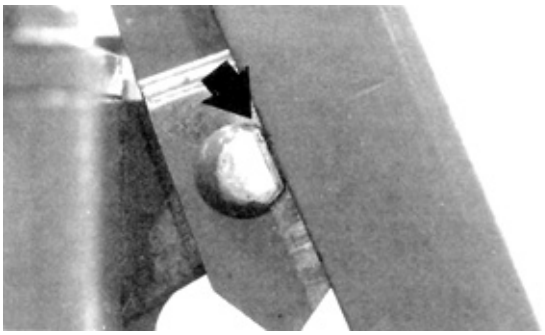

FIGURE 6. Interference between Pump Handle and Rivet.

APPENDIX I

SPECIFICATIONS

MAKE:	Gasboy Superlet Hand Pump
MODEL:	1720
SERIAL NUMBER:	35421
OVERALL DIMENSIONS:	
- height	490 mm (19.3 in)
- width	200 mm (7.9 in)
- length	150 mm (5.9 in)
- pump handle length	355 mm (14 in)
TOTAL WEIGHT:	5.4 kg (12 lb)
SUCTION PIPE:	
- size	25 mm (nominal 1 inch NPT)
- telescoping length	595 to 1060 mm (23.4 to 41.7 in)
- storage tank bung adaptor	50 mm (nominal 2 inch NPT)
DISCHARGE HOSE:	
- size	20 mm (.75 in)
- length	2.48 m (8.15 ft)

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)	=	022 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)	=	220 pounds mass (lb)

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