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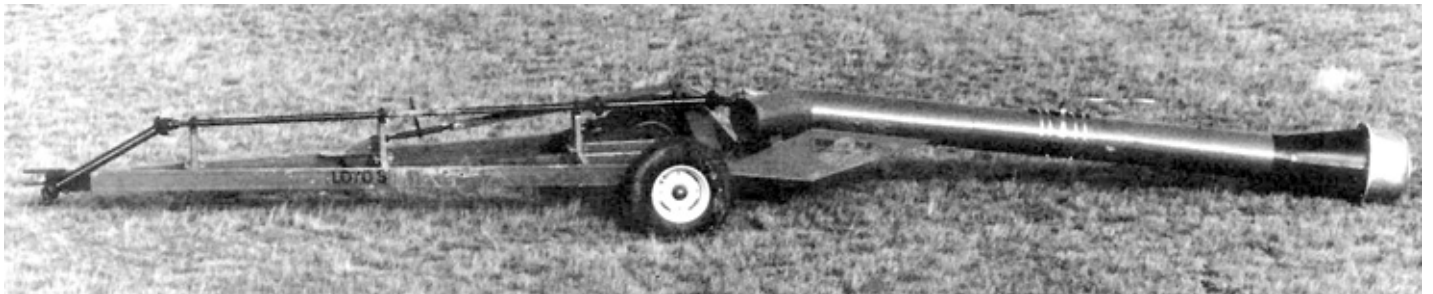
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Group 3c

# EVALUATION REPORT

# 328



## LLOYD'S MODEL RE-100 LIFT PUMP

A Co-operative Program Between



ALBERTA  
FARM  
MACHINERY  
RESEARCH  
CENTRE



PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

## LLOYD'S MODEL RE-100 LIFT PUMP

### MANUFACTURER AND DISTRIBUTOR:

Lloyd's Manufacturing Ltd.  
P.O. Box 850  
Wadena, Saskatchewan  
S0A 4J0

### RETAIL PRICE:

\$5920.00 (December 1983, f.o.b. Lethbridge, Alberta; with 50 ft (15.2 m) of rubber hose and two hose clamps.)

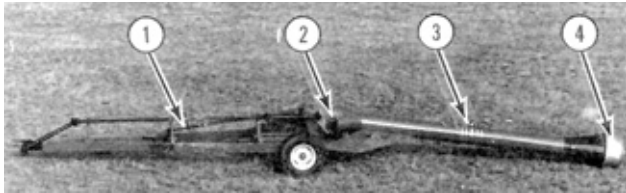


FIGURE 1. Lloyd's Model RE-100 Lift Pump: (1) Lift Mechanism, (2) Discharge Tube, (3) Bearing Inspection Plate, (4) Impeller.

### SUMMARY AND CONCLUSIONS

**Performance Characteristics:** Performance of the Lloyd's model RE-100 lift pump was very good. Measured water flow rate at 1000 rpm power take-off speed varied from 4400 to 1940 gal/min (20,000 to 8820 L/min) over a range of total heads from 16.4 to 55.8 ft (5 to 17 m) with a 27 in (685 mm) inlet submergence depth. A peak efficiency of 44% occurred at a 1000 rpm power take-off speed and 3000 gal/min (13 650 L/min) flow rate. Maximum power required at 1000 rpm power take-off speed was 96 hp (72 kW).

**Ease of Operation:** Hitching the model RE-100 was easy. Caution had to be used when transporting on rough roads due to bouncing as a result of the negative hitch weight. The transport lock mechanism was inconvenient to use. The pump was easy to service and positioning of the model RE-100 at a pump site was easy.

**Operator Safety:** The pump was safe to operate if common sense was exercised.

**Operator's Manual:** The operator's manual was clearly written and included a well illustrated parts list.

**Mechanical Problems:** One mechanical problem occurred during testing. The discharge tube bearing inspection plate seal leaked and broke when operated at total heads above 46 ft (14 m).

### RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Modifications to the transport lock to permit easy lock positioning.
2. Providing an adequate discharge tube bearing inspection plate seal.

Senior Engineer: E. H. Wiens

Project Engineer: M. V. Eliason

### THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. The hole in the transport lock-up arm will be slotted to permit easier alignment with the anchor clevis for easier transport lock-up.
2. If the pump is operated at high total head, we recommend the use of two cover gasket clamps to eliminate leakage.

### GENERAL DESCRIPTION

The Lloyd's model RE-100 is a 12 in (305 mm) diameter centrifugal pump. It consists of an impeller, discharge tube and lift mechanism mounted on a mainframe supported by a single axle and two wheels. Power is supplied through a 1000 rpm power take-off. The test machine was equipped with 50 ft (15.2 m) of 12 in (305 mm) diameter rubber discharge hose.

FIGURE 1 shows the location of major components while detailed specifications are given in APPENDIX I.

### SCOPE OF TEST

The Lloyd's model RE-100 was operated for about 32 hours while pumping water. Performance characteristics were determined with water over a range of discharge heads and speeds. Ease of operation, operator safety and suitability of the operator's manual were also evaluated.

### RESULTS AND DISCUSSION

#### PERFORMANCE CHARACTERISTICS

**Flow Rate:** Flow rate characteristics of the Lloyd's model RE-100 pump are given in FIGURE 2 for a range of total heads and power take-off speeds. Performance curves were determined for a 27 in (685 mm) inlet submergence depth as measured from the water surface to the centre of the impeller.

Maximum flow rate at 16.4 ft (5 m) total head was 4400 gal/min (20,000 L/min) for the 1000 rpm power take-off speed. The manufacturer's stated capacity was 5000 gal/min (22,750 L/min).

Flow rate increased for increasing power take-off speeds. For example, flow at 16.4 ft (5 m) total head increased from 2640 to 4050 gal/min (12000 to 18400 L/min) when power take-off speed was increased from 700 to 900 rpm. Increasing power take-off speed also increased the head at which flow ceased. For example, at a 540 rpm power take-off speed, flow ceased at 17 ft (5.2 m) total head while at a power take-off speed of 900 rpm, flow ceased at 49.2 ft (15 m) total head.

**Power Requirements:** FIGURE 3 shows the power required to operate the Lloyd's model RE-100 pump at various power take-off speeds and flow rates. The maximum power required at a 1000 rpm power take-off speed was 96 hp (72 kW).

**Pump Efficiency:** FIGURE 4 shows pump efficiency of the model RE-100 at various flow rates and power take-off speeds. A peak efficiency of 44% occurred at a 1000 rpm power take-off speed and 3000 gal/min (13,650 L/min) flow. Peak efficiencies at other power take-off speeds were less.

#### EASE OF OPERATION

**Installation:** Positioning the Lloyd's model RE-100 at the pump site was easy. The 18.3 ft (5.6 m) discharge tube reach was adequate for most pumping installations. The pump inlet was easily lowered and the rubber discharge hose could be easily installed by one person. For efficient pumping the discharge hose had to be placed on top of the left wheel. Placing the hose between the left wheel and frame resulted in a discharge restriction (FIGURE 5).

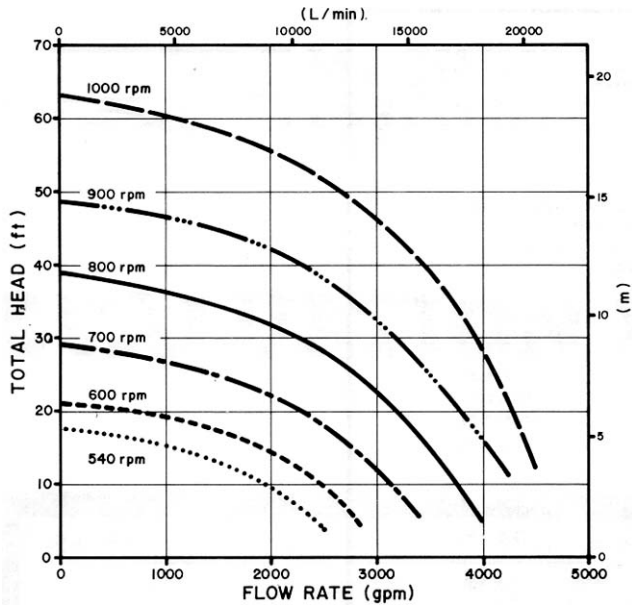


FIGURE 2. Lloyd's Model RE-100 Pump Performance Curves at Various Power Take-off Speeds.

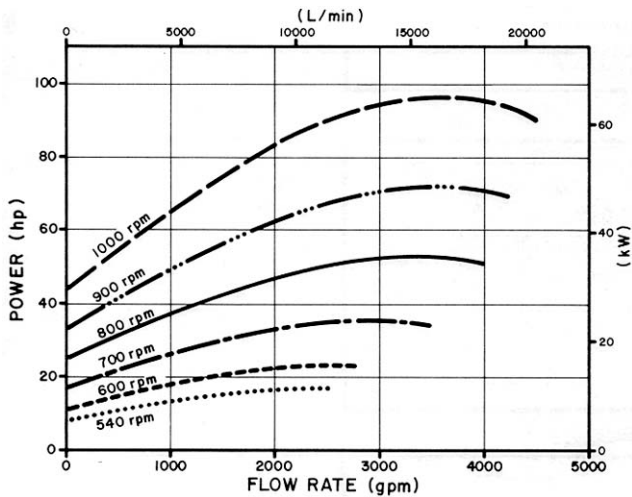


FIGURE 3. Power Requirements to Operate the Lloyd's Model RE-100 Pump at Various Flow Rates and Power Take-off Speeds.

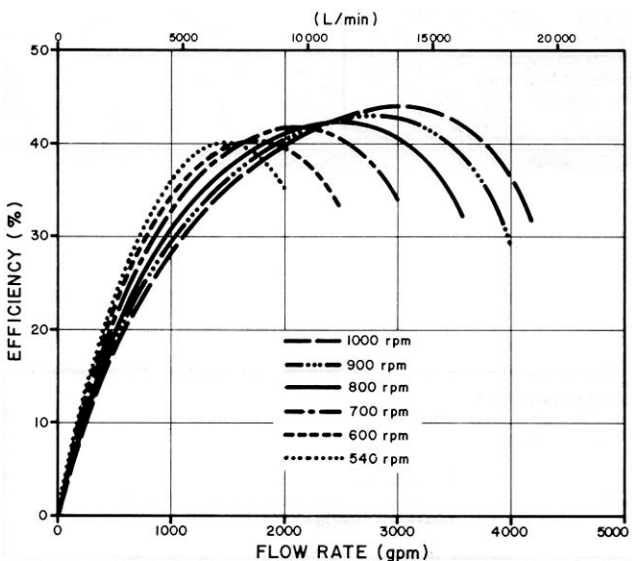


FIGURE 4. Pump Efficiency of the Lloyd's Model RE-100 at Various Flow Rates and Power Take-off Speeds.

**Hitching:** The Lloyd's model RE-100 was equipped with a fixed clevis hitch which was suitable for most tractor drawbars. Caution had to be exercised when hitching due to the negative hitch weight. Lowering the inlet housing, to adjust the hitch weight, permitted easy hitching.

**Transporting:** The Lloyd's model RE-100 towed well on smooth roads at speeds up to 55 mph (90 km/h). On rough roads the negative hitch weight caused bouncing of the inlet and discharge tube. Caution had to be exercised when towing on rough roads.

The transport lock mechanism on the model RE-100 was inconvenient to use. The inlet and discharge tube could not be raised high enough to permit easy lock positioning due to improper alignment of the holes in the transport lock-up arm and the anchor clevis. Modifications to the transport lock are recommended for easier transport lock-up.

**Servicing:** The model RE-100 had eight grease fittings on the drive shaft, two grease fittings on the lift mechanism and two wheels that required servicing. Lubrication was convenient with good access to all grease fittings.

Water lubricated bearings supported the impeller drive shaft within the discharge tube. To avoid failure, water lubricated bearings must be submerged in water before operating the pump.



FIGURE 5. Improper Discharge Hose Placement Resulting in a Discharge Restriction.

## OPERATOR SAFETY

The model RE-100 was safe to operate if common sense was used. Care had to be exercised when priming the discharge system to prevent excessive shock loads and possible discharge hose whipping.

## OPERATOR'S MANUAL

The operator's manual was clearly written and contained useful operating and assembly instructions. A well illustrated parts list was included.

## MECHANICAL PROBLEMS

The intent of the test was evaluation of functional performance. An extended durability evaluation was not conducted. Only one mechanical problem occurred during the 32 hours of operation. When operating the Lloyd's model RE-100 at total heads above 46 ft (14 m) the discharge tube bearing inspection plate seal leaked and broke. It is recommended that an adequate discharge tube bearing inspection plate seal be provided.

**APPENDIX I**

**SPECIFICATIONS**

<b>MAKE:</b>	Lloyd's	
<b>MODEL:</b>	RE-100	
<b>SERIAL NUMBER:</b>	820191-12	
<b>MANUFACTURER:</b>	Lloyd's Manufacturing Ltd. P.O. Box 850 Wadena, Saskatchewan S0A 4J0	
<b>OVERALL DIMENSIONS:</b>		
- length	33.8 ft	(10,310 mm)
- width	7.6 ft	(2310 mm)
- height		
- field position	3.4 ft	(1030 mm)
- transport position	4.8 ft	(1465 mm)
- tire tread	6.8 ft	(2080 mm)
<b>INLET DIAMETER:</b>	9 in	(230 mm)
<b>IMPELLER:</b>		
- number of vanes	7	
- diameter	15 in	(395 mm)
<b>OUTLET DIAMETER:</b>	12 in	(305 mm)
<b>WEIGHT:</b>		
- left wheel	835 lb	(376 kg)
- right wheel	865 lb	(389 kg)
- hitch	- 160 lb	( -72 kg)
<b>TOTAL</b>	1540 lb	(693 kg)
<b>LUBRICATION POINTS:</b>		
- drive shaft	8, five hour service	
- lift mechanism	2, weekly service	
<b>TIRE:</b>	2, 11L-15SL, 8-ply	

**APPENDIX II**

**MACHINE RATINGS**

The following rating scale is used in PAMI Evaluation Reports:

- Excellent
- Very Good
- Good
- Fair
- Poor
- Unsatisfactory

**APPENDIX III**

**CONVERSION TABLE**

feet (ft) x 0.305	= metres (m)
imperial gallons (gal) x 4.55	= litres (L)
horsepower (hp) x 0.75	= kilowatts (kW)
inches (in) x 25.4	= millimeters (mm)
miles/hour (mph) x 1.61	= kilometres/hour (km/h)
pounds (lb) x 0.45	= kilograms (kg)



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