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## Test 749: Land-Rover 88 (Gasoline)

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, [tractortestlab@unl.edu](mailto:tractortestlab@unl.edu)

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# NEBRASKA TRACTOR TEST 749 - LAND-ROVER 88 GASOLINE

The University of Nebraska Agricultural Experiment Station

E. F. Frolik, Dean and Acting Director; Lincoln, Nebraska

## POWER TAKE-OFF PERFORMANCE

Hp	Crank shaft speed rpm	Fuel Consumption Gal per hr	Lb per hp-hr	Hp-hr per gal	Temp Degrees F Cooling med	Air wet bulb	Air dry bulb	Barometer inches of mercury
<b>MAXIMUM POWER AND FUEL CONSUMPTION</b>								
<b>Rated Engine Speed—Two Hours</b>								
30.9Q	2000	3.229	0.629	9.57	214	68	75	28.968
<b>Standard Power Take-off Speed (1000 rpm)—One Hour</b>								
25.96	1655	2.894	0.671	8.97	215	68	75	28.967
<b>VARYING POWER AND FUEL CONSUMPTION—TWO HOURS</b>								
28.54	2170	2.736	0.577	10.43	204	73	80	.....
0.00	23.24	1.086	.....	.....	167	73	79	.....
14.94	2273	1.854	0.747	8.06	182	72	77	.....
30.81	2000	3.249	0.635	9.48	206	72	78	.....
7.61	2316	1.425	1.127	5.34	175	72	77	.....
22.32	2265	2.287	0.617	9.76	192	72	77	.....
Av 17.37	2225	2.106	0.730	8.25	187	72	78	28.843

## DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank shaft speed rpm	Slip of drivers %	Fuel Consumption Gal per hr	Lb per hp hr	Hp-hr per gal	Temperature Degrees F Cooling medium	Air wet bulb	Air dry bulb	Barometer inches of mercury
<b>VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITHOUT BALLAST</b>											
<b>Maximum Available Power—Two Hours—2nd Gear Low Range</b>											
28.05	1891	5.56	1995	5.43	3.268	0.701	8.58	202	69	74	28.740
<b>75% of Pull at Maximum Power—Ten Hours—2nd Gear Low Range</b>											
23.36	1401	6.25	2211	4.20	2.534	0.653	9.22	194	71	79	28.756
<b>50% of Pull at Maximum Power—Two Hours—2nd Gear Low Range</b>											
17.01	972	6.56	2291	2.97	2.076	0.735	8.19	173	59	70	28.950
<b>MAXIMUM POWER WITHOUT BALLAST</b>											
26.32	2776	3.56	2002	11.65	1st Gear Low Range.		196	58	66		28.920
28.09	1891	5.57	2000	5.45	2nd Gear Low Range.		202	69	74		28.740
28.65	1282	8.38	2000	3.84	3rd Gear Low Range.		184	58	66		28.920
29.21	1127	9.72	1998	3.34	1st Gear High Range		183	58	68		28.940
29.12	936	11.67	2000	2.77	4th Gear Low Range.		184	58	68		28.940
27.37	708	14.49	1997	2.15	2nd Gear High Range		195	81	93		28.730
<b>VARYING DRAWBAR PULL AND TRAVEL SPEED WITHOUT BALLAST</b>											
<b>2nd Gear Low Range</b>											
Pounds pull		1900	1950	1950	1850	1700	1650				
Horsepower		28.1	26.0	22.9	19.2	15.4	12.3				
Miles per hour		5.6	5.0	4.4	3.9	3.4	2.8				

Department of Agricultural Engineering

Dates of Test: July 25 to August 2, 1960

Manufacturer: THE ROVER COMPANY LIMITED, SOLIHULL, WARWICKSHIRE, ENGLAND

Manufacturer's Power Rating: Not rated

**FUEL, OIL and TIME** Fuel regular gasoline Octane No Motor 84 Research 92 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.7231 Weight per gallon 6.020 lb Oil SAE 30 API service classification MS, DG To motor 1.582 gal Drained from motor 1.568 gal Transmission lubricant SAE 50 Type gear oil Final-drive lubricant SAE 90 Type EP Total time engine was operated 47½ hours.

**ENGINE** Make Rover Type 4 cylinder vertical Serial No 151910995 Crankshaft mounted lengthwise Rated rpm 2000 Bore and stroke 3.562" x 3.500" Compression ratio 7 to 1 Displacement 139.5 cu in Carburetor size 1¼" Ignition system battery Cranking system 12 volt electric Lubrication pressure Air cleaner oil washed gauze with centrifugal pre-cleaner Oil filter replaceable paper element Oil cooler tubular heat exchanger mounted ahead of radiator Fuel filter gauze in sediment bowl Muffler was used Cooling medium temperature control thermostat.

**CHASSIS** Type standard 4-wheel drive Serial No 144901833 Tread width rear 51½" front 51½" Wheel base 88" Center of gravity (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 47" Vertical distance above roadway 27" Horizontal distance from center of rear wheel tread 0.16" to the left Hydraulic control system none Transmission selective gear fixed-ratio Advertised speeds mph first 4.0 second 5.8 third 8.6 fourth 10.0 fifth 12.0 sixth 14.7 seventh 21.6 eighth 30.0 reverse 4.8 and 12.0 Clutch dry disc single plate operated by foot pedal Brakes hydraulic with internal expanding shoes for all four wheels operated by a foot pedal Parking brake operated by hand lever Steering no power assistance Turning radius (on concrete surface without brake) right 225" left 225" Turning space diameter (on concrete surface without brake) right 483" left 483" Belt pulley 1500 rpm at 2000 engine rpm diam 8" face 8½" Belt speed 3143 fpm Power take-off 1000 rpm at 1655 engine rpm.

**REPAIRS AND ADJUSTMENTS** During the Varying Power and Fuel Consumption run replacements for the generator, fan and governor belts were necessary due to the failure of the fan belt.

**REMARKS** All test results were determined from observed data obtained in accordance with the SAE and ASAE test code.

Third and fourth high range gears were not run as travel speed exceeded 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 749.

L. F. LARSEN  
Engineer-in-Charge

L. W. HURLBUT, Chairman  
G. W. STEINBRUEGGE  
J. J. SULEK  
Board of Tractor  
Test Engineers

## TIRES, BALLAST and WEIGHT

### Without Ballast

Rear tires	—No, size, ply & psi	Two 6.00-16;6;24
Ballast	—Liquid	None
	—Cast iron	None
Front tires	—No, size, ply & psi	Two 6.00-16;6;24
Ballast	—Liquid	None
	—Cast iron	None
Height of drawbar		15 inches
Static weight	—Rear	1619 lb
	—Front	1655 lb
Total weight with operator		3449 lb

# EXPLANATION OF TEST REPORT

## GENERAL CONDITIONS

Each tractor is a production model equipped for common usage. Power consuming accessories can be disconnected only when it is convenient for the operator to do so in practice. Additional weight can be added as ballast if the manufacturer regularly supplies it for sale. The static tire loads and the inflation pressures must conform to recommendations in the Tire Standards published by the Society of Automotive Engineers.

## PREPARATION FOR PERFORMANCE RUNS

The engine crankcase is drained and refilled with a measured amount of new oil conforming to specifications in the operators manual. The fuel used and the maintenance operations must also conform to the published information delivered with the tractor. The tractor is then limbered-up for 12 hours on drawbar work in accordance with the manufacturer's published recommendations. The manufacturer's representative is present to make appropriate decisions regarding mechanical adjustments.

The tractor is equipped with approximately the amount of added ballast that is used during maximum drawbar tests. The tire tread-bar height must be at least 65% of new tread height prior to the maximum power run.

## BELT OR POWER TAKE-OFF PERFORMANCE

**Maximum Power and Fuel Consumption.** The manufacturer's representative makes carburetor, fuel pump, ignition and governor control settings which remain unchanged throughout all subsequent runs. The governor and the manually operated governor control lever is set to provide the high-idle speed specified by the manufacturer for maximum power. Maximum power is measured by connecting the belt pulley or the power take-off to a dynamometer. The dynamometer load is then gradually increased until the engine is operating at the rated speed specified by the manufacturer for maximum power. The corresponding fuel consumption is measured.

**Varying Power and Fuel Consumption.** Six different horsepower levels are used to show corresponding fuel consumption rates and how the governor causes the engine to react to the following changes in dynamometer load: 85% of the dynamometer torque at maximum power; minimum dynamometer torque,  $\frac{1}{2}$  the 85% torque; maximum power;  $\frac{1}{4}$  and  $\frac{3}{4}$  of the 85% torque. Since a tractor is generally subjected to varying loads the average of the results in this test serve well for predicting the fuel consumption of a tractor in general usage.

## DRAWBAR PERFORMANCE

All engine adjustments are the same as those used in the belt or power take-off tests. If the manufacturer specifies a different rated crankshaft speed for drawbar operations, then the position of the manually operated governor control is changed to provide the high-idle speed specified by the manufacturer in the operating instructions.

**Varying Power and Fuel Consumption With Ballast.** The varying power runs are made to show the effect of speed-control devices (engine governor, automatic transmissions, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree

turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the tractor maintain the travel speed at maximum horsepower on the straight sections of the test course; (2) 75% of the pull at maximum power; and (3) 50% of the pull at maximum power. Prior to 1958, fuel consumption data (10 hour test) were shown only for the pull obtained at maximum power for tractors having torque converters and at 75% of the pull obtained at maximum power for gear-type tractors.

**Maximum Power with Ballast.** Maximum power is measured on straight level sections of the test course. Data are shown for not more than 12 different gears or travel speeds. Some gears or travel speeds may be omitted because of high slippage of the traction members or because the travel speed may exceed the safe-limit for the test course. The maximum safe speed for the Nebraska Test Course has been set at 15 miles per hour. The slippage limits have been set at 15% and 7% for pneumatic tires and steel tracks or lugs, respectively. Higher slippage gives widely varying results.

**Maximum Power Without Ballast.** All added ballast is removed from the tractor. The maximum drawbar power of the tractor is determined by the same procedure used for getting maximum power with ballast. The gear (or travel speed) is the same as that used in the 10-hour test.

**Varying Power and Travel Speed with Ballast.** Travel speeds corresponding to drawbar pulls beyond the maximum power range are obtained to show the "lugging ability" of the tractor. The run starts with the pull at maximum power; then additional drawbar pull is applied to cause decreasing speeds. The run is ended by one of three conditions; (1) maximum pull is obtained, (2) the maximum slippage limit is reached, or (3) some other operating limit is reached.

For additional information about the Nebraska Tractor Tests write to the Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska.



Land-Rover 88 Gasoline