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## Test 1019: David Brown 4600 Selectamatic (Gasoline)

Nebraska Tractor Test Lab

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

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# NEBRASKA TRACTOR TEST 1019—DAVID BROWN 4600 SELECTAMATIC GASOLINE

## POWER TAKE-OFF PERFORMANCE

Hp	Crank- shaft speed rpm	Fuel Consumption		Hp-hr per gal	Temperature Degrees F			Barometer inches of Mercury	
		Gal per hr	Lb per hp-hr		Cooling medium	Air wet bulb	Air dry bulb		
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours									
46.05	2200	3.995	0.533	11.53	188	65	75	29.142	
Standard Power Take-off Speed (540 rpm)—One Hour									
40.59	1828	3.453	0.523	11.75	181	69	75	29.048	
Standard Power Take-off Speed (1000 rpm)—One Hour									
43.17	2000	3.679	0.524	11.73	185	68	75	29.033	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
40.28	2280	3.558	0.543	11.32	184	68	75	.....	
0.00	2328	1.132	.....	.....	170	68	75	.....	
20.15	2281	2.070	0.631	9.73	174	68	75	.....	
45.94	2201	4.047	0.541	11.35	188	69	76	.....	
10.10	2288	1.572	0.956	6.42	172	68	75	.....	
29.97	2261	2.636	0.541	11.37	178	69	76	.....	
Av	24.41	2273	2.502	0.630	9.76	178	68	75	29.063

## DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Slip of drivers %	Fuel Consumption		Hp-hr per gal	Temp Degrees F			Barom- eter inches of Mercury
					Gal per hr	Lb per hp-hr		Cool- ing med	Air wet bulb	Air dry bulb	
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—3rd Gear											
38.34	2833	5.08	2197	6.51	3.694	0.635	9.67	172	56	64	29.160
75% of Pull at Maximum Power—Ten Hours—3rd Gear											
32.10	2228	5.40	2298	4.92	3.336	0.639	9.62	173	64	75	29.124
50% of Pull at Maximum Power—Two Hours—3rd Gear											
22.20	1501	5.55	2327	3.52	2.440	0.676	9.10	168	53	56	29.165
MAXIMUM POWER WITH BALLAST											
30.87	5421	2.14	2271	14.94	1st Gear .....		177	62	77	29.100	
38.18	3908	3.66	2201	9.19	2nd Gear .....		181	62	76	29.080	
39.75	2936	5.08	2197	6.51	3rd Gear .....		171	55	62	29.160	
39.21	2091	7.03	2200	4.58	4th Gear .....		179	61	75	29.080	
38.67	1669	8.69	2199	3.67	5th Gear .....		176	61	75	29.080	
MAXIMUM PULL WITHOUT BALLAST											
35.54	3747	3.56	2250	14.93	2nd Gear .....		172	68	77	29.110	
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—3rd Gear											
Pounds Pull			2936	2975	3069	3262	3350	3423	3314		
Horsepower			39.75	36.15	33.07	30.68	26.90	22.88	17.74		
Crankshaft speed rpm			2197	1976	1757	1541	1319	1101	880		
Miles per hour			5.08	4.56	4.04	3.53	3.01	2.51	2.01		
Slip of Drivers, %			6.51	6.86	7.08	7.42	7.65	7.98	7.65		

## TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 14.9-28; 6; 14	Two 14.9-28; 6; 14
	—Liquid	440 lb each	None
	Cast iron	475 lb each	None
Front tires	—No, size, ply & psi	Two 6.00-16; 6; 32	Two 6.00-16; 6; 32
	—Liquid	None	None
	Cast iron	245 lb each	None
Height of drawbar		20 inches	21 inches
Static weight with operator—Rear		4760 lb	2930 lb
	Front	1990 lb	1500 lb
	Total	6750 lb	4430 lb

Department of Agricultural Engineering

Dates of Test: September 2 to September 11, 1969

Manufacturer: DAVID BROWN TRACTORS LTD., MELTHAM, HUDDERSFIELD, YORKSHIRE, ENGLAND

**FUEL, OIL and TIME** Fuel regular gasoline Octane No Motor 85 Research 93 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.7383 Weight per gallon 6.146 lb Oil SAE 10W-20W-30 API service classification MS DG DM To motor 1.852 gal Drained from motor 1.214 gal Transmission lubricant SAE 20W-30 Final-drive lubricant SAE 140 Total time engine was operated 47 hours.

**ENGINE** Make David Brown Type 3 cylinder vertical Serial No 355101 1222 Crankshaft mounted lengthwise Rated rpm 2200 Bore and stroke 3.939" x 4.500" Compression ratio 7.5 to 1 Displacement 164.4 cu in Carburetor size 1 1/4" Ignition system battery Cranking system 12 volt electric Lubrication pressure Air cleaner oil washed wire mesh with centrifugal pre cleaner Oil filter full flow replaceable paper element Fuel filter sediment bowl and screen Muffler was used Cooling medium temperature control thermostat.

**CHASSIS** Type standard Serial No 4600A 900221 Tread width rear 52" to 80" front 52" to 72" Wheel base 79 3/4" 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 27.5" Vertical distance above roadway 27.5" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system direct engine drive except when PTO clutch is disengaged Transmission selective gear fixed ratio Advertised speeds mph first 2.38 second 3.96 third 5.34 fourth 7.24 fifth 8.86 sixth 16.3 reverse 3.94 and 8.80 Clutch single plate dry disc in combination with PTO clutch operated by foot pedal Brakes internal expanding shoe operated independently by two foot pedals which can be locked together or by a hand lever Steering no power assist Turning radius (on concrete surface with brake applied) right 126" left 126" (on concrete surface without brake) right 138" left 138" Turning space diameter (on concrete surface with brake applied) right 258" left 258" (on concrete surface without brake) right 282" left 282" Belt pulley 1555 rpm at 2200 engine rpm diam 8.5" face 5.125" Belt speed 3460 fpm Power take-off 540 rpm at 1823 engine rpm and 1000 rpm at 2000 engine rpm.

**REPAIRS and ADJUSTMENTS:** No repairs or adjustments.

**REMARKS:** All test results were determined from observed data obtained in accordance with the SAE and ASAE test code. Sixth gear was not run as it exceeded 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1019.

L. F. LARSEN

Engineer-In-Charge

G. W. STEINBRUEGGE, Chairman

W. E. SPLINTER

D. E. LANE

Board of Tractor Test Engineers

The University of Nebraska Agricultural Experiment Station  
E. F. Frolik, Dean; H. W. Ottoson, Director; Lincoln, Nebraska

# 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,  $\frac{1}{2}$  of 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

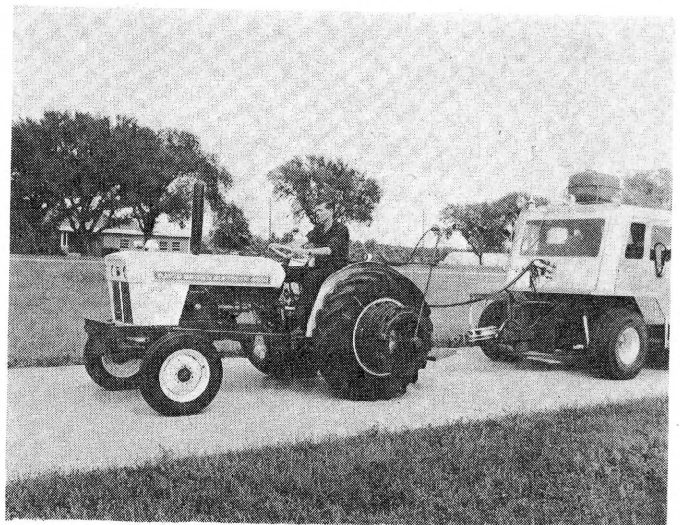
speed-control devices (engine, governor, automatic transmission, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to 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 Pull without Ballast.** All added ballast is removed from the tractor. The drawbar pull is determined at slip limits of 15% for pneumatic tires or 7% for steel tracks or lugs. The tractor is operated at the fastest possible travel speed.

**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.



DAVID BROWN 4600 SELECTAMATIC GASOLINE