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Test 1142: David Brown 1210 Diesel (Also Case 1210 Manual Diesel) 12-Speed

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 1142 – DAVID BROWN 1210 DIESEL ALSO CASE 1210 MANUAL DIESEL 12 SPEED

POWER TAKE-OFF PERFORMANCE

Hp	Crank- shaft speed rpm	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
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours (PTO Speed—1150 rpm)								
65.98	2300	4.130	0.433	15.98	196	59	75	28.910
Standard Power Take-off Speed (1000 rpm)—One Hour								
59.40	2000	3.623	0.422	16.40	197	60	75	28.905
Standard Power Take-off Speed (540 rpm)—One Hour								
55.00	1828	3.357	0.422	16.38	198	60	75	28.880
VARYING POWER AND FUEL CONSUMPTION—Two Hours								
58.08	2382	3.444	0.410	16.86	181	61	76	.....
0.00	2466	0.932	.....	.....	176	61	76	.....
29.43	2412	2.004	0.471	14.69	185	60	75	.....
65.45	2300	4.120	0.435	15.89	194	60	75	.....
14.89	2441	1.470	0.683	10.13	179	60	76	.....
43.77	2394	2.693	0.426	16.25	182	61	76	.....
Av 35.27	2399	2.444	0.479	14.43	183	60	76	28.857

DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Slip of drivers %	Fuel Consumption			Temp	Degrees F		Barometer
					Gal per hr	Lb per hp-hr	Hp-hr per gal	Cool- ing med	Air wet bulb	Air dry bulb	inches of Mercury
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—7th Gear (L-2)											
55.83	4188	5.00	2300	5.89	4.102	0.508	13.61	187	63	68	28.820
75% of Pull at Maximum Power—Ten Hours—7th Gear (L-2)											
45.14	3217	5.26	2381	4.33	3.144	0.482	14.36	189	73	80	28.660
50% of Pull at Maximum Power—Two Hours—7th Gear (L-2)											
31.07	2151	5.42	2422	3.20	2.403	0.535	12.93	180	54	57	28.960
50% of Pull at Reduced Engine Speed—Two Hours—9th Gear (HS-3)											
31.43	2171	5.43	1782	3.20	2.132	0.469	14.74	181	63	68	28.960
MAXIMUM POWER WITH BALLAST											
48.82	8097	2.26	2378	14.50	3rd Gear (HS-1)			183	60	65	28.700
53.49	7005	2.86	2297	11.39	4th Gear (L-1)			187	61	66	28.730
57.04	4286	4.99	2300	6.05	7th Gear (L-2)			187	62	67	28.750
57.23	3486	6.16	2300	4.71	8th Gear (H-1)			187	63	68	28.780
56.05	3026	6.95	2301	3.96	9th Gear (HS-3)			187	64	69	28.800
55.55	2015	10.34	2302	2.50	11th Gear (H-2)			188	64	69	28.810
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST											
7th Gear (L-2)											
Pounds Pull				4286	4440	4493	4615	4673	4497		
Horsepower				57.04	52.93	47.77	42.77	36.99	29.68		
Crankshaft Speed rpm				2300	2065	1844	1610	1377	1145		
Miles Per Hour				4.99	4.47	3.99	3.48	2.97	2.47		
Slip of Drivers %				6.05	6.25	6.38	6.51	6.64	6.51		

TRACTOR SOUND LEVEL (Without Cab)

	dB(A)
Maximum Available Power 2 Hours	98.0
75% of Pull at Max. Power 10 Hours	98.0
50% of Pull at Max. Power 2 Hours	97.5
50% of Pull at Reduced Engine Speed 2 Hours	95.0
Bystander 12th Gear (H3)	89.0

TIRES, BALLAST AND WEIGHT

	With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi	Two 18.4-30;6;16
Ballast	—Liquid	1310 lb each
	Cast Iron	920 lb each
Front Tires	—No., size, ply & psi	Two 7.50-16;6;32
Ballast	—Liquid	None
	Cast Iron	90 lb each
Height of drawbar	19½ inches	20 inches
Static weight with operator—rear	8020 lb	3560 lb
	front	2420 lb
	total	10440 lb

Department of Agricultural Engineering

Dates of Test: September 17 to October 1, 1973

Manufacturer: DAVID BROWN TRACTORS LTD., Meltham, Huddersfield, Yorkshire, England

FUEL OIL AND TIME Fuel No 2 Diesel Cetane No 50.1 (rating taken from oil company's typical inspectoin data) **Specific gravity** converted to 60°/60° 0.8308 **Weight per gallon** 6.917 lb **Oil SAE 20-20W API service classification** (Case HDM Oil) **To motor** 1.725 gal **Drained from motor** 1.419 gal **Transmission and final drive lubricant** SAE 20W-40 **Total time engine was operated** 53 hours.

ENGINE Make David Brown Diesel **Type** 4 cylinder vertical **Serial No** AD4/55A/22452 **Crankshaft Mounted** lengthwise **Rated rpm** 2300 **Bore and stroke** 3.939" x 4.50" **Compression ratio** 17 to 1 **Displacement** 219 cu in **Cranking system** 12 volt electric **Lubrication pressure** Air cleaner oil washed wire mesh with pleated paper precleaner **Oil filter** full flow with replaceable pleated paper element **Fuel filter** primary and secondary with replaceable pleated paper elements **Muffler** vertical **Cooling medium temperature control** thermostat.

CHASSIS Type standard **Serial No** 1210/1/722965 **Tread width** rear 60" to 80" front 52" to 72" **Wheel base** 89" **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 34.0" Vertical distance above roadway 35.5" Horizontal distance from center of rear wheel tread 0" to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Adverspeeds mph** first 1.2 second 2.0 third 2.5 fourth 3.2 fifth 3.5 sixth 4.1 seventh 5.2 eighth 6.3 ninth 7.0 tenth 8.9 eleventh 10.3 twelfth 17.8 reverse 2.1, 4.1, 5.2 and 10.5 **Clutch** single plate dry disc operated by foot pedal **Brakes** internal expanding shoes operated by hand lever or independently by two foot pedals **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied right 138" left 138" (on concrete surface with brake) right 155" left 155" **Turning space diameter** (on concrete surface with brake applied) right 282" left 282" (on concrete surface without brake) right 316" left 316" **Power take-off** 540 rpm at 1828 engine rpm or 1000 at 2000 engine rpm.

REPAIRS AND ADJUSTMENTS: No repairs or adjustments

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test code or official Nebraska test procedure.

First and second gears were not run as it was necessary to limit the pull in third gear because of the tire tangential pull limitation.

Fifth, sixth, tenth and twelfth gears were not run as test procedure requires only six travel speeds.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 1142.

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
H. W. Ottoson, Director & Acting Dean; 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. Prior to the maximum power run the tire tread-bar height must be at least 65% of new tread height.

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 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.

Varying Power and Fuel Consumption With Ballast. The varying power runs are made to show the effects 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 4 different runs 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; (3) 50% of the pull at maximum power; and (4) maintaining the same load and travel speed as in (3) by shifting to a higher gear and reducing the engine rpm.

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 6 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 manufacturer's representative has the option of selecting one gear or speed over eight miles per hour. 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.

Varying Drawbar Pull 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.

SOUND MEASUREMENT

Sound is recorded during each of the Varying Power and Fuel Consumption runs as the tractor travels on a straight section of the test course. The dB(A) sound level is obtained with the microphone located near the right ear of the operator. Bystander sound readings are taken with the microphone placed 25 feet from the line of travel of the tractor.

An increase of 10 dB(A) will approximately double the loudness to the human ear.

For additional information about the Nebraska Tractor Tests write to the Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska 68503.



DAVID BROWN 1210 DIESEL