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Test 1641: Belarus 1770 Diesel 12-Speed

Nebraska Tractor Test Lab

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NEBRASKA TRACTOR TEST 1641—BELARUS 1770 DIESEL 12 SPEED

POWER TAKE-OFF PERFORMANCE

Power Hp (kW)	Crank shaft speed rpm	Fuel Consumption			Temperature °F (°C)			Barometer inch Hg (kPa)	
		gal/hr (l/h)	lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	Cooling medium	Air wet bulb	Air dry bulb		
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed — Two hours (PTO Speed — 1024 rpm)									
167.60 (124.98)	2100	10.119 (38.304)	0.422 (0.257)	16.56 (3.26)	195 (91)	59 (15)	75 (24)	28.61 (96.88)	
Standard Power Take-Off Speed (1000 rpm) — One Hour									
171.27 (127.71)	2050	10.187 (38.563)	0.416 (0.253)	16.81 (3.31)	198 (92)	60 (16)	76 (25)	28.59 (96.82)	
VARYING POWER AND FUEL CONSUMPTION — Two Hours									
148.98 (111.09)	2193	9.385 (35.526)	0.440 (0.268)	15.87 (3.13)	192 (89)	62 (17)	78 (25)	.....
.....	2295	2.742 (10.380)	.....	.....	169 (76)	65 (18)	83 (28)	.....
76.10 (56.75)	2245	5.930 (22.449)	0.545 (0.331)	12.83 (2.53)	173 (78)	63 (17)	78 (26)	.....
167.22 (124.69)	2101	10.007 (37.881)	0.418 (0.254)	16.71 (3.29)	194 (90)	63 (17)	80 (26)	.....
38.44 (28.67)	2265	4.502 (17.040)	0.819 (0.498)	8.54 (1.68)	169 (76)	64 (18)	80 (27)	.....
113.12 (84.35)	2225	7.626 (28.866)	0.471 (0.287)	14.83 (2.92)	180 (82)	64 (18)	81 (27)	.....
Av Av	90.76 (67.68)	2221	6.699 (25.357)	0.516 (0.314)	13.55 (2.67)	179 (82)	63 (17)	80 (27)	28.58 (96.77)

DRAWBAR PERFORMANCE

Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank- shaft speed rpm	Slip %	Fuel Consumption			Temp. °F (°C)			Barom. inch Hg (kPa)
					gal/hr (l/h)	lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	Cool- ing med	Air wet bulb	Air dry bulb	
Maximum Available Power — Two Hours 6th (2-2) Gear											
148.11 (110.44)	9751 (43.37)	5.70 (9.17)	2100	4.91	10.156 (38.444)	0.479 (0.292)	14.58 (2.87)	183 (84)	50 (10)	59 (15)	28.78 (97.46)
75% of Pull at Maximum Power — Ten Hours 6th (2-2) Gear											
116.99 (87.24)	7200 (32.03)	6.09 (9.81)	2213	3.42	8.827 (33.414)	0.527 (0.321)	13.25 (2.61)	177 (81)	46 (8)	56 (13)	28.90 (97.86)
50% of Pull at Maximum Power — Two Hours 6th (2-2) Gear											
83.08 (61.95)	4989 (22.19)	6.24 (10.05)	2242	2.48	7.116 (26.938)	0.599 (0.364)	11.68 (2.30)	176 (80)	51 (10)	59 (15)	28.73 (97.29)
50% of Pull at Reduced Engine Speed — Two Hours 8th (2-4) Gear											
83.11 (61.98)	4990 (22.19)	6.25 (10.05)	1678	2.66	6.179 (23.391)	0.520 (0.316)	13.45 (2.65)	175 (79)	50 (10)	54 (12)	28.70 (97.19)
MAXIMUM POWER IN SELECTED GEARS											
124.68 (92.98)	18440 (82.02)	2.54 (4.08)	2188	14.65	2nd (1-2) Gear			178 (81)	46 (8)	54 (12)	28.79 (97.49)
138.69 (103.42)	17487 (77.79)	2.97 (4.79)	2098	11.70	3rd (1-3) Gear			179 (82)	46 (8)	54 (12)	28.79 (97.49)
142.98 (106.62)	15396 (68.48)	3.48 (5.60)	2099	8.95	4th (1-4) Gear			179 (82)	47 (8)	55 (13)	28.79 (97.49)
150.22 (112.02)	11743 (52.23)	4.80 (7.72)	2100	6.01	5th (2-1) Gear			181 (82)	49 (9)	57 (14)	28.79 (97.49)
151.30 (112.82)	9977 (44.38)	5.69 (9.15)	2099	5.02	6th (2-2) Gear			183 (84)	49 (9)	57 (14)	28.79 (97.49)
150.36 (112.13)	8315 (36.98)	6.78 (10.91)	2099	4.15	7th (2-3) Gear			180 (82)	47 (8)	55 (13)	28.79 (97.49)
148.22 (110.53)	7174 (31.91)	7.75 (12.47)	2100	3.48	8th (2-4) Gear			180 (82)	48 (9)	56 (13)	28.79 (97.49)

Department of Biological Systems Engineering

Dates of Test: May 7-17, 1990

Manufacturer: KHARKOV TRACTOR PLANT,
Kharkov-7, USSR

FUEL, OIL AND TIME: Fuel No. 2 Diesel Cetane No. 53.9 (rating taken from oil company's inspection data) Specific gravity converted to 60/60°F (15/15°C) 0.8396 Fuel weight 6.991 lbs/gal (0.838 kg/l) Oil SAE 30 API service classification SE, SF, CC, CD To motor 5.742 gal (21.736 l) Drained from motor 4.129 gal (15.629 l) Transmission and hydraulic lubricant SAE 30 Final drive lubricant SAE 90 Gear Lube Total time engine was operated 40.5 hours.

ENGINE: Make Belarus Diesel Model SMD 63 Type six cylinder vee with turbo charger Serial No. 953219 Crankshaft lengthwise Rated rpm 2100 Bore and stroke (as specified) 5.118" × 4.528" (130 mm × 115 mm) Compression ratio 15 to 1 Displacement 558 cu in (9150 ml) Starting system 24 volt Lubrication pressure Air cleaner two paper elements Air compressor direct engine drive Oil filter full flow centrifugal Oil cooler radiator for crankcase oil, radiator for transmission oil Fuel filter three paper elements Muffler vertical Cooling medium temperature control two thermostats.

ENGINE OPERATING PARAMETERS: Fuel rate 70-73 lb/h (31.8-33.1 kg/h) High idle 2260-2300 rpm Turbo boost nominal 11-13 psi (75-90 kPa) as measured 12.0 psi (83 kPa).

CHASSIS: Type four wheel drive Serial No. 489886 Tread width rear 73.2" (1860 mm) front 73.2" (1860 mm) Wheel base 112.6" (2860 mm) 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 69.9" (1775 mm) Vertical distance above roadway 41.7" (1060 mm) Horizontal distance from center of rear wheel tread 0" (0 mm) to the right/left Hydraulic control system direct engine drive with throwout lever (engaged during drawbar tests) Transmission selective gear fixed ratio with partial (4) range operator controlled powershift Advertised speeds mph (km/h) first 2.3 (3.7) second 2.7 (4.4) third 3.2 (5.2) fourth 3.6 (5.9) fifth 4.8 (7.8) sixth 5.7 (9.2) seventh 6.7 (10.8) eighth 7.6 (12.3) ninth 11.2 (18.0) tenth 13.1 (21.1) eleventh 15.5 (24.9) twelfth 17.6 (28.3) reverse 3.5 (5.6), 4.1 (6.6), 4.8 (7.8), 5.5 (8.8) Clutch double dry disc pneumatically operated by foot pedal Brakes drum and shoe pneumatically operated by foot pedal Steering hydrostatic and articulated Turning radius (on concrete surface without brake) right 264" (6.70 m) left 264" (6.70 m) Turning space diameter (on concrete surface without brake) right 575" (14.60 m) left 575" (14.60 m)

LUGGING ABILITY IN 6th (2-2) GEAR

Crankshaft Speed rpm	2099	1891	1684	1465	1257	1052
Pull—lbs (kN)	9977 (44.38)	11690 (52.00)	12819 (57.02)	11953 (53.17)	11273 (50.14)	10447 (46.47)
Increase in Pull %	0	17	28	20	13	5
Power—Hp (kW)	151.30 (112.82)	158.04 (117.85)	153.13 (114.19)	124.99 (93.20)	101.48 (75.67)	79.13 (59.01)
Speed—Mph (km/h)	5.69 (9.15)	5.07 (8.16)	4.48 (7.21)	3.92 (6.31)	3.38 (5.43)	2.84 (4.57)
Slip %	5.02	5.94	6.79	6.23	5.80	5.38

TRACTOR SOUND LEVEL WITH CAB dB(A)

Maximum Available Power—Two Hours	81.5
75% of Pull at Maximum Power—Ten Hours	82.5
50% of Pull at Maximum Power—Two Hours	85.0
50% of Pull at Reduced Engine Speed—Two Hours	83.0
Bystander in 11th (3-3) gear	88.5

TIRES, BALLAST AND WEIGHT

Rear Tires	—No., size, ply & psi (kPa)	With Ballast	Without Ballast
		Two 610-665/23.1/18-26P; 12; 18 (125) 430 lb (195 kg) None	Two 610-665/23.1/18-26P; 12; 18 (125) None None
Front Tires	—No., size, ply & psi (kPa)	Two 610-665/23.1/18-26P; 12; 18 (125) 22 lb (10 kg) None	Two 610-665/23.1/18-26P; 12; 18(125) None None
		—Test equip (each) —Liquid (each)	
Height of Drawbar		20.0 in (510 mm)	20.0 in (510 mm)
Static Weight with Operator	—Rear	8280 lb (3756 kg)	7420 lb (3366 kg)
	—Front	12210 lb (5538 kg)	12165 lb (5518 kg)
	—Total	20490 lb (9294 kg)	19585 lb (8884 kg)

THREE POINT HITCH PERFORMANCE

Observed Maximum Pressure psi (kPa)	*2700 (18615)
Location	remote outlet
Hydraulic oil temperature °F (°C)	175 (79)
Location	hydraulic reservoir
	Maximum Lift Capacity
QUICK ATTACH	No
CATEGORY	III
LOAD lbs (kg)	12482 (5662)
TIME sec	6.22
HITCH POINT MOVEMENT in (mm)	
Lowest position	8.0 (203)
Top of timed range	34.1 (866)
Highest position	42.6 (1082)
LOAD CG MOVEMENT in (mm)	
Lowest position	10.9 (276)
Top of timed range	30.5 (775)
Highest position	37.3 (947)

* The observed system pressure, 2700 psi (18615 kPa) exceeds manufacturers maximum stated pressure of 2610 psi (18000 kPa).

m) **Power take-off** 1000 rpm at 2050 engine rpm and 540 rpm at 2025 engine rpm **Unladen tractor mass** 19400 lb (8800 kg).

REPAIRS AND ADJUSTMENTS: The parking brake return spring was replaced at the end of the test sequence.

REMARKS: All test results were determined from observed data obtained in accordance with official SAE and Nebraska test procedures. For the maximum power tests, the fuel temperature at the injection pump inlet was maintained at 118 °F (48°C). Seven gears were chosen between 15% slip and 10 mph (16.1 km/h).

We, the undersigned, certify that this is as true and correct report of official Tractor Test No. 1641, July, 30, 1990.

LOUIS I. LEVITICUS

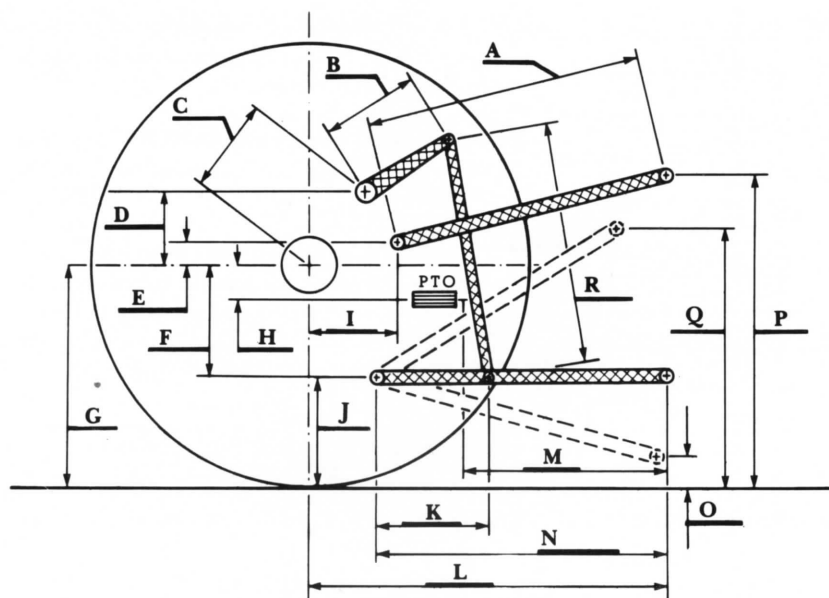
Engineer-in-Charge

K. VON BARGEN

R.D. GRISSO

G.J. HOFFMAN

Board of Tractor Test Engineers



HITCH DIMENSIONS AS TESTED—NO LOAD

	inch	mm
A	34.0	864
B	23.6	600
C	30.6	778
D	18.5	470
E	18.5	470
F	7.7	195
G	30.0	762
*H	-7.6	-194
I	24.4	620
J	22.3	567
K	29.2	741
L	58.3	1482
M	33.7	857
N	37.1	942
O	8.0	203
P	44.3	1125
Q	46.4	1178
R	28.0	711

*PTO is above rear axle



Belarus 1770 Diesel