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Test 1640: Belarus 822, 820, 800M and 802M Diesel 18-Speed

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, tractortestlab@unl.edu

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NEBRASKA TRACTOR TEST 1640—BELARUS 822 DIESEL ALSO BELARUS 820 DIESEL ALSO BELARUS 800M AND 802M DIESEL 18 SPEED

Department of Biological Systems Engineering

Dates of Test: June 6-19, 1990

Sound level test on 800M—October 25, 1991.

Manufacturer: MINSK TRACTOR WORKS,
MTZ, Minsk, USSR

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 — 571 rpm)									
75.15 (56.04)	2200	4.477 (16.948)	0.417 (0.253)	16.78 (3.31)	195 (91)	59 (15)	75 (24)	28.85 (97.70)	
Standard Power Take-Off Speed (1001 rpm) — One Hour									
73.55 (54.85)	2183	4.433 (16.780)	0.421 (0.256)	16.59 (3.27)	194 (90)	63 (17)	74 (23)	28.78 (97.46)	
Standard Power Take-Off Speed (540 rpm) — One Hour									
71.71 (53.47)	2075	4.221 (15.979)	0.412 (0.250)	16.99 (3.35)	196 (91)	59 (15)	75 (24)	28.80 (97.53)	
VARYING POWER AND FUEL CONSUMPTION — Two Hours									
64.73 (48.27)	2228	3.875 (14.668)	0.418 (0.255)	16.71 (3.29)	184 (84)	59 (15)	75 (24)	..... .....
.....	2331	1.330 (5.036)	..... .....	..... .....	144 (62)	59 (15)	75 (24)	..... .....
33.40 (24.91)	2302	2.300 (8.707)	0.481 (0.293)	14.52 (2.86)	155 (68)	60 (16)	75 (24)	..... .....
74.22 (55.34)	2203	4.407 (16.683)	0.415 (0.253)	16.84 (3.32)	187 (86)	61 (16)	76 (24)	..... .....
16.85 (12.57)	2320	1.824 (6.904)	0.757 (0.460)	9.24 (1.82)	154 (68)	61 (16)	76 (24)	..... .....
49.35 (36.80)	2268	3.025 (11.452)	0.429 (0.261)	16.31 (3.21)	167 (75)	63 (17)	76 (24)	..... .....
Av 39.86 Av (29.73)	2275	2.794 (10.575)	0.490 (0.298)	14.27 (2.81)	165 (74)	60 (16)	75 (24)	28.81 (97.56)	

DRAWBAR PERFORMANCE (Front Drive in Automatic mode)

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 9th (4H) Gear											
62.47 (46.58)	4229 (18.81)	5.54 (8.92)	2200	3.47	4.298 (16.271)	0.481 (0.293)	14.53 (2.86)	190 (88)	68 (20)	79 (26)	28.87 (97.75)
75% of Pull at Maximum Power — Ten Hours 9th (4H) Gear											
49.53 (36.93)	3263 (14.51)	5.69 (9.16)	2244	2.73	3.543 (13.412)	0.500 (0.304)	13.98 (2.75)	185 (85)	74 (23)	86 (30)	28.79 (97.50)
50% of Pull at Maximum Power — Two Hours 9th (4H) Gear											
34.10 (25.43)	2175 (9.67)	5.88 (9.46)	2301	2.03	2.775 (10.505)	0.569 (0.346)	12.29 (2.42)	171 (77)	73 (23)	85 (29)	28.63 (96.95)
50% of Pull at Reduced Engine Speed — Two Hours 14th (8L) Gear											
34.10 (25.42)	2175 (9.67)	5.88 (9.46)	1509	2.07	2.310 (8.745)	0.474 (0.288)	14.76 (2.91)	183 (84)	74 (23)	85 (29)	28.62 (96.90)

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 2.575 gal (9.748 l) Drained
from motor 2.332 gal (8.828 l) Transmission and
final drive lubricant SAE 90 gear lubricant Hy-
draulic lubricant SAE 30 Total time engine was
operated 39.0 hours.

ENGINE: Make MTZ Diesel Model D240
Type four cylinder vertical Serial No. 214336
Crankshaft lengthwise Rated rpm 2200 Bore and
stroke (as specified) 4.331" × 4.921" (110 mm ×
125 mm) Compression ratio 16 to 1 Displacement
290 cu in (4750 ml) Starting system 24 volt Lu-
brication pressure Air cleaner oil bath with pre-
cleaner Oil filter full flow centrifugal Oil cooler
radiator for crankcase oil Fuel filter one cleanable
screen and one paper element Muffler vertical
Cooling medium temperature control one ther-
mostat.

ENGINE OPERATING PARAMETERS: Fuel
rate: not to exceed 32.4 lb/h (14.7 kg/h) High idle:
not to exceed 2380 rpm.

CHASSIS: Type front wheel assist Serial No.
295433 Tread width rear 56.7" (1440 mm) to 82.7"
(2100 mm) front 53.1" (1350 mm) to 70.9" (1800
mm) Wheel base 96.5" (2450 mm) Center of gravity
(without operator or ballast, with minimum tread,
with fuel tank filled and tractor serviced for op-
eration) Horizontal distance forward from center-
line of rear wheels 36.9" (937 mm) Vertical distance
above roadway 40.4" (1025 mm) Horizontal dis-
tance from center of rear wheel tread 0.4" (11 mm)
to the right Hydraulic control system direct en-
gine drive with throwout lever (engaged during
test) Transmission selective gear fixed ratio Ad-
vertised speeds mph (km/h) first 1.2 (1.9) second
1.6 (2.6) third 2.1 (3.3) fourth 2.7 (4.4) fifth 3.5
(5.6) sixth 4.3 (6.9) seventh 4.6 (7.4) eighth 5.1
(8.2) ninth 5.7 (9.1) tenth 6.0 (9.6) eleventh 6.7
(10.8) twelfth 7.3 (11.8) thirteenth 7.9 (12.7) four-
teenth 8.7 (13.9) fifteenth 9.7 (15.6) sixteenth 11.5
(18.4) seventeenth 16.1 (25.9) eighteenth 21.3
(34.3) reverse 2.5 (4.1), 3.4 (5.4), 4.3 (7.0), 5.7 (9.2)
Clutch single dry disc operated by foot pedal Brakes
dry disc operated by two foot pedals which can be
locked together Steering hydrostatic Turning ra-
dial (on concrete surface with brake applied) right

MAXIMUM POWER IN SELECTED GEARS

47.90 (35.72)	9973 (44.36)	1.80 (2.90)	2241	14.38	3rd (2L) Gear	183 (84)	72 (22)	80 (27)	28.66 (97.05)
59.20 (44.15)	8906 (39.61)	2.49 (4.01)	2200	8.56	4th (2H) Gear	185 (85)	72 (22)	82 (28)	28.64 (96.99)
62.38 (46.51)	7021 (31.23)	3.33 (5.36)	2200	5.63	5th (3L) Gear	185 (85)	67 (19)	73 (23)	28.84 (97.66)
63.37 (47.26)	5741 (25.53)	4.14 (6.66)	2198	4.58	6th (4L) Gear	185 (85)	67 (19)	73 (23)	28.84 (97.66)
63.33 (47.23)	5305 (23.60)	4.48 (7.20)	2199	4.15	7th (3H) Gear	184 (84)	67 (19)	72 (22)	28.83 (97.63)
63.55 (47.39)	4823 (21.45)	4.94 (7.95)	2199	3.72	8th (5L) Gear	187 (86)	66 (19)	74 (23)	28.85 (97.70)
64.27 (47.93)	4350 (19.35)	5.54 (8.92)	2201	3.36	9th (4H) Gear	188 (86)	66 (19)	76 (24)	28.87 (97.77)
63.41 (47.28)	4093 (18.21)	5.81 (9.35)	2197	3.29	10th (6L) Gear	187 (86)	66 (19)	75 (24)	28.86 (97.73)
63.95 (47.69)	3640 (16.19)	6.59 (10.60)	2199	3.07	11th (5H) Gear	186 (86)	66 (19)	74 (23)	28.85 (97.70)
63.10 (47.06)	3291 (14.64)	7.19 (11.57)	2201	2.77	12th (7L) Gear	183 (84)	67 (19)	72 (22)	28.83 (97.63)
63.52 (47.36)	3079 (13.69)	7.74 (12.46)	2199	2.55	13th (6H) Gear	186 (85)	66 (19)	75 (24)	28.86 (97.73)
62.19 (46.38)	2731 (12.15)	8.54 (13.74)	2200	2.33	14th (8L) Gear	181 (83)	67 (19)	71 (22)	28.82 (97.60)

LUGGING ABILITY IN 9th (4H) GEAR

Crankshaft Speed rpm	2201	1980	1753	1533	1318	1101
Pull—lbs (kN)	4350 (19.35)	4580 (20.37)	4997 (22.23)	5344 (23.77)	5353 (23.81)	5095 (22.66)
Increase in Pull %	0	5	15	23	23	17
Power—Hp (kW)	64.27 (47.93)	60.74 (45.30)	58.49 (43.62)	54.58 (40.70)	46.98 (35.03)	37.44 (27.92)
Speed—Mph (km/h)	5.54 (8.92)	4.97 (8.00)	4.39 (7.06)	3.83 (6.16)	3.29 (5.30)	2.76 (4.43)
Slip %	3.36	3.58	3.87	4.15	4.30	4.15

TRACTOR SOUND LEVEL

	W/O Cab dB(A)	With Cab dB(A)
Maximum Available Power—Two Hours	94.0	81.5
75% of Pull at Maximum Power—Ten Hours	93.0	80.5
50% of Pull at Maximum Power—Two Hours	92.0	81.0
50% of Power at Reduced Engine Speed—Two Hours	91.0	80.5
Bystander in 17th (9L) gear	86.0	89.0

MAXIMUM POWER IN SELECTED GEARS

MAXIMUM POWER (4WD MODE)

64.16 (47.85)	4346 (19.33)	5.54 (8.91)	2199	2.86	9th (4H) Gear	188 (86)	66 (19)	76 (24)	28.87 (97.77)
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MAXIMUM PULL (2WD MODE)

51.16 (38.15)	8053 (35.82)	2.38 (3.83)	2234	14.49	4th (2H) Gear	180 (82)	72 (22)	81 (27)	28.65 (97.02)
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TIRES, BALLAST AND WEIGHT

	With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi (kPa)	Two 400-965/15.5-38P; 8; 24 (165)
Ballast	—Liquid (each) —Cast Iron (each)	Two 400-965/15.5-38P; 8; 24 (165) None None
Front Tires	—No., size, ply & psi (kPa)	Two 290-508/11.2-20; 8; 20(140)
Ballast	—Liquid (each) —Cast Iron (each)	Two 290-508/11.2-20; 8; 20(140) None None
Height of Drawbar	15.5 in (395 mm)	15.5 in (395 mm)
Static Weight with Operator —Rear	7620 lb (3456 kg)	5880 lb (2667 kg)
—Front	3455 lb (1567 kg)	3430 lb (1556 kg)
—Total	11075 lb (5023 kg)	9310 lb (4223 kg)*

156" (3.96 m) left 191" (4.85 m) (on concrete surface without brake) right 175" (4.45 m) left 215" (5.46 m) **Turning space diameter** (on concrete surface with brake applied) right 323" (8.20 m) left 393" (9.98 m) (on concrete surface without brake) right 361" (9.17 m) left 441" (11.20 m) **Power take-off** 540 rpm at 2075 engine rpm and 1000 rpm at 2182 engine rpm **Unladen tractor mass** 8480 lb (3846 kg).

REPAIRS AND ADJUSTMENTS: One fuel injector was replaced during preliminary PTO test.

***NOTE:** Tractor is shipped with rear weights — 168 lb (76 kg) and front weight package — 492 lb (223 kg).

Note: Report reissued, supplemental sales permit for Belarus 800M and 802M Diesel models, December, 1991.

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 was maintained at 164 °F (73°C). Twelve 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. 1640, July, 30, 1990.

LOUIS I. LEVITICUS

Engineer-in-Charge

K. VON BARGEN

R. D. GRISSE

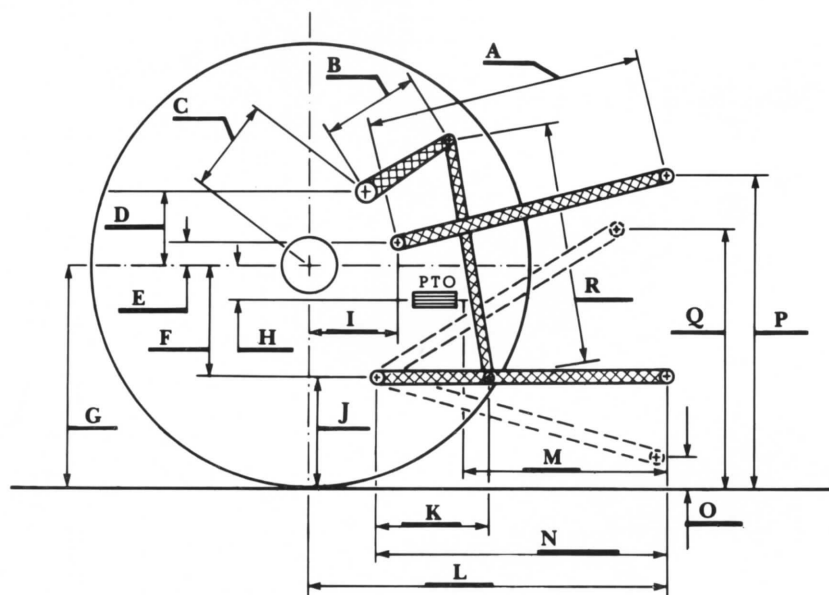
L. L. BASHFORD

Board of Tractor Test Engineers

THREE POINT HITCH PERFORMANCE

Observed Maximum Pressure psi (kPa)	2800 (19300)
Location	remote outlet
Hydraulic oil temperature °F (°C)	151 (66)
Location	hydraulic reservoir
	Maximum Lift Capacity

QUICK ATTACH	No
CATEGORY	II
LOAD lbs (kg)	3324 (1508)
TIME sec	2.14
HITCH POINT MOVEMENT in (mm)	
Lowest position	12.0 (305)
Top of timed range	36.0 (914)
Highest position	36.5 (927)
LOAD CG MOVEMENT in (mm)	
Lowest position	12.2 (309)
Top of timed range	43.3 (1099)
Highest position	44.8 (1137)



HITCH DIMENSIONS AS TESTED—NO LOAD

	inch	mm
A	21.0	533
B	10.2	260
C	17.6	447
D	10.6	270
E	6.3	160
F	9.6	245
G	28.4	721
H	4.6	117
I	19.0	483
J	18.8	478
K	15.1	384
L	40.0	1016
M	22.6	573
N	31.1	791
O	8.0	203
P	37.8	961
Q	36.4	924
R	18.4	467



Belarus 822 Diesel

Agricultural Research Division
Institute of Agriculture and Natural Resources
University of Nebraska—Lincoln
Darrell W. Nelson, Dean and Director