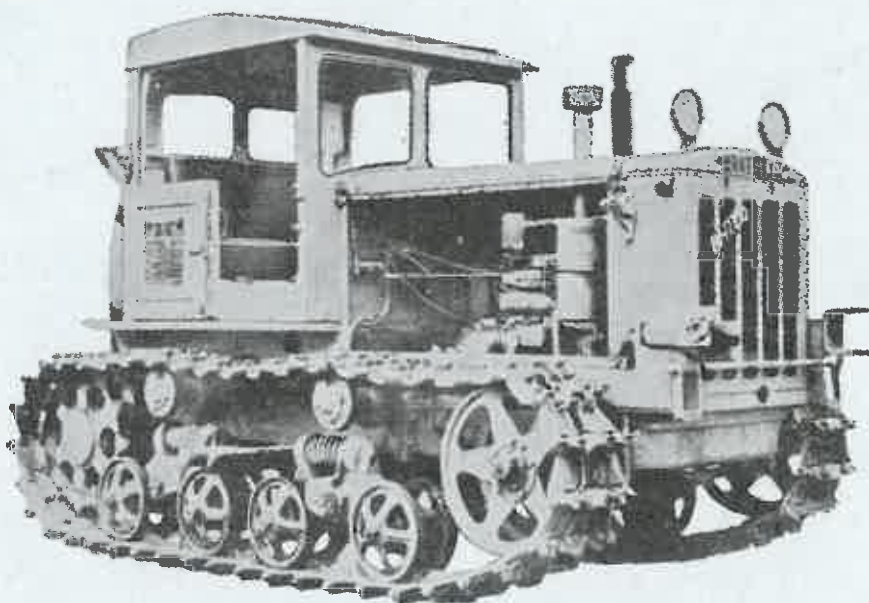


**SOCIALISTIC REPUBLIC OF CROATIA
INSTITUTE FOR MECHANIZATION IN AGRICULTURE
AGRICULTURAL FACULTY OF THE ZAGREB UNIVERSITY**

TEST BULLETIN: O.E.C.D. No. 101

Date of approval: 30th December 1965

**REPORT ON TEST IN ACCORDANCE WITH O. E. C. D. TEST CODE FOR
AGRICULTURAL TRACTORS**



TRACKLAYING TRACTOR

MODEL BNT-60 P

with an IMR IM — 036/T engine

**Manufactured by: BRATSTVO Machine and Die Forgings Factory,
Novi Travnik, Yugoslavia**

Date of Tests: April/June 1965

This report has been approved by the O.E.C.D. Coordinating Centre (C.N.E.E.M.A., Antony, France) as being in accordance with the O.E.C.D. Tractor Test Code.

Date of Approval: 30th December 1965

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This Bulletin is based on engineering tests in accordance with the O.E.C.D. Tractor Code. It does not contain an evaluation of the performance of the tractor on practical farm work.

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Performance curves

POWER TAKE - OFF TEST

FIG. NO.

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DRAWBAR TEST WITH BALLAST

Not applicable

DRAWBAR TEST WITHOUT BALLAST

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PART I.

SPECIFICATION OF TRACTOR

Tractor:

Make: BRATSTVO Machine and Die Forgings Factory, Novi Travnik
Model: BNT-60 P
Type: Diesel
Serial No.: 2428

Engine:

Make: Rakovica Engine Factory, Belgrade
Model: IM - 036
Type: IM - 036/T
Serial No.: 19530
Cylinders: 6 cylinders, vertical, in-line, 89 mm (3 1/2 in) bore x 127 mm (5 in) stroke, compression ratio 16.5 : 1, replaceable dry cylinder liners, overhead valves
Rated speed: 1800 rev/min, governor setting — no load engine speed 1900 rev/min
Fuel system: Fuel — Diesel oil
»Industrija precizne mehanike« type YPE 6 A 60 U 310/306 injection pump, Serial No. 01-450
»Industrija precizne mehanike« injector nozzles type BEP/K 22 P 70 fuel feed pump, sediment bowl and water trap on suction side of feed pump, »Ikarus« type IK-610 and IK-614 double filter in pressure line. Injection pressure 160 kp/cm² (155 atm). Injection timing 29° before TDC. Capacity of fuel tanks 170 + 80 l (37.5 + 17.5 UK gal)
Governor: »Industrija precizne mehanike« type YEPAMZ 80 A pneumatic governor incorporated in fuel injection pump, governed range of engine speed to 1800 rev/min
Air cleaner: »Ikarus« type IK-516/A, oil bath with pre-cleaner outside hood, oil capacity 1.7 l (3.0 pt)
Lubrication system: Forced feed from gear type pump with metal strainer in sump. Recommended oil SUPER HD oil. »Ikarus« type IK-145 oil filter with replaceable felt cartridge, recommended oil change period 250 h. Oil capacity (engine sump) 11.2 l (20 pt)
Cooling system: Water cooled, pressurized, impeller assisted with 432 mm (17 in) dia belt driven 6-blade fan, thermostat and radiator shutters for temperature control. Cooling water capacity: 19 l (4.2 UK gal)

Transmission:

Clutch:

Single plate dry clutch, hand-lever operated

Gearbox and
final drive:

Own make sliding gear type with 5 forward speeds and 1 reverse, oil capacity: gearbox 9 l (15.8 pt), final drives 1.7 l (3 pt) each. Recommended oil: hipoid oil. Viscosities, in summer SAE 140, in winter SAE 90. Oil change period 500 hr.

Gear	Number of engine revolutions for one revolution of driving sprocket	Theoretical travelling speed for 1800 rev/min rated speed of engine	
		km/h	(mile/h)
1 st	62.88	3.52	(2.19)
2 nd	48.61	4.55	(2.83)
3 rd	41.60	5.31	(3.30)
4 th	35.93	6.16	(3.83)
5 th	28.58	7.74	(4.81)
Reverse	94.32	2.35	(1.46)

Steering device
and brakes:

Clutch and brake steering with multi-plate clutch, hand-lever operated; external contracting band brake on clutch drums on final drive pinion shaft, foot-pedal operated, ratchet on foot pedals for parking

Tracks:

Length of track 7370 mm (24 ft 21 in). Length of track in ground contact 1620 mm (5 ft 3.8 in).

Track plates width: 390 mm (15.4 in). Track gauge 1435 mm (56 1/2 in). Total area of contact with ground 13 875 cm² (2 151 in²), nominal pressure on ground 0.42 kp/cm² (5.7 lb/in²)

Idler wheels
and rollers

Front idler wheels, 4 bottom track rollers per track, two top carrier roller per track, driving sprockets pitch diameter 652 mm (25.6 in)

Power take-off:

Main:

Manually engaged, proportional engine speed, 6-spline, 34.9 mm (1 3/8 in) dia at rear of tractor, driven through main clutch

Height above
ground:

750 mm (29.5 in)

Speed:

760 rev/min (at 1800 rev/min engine speed)

Direction of
rotation:

Clockwise viewed from tractor rear.

Gears ratio:

1 : 2.37

Gear reducer —
multiplier:

Gear ratio 1.45 : 1 or 1 : 1.45 — related to position of unit

Speeds:	Reducer: 524 rev/min at 1800 rev/min engine speed Multiplier: 1100 rev/min at 1800 rev/min engine speed 1000 rev/min at 1634 rev/min engine speed
Belt pulley:	Not fitted
Power lift:	None
Drawbar:	Vertical adjustment 340, 390, 470 or 510 mm (13.4, 15.4, 18.5 or 20.0 in) With central hole and 2 holes 90 mm (3.55 in) apart either side of centre line; position of pivot centre relative to sprocket centre: 530 mm (20.9 in)
Hitch:	2 forward 350 mm (13.8 in) above ground
Electrical equipment:	
Voltage:	12 V
Generator:	»Iskra« type DEA-12/200/1600
Batteries:	»Munja« type EF-9, lead-acid, capacity 180 amp h
Starting device:	»Iskra« type SN 1/N-12/2.5/11. Solenoid engaged starter motor »Industrija precizne mehanike« inlet manifold flame type cold starting aid
Overall dimensions:	
Overall length:	3630 mm (11 ft 10.9 in)
Overall width:	1880 mm (6 ft 2.91 in)
Overall height:	2270 mm (7 ft 5.36 in)
Minimum ground clearance:	330 (13 in) (with full grouser penetration)
Weight:	Fully equipped—5 940 kp (13 095 lb)
Special remarks:	The weight is with driver and bulldozer support beam

PART II

LABORATORY TESTS

Compulsory tests: Power take-off test (the test was performed with the multiplier on the shaft)

Date and location of tests: 15th April 1965, Belgrade

Type of dynamometer: Water brake, Clayton

Position of governor control: Fully open

Fuel: Diesel oil, density 0.832 kg/dm³ at 10°C (59°F)
Cetane No. 58

Engine oil: EXTRA HD 30, SAE No. 30

Transmission oil: SAE No. 140

Horse-power, Metric hp (U. S. hp)	Speeds,		Equiva- lent crank- shaft torque, kpm (lb ft)	Fuel consumption			Temperarure			Atmospher. conditions	
	Engine	P. t. o.		Per hour,	Specific,	HP hours/ unit of vol., metric hp h/l (hp h/ gal)	Cool- ant, °C (°F)	Oil, °C (°F)	Fuel, °C (°F)	Air temp., °C (°F)	Atmos. press- ure, mm Hg (in Hg)
rev/min	rev/min		kg/h (UK gal/h)	g/metric hp h (lb/ hp h)							
A. Maximum power — sustained											
53.7 (53.0)	1803	1104	21.1 (152.6)	11.46 (3.03)	213 (0.475)	3.91 (17.5)	81 (178)	80 (176)	27 (81)	34 (93)	755 (29.72)
B. Power at standard p. t. o. speed (540 rev/min)											
50.0 (49.3)	1634	1000	21.9 (158.4)	10.52 (2.79)	211 (0.472)	3.94 (17.7)	80 (176)	N. R.*	26 (79)	33 (92)	757 (29.80)
C. Power at maximum torque											
39.2 (38.7)	1190	728	23.4 (169.3)	7.82 (2.06)	200 (0.447)	4.16 (18.7)	80 (176)	70 (158)	29 (84)	32 (90)	755 (29.72)
D. Power at rated speed											
53.7 (53.0)	1800	1102	21.4 (154.8)	11.55 (3.06)	215 (0.481)	3.88 (17.4)	80 (176)	N. R.*	27 (81)	32 (90)	757 (29.80)
No load, maximum engine speed: 1890 rev/min											

* N. R. — not recorded

PART III

DRAWBAR TESTS

Date of tests: 3rd — 19th June 1965, Zagreb
 Type of track: Grassland on clay
 Position of governor control lever: Fully open, giving no-load engine speed of 1890 rev/min
 Fuel: Diesel oil, density 0.834 kg/dm³ at 15°C (59°F)
 Cetane No. 58
 Engine oil: EXTRA HD 30, SAE No. 30
 Transmission oil: SAE No. 140

A. Tests with maximum additional weight

Not applicable

B. Tests without ballast

Weight with the driver: 5940 kg (13095 lb)
 Height of drawbar above ground: 340 mm (13.4 in)

(1) MAXIMUM POWERS AND PULLS:

Gear	Maximum powers						Air temp., °C (°F)	Atmos. pressure, mm Hg (in Hg)	Maximum pulls	
	Horse-power, Metric hp (U. S. hp)	Corresponding pull, kp (lb)	Track-slip, %	Engine speed, rev/min	Forward speed, km/h (mile/h)	Engine coolant temp., °C (°F)			Pull, kp (lb)	Reason for stall
1 st	40.8 (40.2)	3240 (7143)	1.3	1780	3.40 (2.11)	80 (176)	25 (77)	756 (29.65)	3764 (8298)	Engine stall
2 nd	39.5 (39.0)	2460 (5423)	1.0	1780	4.32 (2.68)	75 (167)	29 (84)	752 (29.60)	2900 (6393)	Engine stall
3 rd	36.0 (35.5)	1845 (4068)	1.0	1800	5.25 (3.26)	75 (167)	29 (84)	751 (29.8)	2210 (4872)	Engine stall
4 th	34.3 (33.8)	1590 (3505)	1.0	1790	5.85 (3.63)	75 (167)	20 (68)	753 (29.65)	1835 (4045)	Engine stall
5 th	31.2 (30.8)	1160 (2557)	< 1	1740	7.25 (4.50)	75 (167)	26 (79)	751 (29.8)	1310 (2888)	Engine stall

(2) FUEL CONSUMPTION

Gear	Optimum fuel consumption			Range of pull over which specific fuel consumption does not exceed the optimum consumption by more than 10% kp (lb)
	Specific fuel consumption, g/metric drawbar hp h (lb/drawbar hp h)	In hp h per unit of volume, metric drawbar hp h/l (hp h/UK gal)	Corresponding pull, kp (lb)	
1 st	270 (0.603)	3.08 (13.8)	3470 (7650)	2900 — 3764 (6393 — 8300)
2 nd	240 (0.536)	3.48 (15.6)	2900 (6393)	2700 — 2900 (5952 — 6393)
3 rd	254 (0.568)	3.28 (14.7)	2200 (4850)	2075 — 2210 (4575 — 4872)
4 th	290 (0.648)	2.87 (12.9)	1835 (4045)	1450 — 1835 (3197 — 4045)
5 th	321 (0.717)	2.59 (11.6)	1310 (2888)	1160 — 1310 (2557 — 2888)

PART IV

1. Location of centre of gravity

	Tractor, unballasted
Height above ground	752 mm (29.6 in)
Distance forward from the vertical plane containing the axis of the rear sprockets	1360 mm (53.5 in)
Distance from the median plane parallel to the longitudinal axis of the tractor bisecting the track — on the right	3 mm (0.12 in)

2. Turning space

	With brakes		Without brakes	
	Right-hand	Left-hand	Right-hand	Left-hand
Radius of turning space	2.3 m (7.55 ft)	2.4 m (7.87 ft)	—	—

PART V

1. Repairs and adjustments during tests: None

2. Remarks: None

Test Engineer: D. KRPAŃ
 Officer in charge: V. OBELIĆ
 Director: I. TODORIĆ
 Date: 24th June 1965

APPENDIX

Institut za mehanizaciju
poljoprivrede
ZAGREB

Tractor BNT-60P
Power take-off Test

Figure 1
A-181 e

