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TEST REPORT: O.E.C.D. No. 1187

REPORT ON TEST IN ACCORDANCE WITH THE O.E.C.D.
RESTRICTED STANDARD CODE FOR THE OFFICIAL
TESTING OF AGRICULTURAL TRACTORS



Universal U-453 DT Tractor with Four-wheel Drive
Manufacturer: U.T.B. Tractorul Plant-Brasov
5, Turnului Street
2200 Brasov, Rumania

Date of Approval: 1989.04.25

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

This report has been approved by the O.E.C.D. Coordinating Centre (C.E.M.A.G.R.E.F., France) as being in accordance with the O.E.C.D. STANDARD CODE.

Date of Approval: 1989.04.25 O.E.C.D. No. 1187

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Tractor manufacturer's name and address:	U.T.B. Tractorul plant - Brasov 5, Turnului Street 2200 Brasov - RUMANIA
Submitted for test by:	The manufacturer
Selected for test by:	The manufacturer in agreement with SjF
Place of running-in:	U.T.B. Tractorul plant - Brasov
Duration of running-in:	60 h

I. SPECIFICATIONS OF TRACTOR

TRACTOR

Make:	U.T.B.
Model:	U-453 DT
Type:	4 WD, Universal
Serial No.:	45300004
First serial No.:	45300001

ENGINE

Make:	U.T.B.
Model:	D-115.000
Type:	4 strokes, direct injection diesel
Serial No.:	298096

Cylinders

Number/disposition:	3/vertical in line
Bore/stroke:	95/110 mm
Capacity:	2340 cm^3
Compression ratio:	17/1
Arrangement of valves:	Overhead
Cylinder liners:	Dry type

Supercharging

None

Fuel System

Fuel feed system:	Membrane pump
Make, type and model of fuel filter(s):	2, interchangeable element filters, type CAV 7176-096
Capacity of fuel tank:	62 l
Make, type and model of injection pump:	Rotary type, MEFIN CAV-DPAM 3832 F051
Serial No.:	49E-800-6-2550
Manufacturer's production setting of injection pump:	43 mm^3/stroke at rated engine speed and full load
Injection pump timing:	13° before TDC
Make, model of injectors:	RO-KBL 70 S 23 MEFIN
Injection pressure:	23.0 + 0.8 MPa

Governor

Make:	MEFIN
Model:	Built-in in the injection pump
Type:	Mechanic, centrifugal for all speed ranges.
Governed range of engine speed:	600-2550 rev/min

Rated Engine Speed 2400 rev/min

Air Cleaner

Pre-cleaner:	
Make:	U.T.B.
Model:	2402.05.0103
Type:	Dry, centrifugal type
Location of air intake:	Above bonnet on left-hand side
Main cleaner:	
Make:	U.T.B.
Model:	121.05.033
Type:	Wet
Oil capacity:	1.0 l
Maintenance indicator:	None

Lubrication System

Type of feed pump:	Gear pump
Type of filter(s):	Paper element filter, replaceable
Number:	1
Cleaning period:	250 h

Cooling System

Type of coolant:	Water
Type of pump:	Centrifugal
Specification of fan:	Axial type
Number of fan blades:	4
Fan diameter:	412 mm
Coolant capacity:	13 l
Type of temperature control:	Thermostatic
Surpressure system:	60 kPa

Starting System:

Make:	Electroprecizia
Model:	DM2134
Type:	Solenoid engaged type
Starter motor power rating:	3.1 kW
Cold starting aid:	tarter
Safety device:	Gear selector to be in neutral

Electrical System

Voltage:	12 V
Generator:	Alternator
Make:	recizia
Model:	[illegible]
Power:	500 W
Battery (Number of accumulators):	1
Rating:	150 Ah at 20 hours

Exhaust System

Make:	U.T.B.
Model:	2404.06.0306
Type:	In-case, double helical elements
Location:	Left hand side, vertical
Height of outlet above ground:	2570 mm

TRANSMISSION TO WHEELS

Clutch

Make:	U.T.B.
Type:	Dry disc double clutch (for travel and P.T.O.)
Number of plates:	2
Diameter of plates:	280 mm
Method of operation:	Foot pedal for travel and hand-lever for P.T.O.

Gear Box

Make:	U.T.B.
Type:	mechanical
Arrangement:	4 forward x 3 ranges and 1 reverse x 3 ranges, 3rd and 4th gears are synchomeshed.
Number of gears:	12 forward and 3 reverse

Rear Axle and Final Drives:

Make:	U.T.B.
Type:	Bevel gear type differential and planetary gear type final drives.
Differential lock:	
Type:	mechanic
Method of engagement:	Operated by foot pedal
Method of disengagement:	Self disengaged

Front Axle and Final Drives

Make:	U.T.B.
Type:	Bevel gear type differential and planetary gear type final drives
Differential lock:	None

Total Ratios and Travelling Speeds

Gear	Group	Number of engine rev. for one rev. of the driving wheel.	x) Nominal travelling speed for 2400 rpm. rated engine speed. km/h
	Creep		
1st		721.3	0.80
2nd		479.8	1.21
3rd		327.8	1.77
4th		253.7	2.28
1 rev		501.9	1.15
	Slow		
1st		233.8	2.48
2nd		155.2	3.73
3rd		106.3	5.45
4th		82.2	7.04
1 rev		162.4	3.57
	Fast		
1st		65.0	8.91
2nd		43.2	13.40
3rd		29.5	19.63
4th		22.9	25.29
1 rev		45.2	12.81

x) Tyre size: Rear 14.9/13-28. Radius index 640 mm (dynamic)

POWER TAKE OFF

Main Power Take Off:

Type:	Independent
Method of engagement:	By hand lever
Number of shafts:	1
Method of changing power take-off shaft ends and speeds:	The P.T.O. shaft ends are changed by changing the output shaft. The speed by means of a handlever.

Power Take-off Proportional to Engine Speed.

540 Rev/min

Location:	At rear of tractor
Diameter of power take-off shaft end:	35 mm
Number of splines In conformity with ISO 500, 1979:	6
Height above ground:	580 mm
Distance from the median plane of the tractor:	0 mm
Distance behind rear wheel axle:	337 mm
PTO speed at rated engine speed (2400 rev/min):	600 rev/min
Engine speed at standard power take-off speed:	2160 rev/min
Engine to pto ratio:	4:1
Power restriction and maximum torque:	None
Direction of rotation (Viewed facing driving end):	Clockwise

1000 Rev/min

Location:	At rear of tractor
Diameter of power take-off shaft end:	35 mm
Number of splines in conformity with ISO 500, 1979:	21

Height above ground:	580 mm
Distance from the median plane of the tractor:	0 mm
Distance behind rear wheel axle:	337 mm
PTO speed at rated engine speed (2400 rev/min):	991 rev/min
Engine speed at standard power take-off speed:	2421 rev/min
Engine to pto ratio:	2.421
Direction of rotation (Viewed facing driving end):	Clockwise

Power Take-off Proportional to Ground Speed: Optional

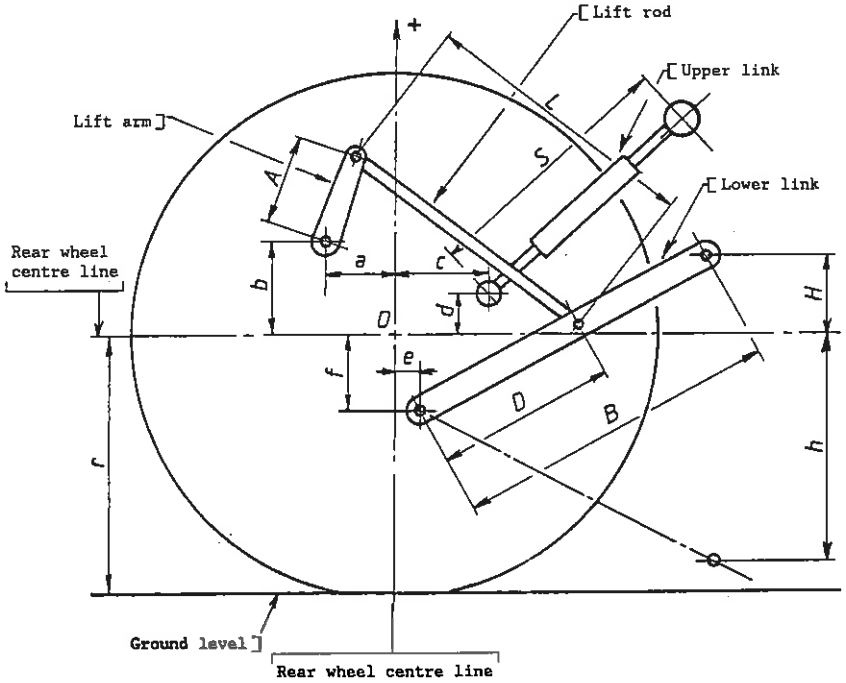
POWER LIFT:

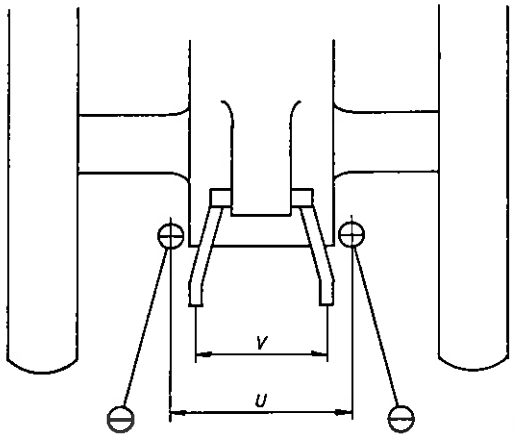
Make:	U.T.B.
Type of hydraulic system:	Open center system, position, draft or mixed control.
Type and number of cylinders:	1 main and 2 auxiliary (optional), single acting type
Type of linkage lock for transport:	Hydraulic
Relief valve pressure setting:	18.6 MPa
Opening pressure of cylinder safety valve:	20.0 MPa
Lift pump type:	Gear pump
Transmission between pump and engine:	Pinions
Type and number of filters:	1 paper element filter
Site of oil reservoir:	Transmission housing
Type and number of tapping points:	2, double acting
Maximum volume of oil available to external cylinders:	12.0 l

THREE-POINT LINKAGE

Category: II according to ISO 730/2-1979

Controls: Draft and position control by sensor at each lower link.





Dimensions of Linkage Geometry (When Connected to the Standard Frame) mm

			Dimension or range mm	Settings used in test mm
Rear tyres (size 14.9/13-28) dynamic index radius		(r)	640	
Front tyres (size 7.50-20) dynamic index radius		(r´)	435	
Lenght of lift arms		**(A)**	230	
Length of lower links		(B)	900	
Distance of lift arm pivot point from rear wheel centre line	Horizontally	(a)	15	
	Vertically	(b)	281	
Horizontal distance between the 2 lower link points		(u)	425	
Horizontal distance between the 2 lift arm end points		(v)	542	
Length of upper link		(S)	650 to 1030	800
Distance of upper link point from rear wheel centre line	Horizontally	(c)	144	
	Vertically	(d)	205/230 255/280	230
Distance of lower link from rear wheel centre line	Horizontally	(e)	84	
	Vertically	(f)	142	
Distance of lower link pivot points to lift rod pivot points on lower links		(D)	445/495	445
Length of lift rods		(L)	515 to 630	575
Height of lower hitch points relative to the rear wheel centre line, situated 640 mm above the ground level		(h)	290 to 595	435
		(H)	5 to 232	118
Height above ground of lower hitch points when locked in transport position			Any height within lift range	

SWINGING DRAWBAR

Type:	Clevis type
Height above ground:	
maximum:	370 mm
minimum:	260 mm
Type of adjustment:	Changing by turning clevis
Distance of hitch point from rear wheel axis	
horizontally:	677/727 mm
Distance of hitch point from power take-off shaft end	
vertically:	210/320 mm
horizontally:	340/390 mm
Lateral adjustment:	88/93 mm left hand 88/93 mm right hand
Distance of pivot point from rear wheel axis,	
horizontally:	20 mm behind
Diameter drawbar pin hole:	33 mm

FIXED DRAWBAR (FRONT)

Height above ground:	575 mm
Distance of hitch point from front wheel axis	
Horizontally:	330 mm
Diameter hitch pin hole:	29 mm

HOLED DRAWBAR

Number of holes:	7
Distance between holes:	80 mm
Hole diameter:	32 mm
Thickness/width of the drawbar:	32/80 mm
Height above ground	
minimum:	45 mm
maximum:	872 mm
Horizontal distance to power take-off shaft end (rear):	620 mm

STEERING

Make:	Steaua Rosie
Method of operation:	Hydrostatic, controlled by steering wheel and separate hydraulic circulation. Hydraulic pump with gears, driven by engine.

Working pressure:	14.0 MPa
Hydraulic ram:	Double-acting, transversally placed along the axle.

BRAKES

Service Brake

Make:	U.T.B.
Type:	Wet disc brake, each brake consists of a friction plate mounted on rear planetary axles.
Method of operation:	Independent or simultaneous control on rear wheels, the braking performed through a mechanically actuated hydraulic pump each.
Trailer braking take-off:	None

Parking Brake

Type:	Disc type brake mounted on the drive pinion of central drive
Method of operation:	Mechanically actuated.

WHEELS

Number:	Front:	2 steering and driving
	Rear:	2 driving
Wheelbase:		2130 mm

Track width adjustment method:

	Min.	Max.	Adjustment method
Front	1410	1510	Through wheel turning by exchanging wheels and rim lugs
Rear	1410	1910	

PROTECTIVE STRUCTURE

Make:	I.P.T.
Model:	88 UC 703 B
Manufacturer's name and address:	I.P.T. Intorsura Buzaului Rumania
Protective device:	Safety cab
Tilting/not tilting:	Not tilting
OECD-Approval number:	CSD 1192/7

DRIVER'S SEAT

Make:	U.T.B.
Model:	U.T.B. 52648900
Type of suspension:	Floating parallelogram with thrust spring
Type of damping:	Hydraulic
Range of adjustment:	
longitudinal:	184 mm
vertical:	100 mm

LIGHTING

The lighting is in accordance with the national Danish regulations for road traffic.

	Height above ground of centre mm	Size mm	Distance from outside edge of tractor to median plan mm
Headlights	1230	145x130	789
Sidelights	1240	160x65	137
Rearlights	1360	310x78	294
Reflectors	1313	75x51	240
	670	75x51	705

CONDITIONS DURING TEST

Overall Dimensions

Tyre size front:	7.50-20
rear:	14.9/13-28

	Length mm	Width min. mm	Width max. mm	Height at top of exhaust silencer mm	Height at top of protective structure mm
Without ballast	3585	1788	2288	2570	2400

Ground Clearance (unballasted)

Clearance: 230 mm

The swinging drawbar is the clearance limiting part.

Track Setting

Front:	1410 mm
Rear:	1510 mm

Tractor Mass
(With tanks full - with cab)

Without ballast:	Without driver	With driver
front	1160 kg	1175
rear	1740 kg	1800
total	2900 kg	2975

Tyres and Track Width Specifications

	Front wheels	Rear wheels
Tyres:		
Dimensions	7.5-20	14.9/13-28
Ply rating	8	6
Type	Diagonal	Radial
Maximum load (tyre manufacturer's) (kN)	10.78	15.78
Maximum load (tractor manufacturer's) (kN)	10.78	15.78
Inflation pressure tyre manufacturer's (kPa)	280	140
Dynamic radius index (mm)	435	640
Chosen track width (mm):	1410	1510

Oils and Lubrication

Capacity and Change Interval

	Capacity (l)	Oil change (h)	Filter change (h)
Engine	6.8	250	250
Gear box and rear axle	34	1000	500
Front axle	7	1000	500
Final drive (front)	2	1000	500
Final drive (rear)	2	1000	500
Hydraulic system	in common with gearbox		
Steering	2.6	1000	500

Specifications

	Recommended	Used during test
Engine oil		
Type:	SAE 20W/40	SAE 20W/40
Viscosity:	14.5 cst	14.5 cst
Classification (API, MIL-L, ISO):	API CC-SF	API CC-SF
Transmission oils		
Type:	SAE 80 EP	SAE 80 EP
Viscosity:	48 cSt	48 cSt
Classification:	API GL-5	API GL-4
Hydraulic fluid		
Type:	Same as transmission oils	
Viscosity:		
Classification:		
Steering oil		
Type:	Same as transmission oils	
Viscosity:		
Classification:		
Grease	NLGI No.3	NLGI No.3
Number of lubrication points:	14	

Fuel

Type	
In conformity with national standard:	Esso Diesel Fuel
Density at 15°C:	0.846 g/cm^3

II. COMPULSORY TEST RESULTS

1. MAIN POWER TAKE-OFF

Date and location of tests: 1988.07.28., Bygholm, Horsens

Type of dynamometer: SCHENCK D700-1H

Power	Speed		Fuel consumption			Specific Energy
	Engine	P.T.O	Hourly	Specific		
kW	rev/min		kg/h	l/h	g/kWh	kWh/l
1.1 MAXIMUM POWER - Two-hour test						
29.6	2428	607	7.94	9.39	268	3.15
1.2 POWER AT RATED ENGINE SPEED						
29.2	2400	600	7.80	9.22	267	3.17
1.3 STANDARD POWER TAKE-OFF SPEED (540 ± 10 rev/min)						
26.8	2160	540	6.97	8.24	260	3.25
1.4. PART LOADS						
1.4.1 The torque corresponding to maximum power						
29.6	2428	607	7.94	9.39	268	3.15
1.4.2 85% of torque obtained in 1.4.1						
25.3	2442	611	7.14	8.44	282	3.00
1.4.3 75% of torque defined in 1.4.2						
19.1	2456	614	5.80	6.86	304	2.78
1.4.4 50% of torque defined in 1.4.2						
12.8	2476	619	4.50	5.32	352	2.41
1.4.5 25% of torque defined in 1.4.2						
6.5	2502	626	3.59	4.24	552	1.53
1.4.6 unloaded						
-	2540	635	2.78	3.29	-	-

1.5. PART LOADS AT STANDARD POWER TAKE-OFF SPEED (1000 rev/min)

Power	Speed		Fuel consumption			Specific Energy
	Engine	P.T.O	Hourly	Specific		
kW	rev/min		kg/h	l/h	g/kWh	kWh/l
1.5.1 The torque corresponding to maximum power						
26.8	2160	540	6.97	8.24	260	3.25
1.5.2 85% of torque obtained in 1.5.1						
23.0	2180	545	6.33	7.48	275	3.07
1.5.3 75% of torque defined in 1.5.2						
17.4	2200	550	5.20	6.15	299	2.83
1.5.4 50% of torque defined in 1.5.2						
11.8	2236	559	3.91	4.62	331	2.55
1.5.5 25% of torque defined in 1.5.2						
6.0	2272	568	3.00	3.55	500	1.69
1.5.6 unloaded						
-	2312	578	2.15	2.54	-	-

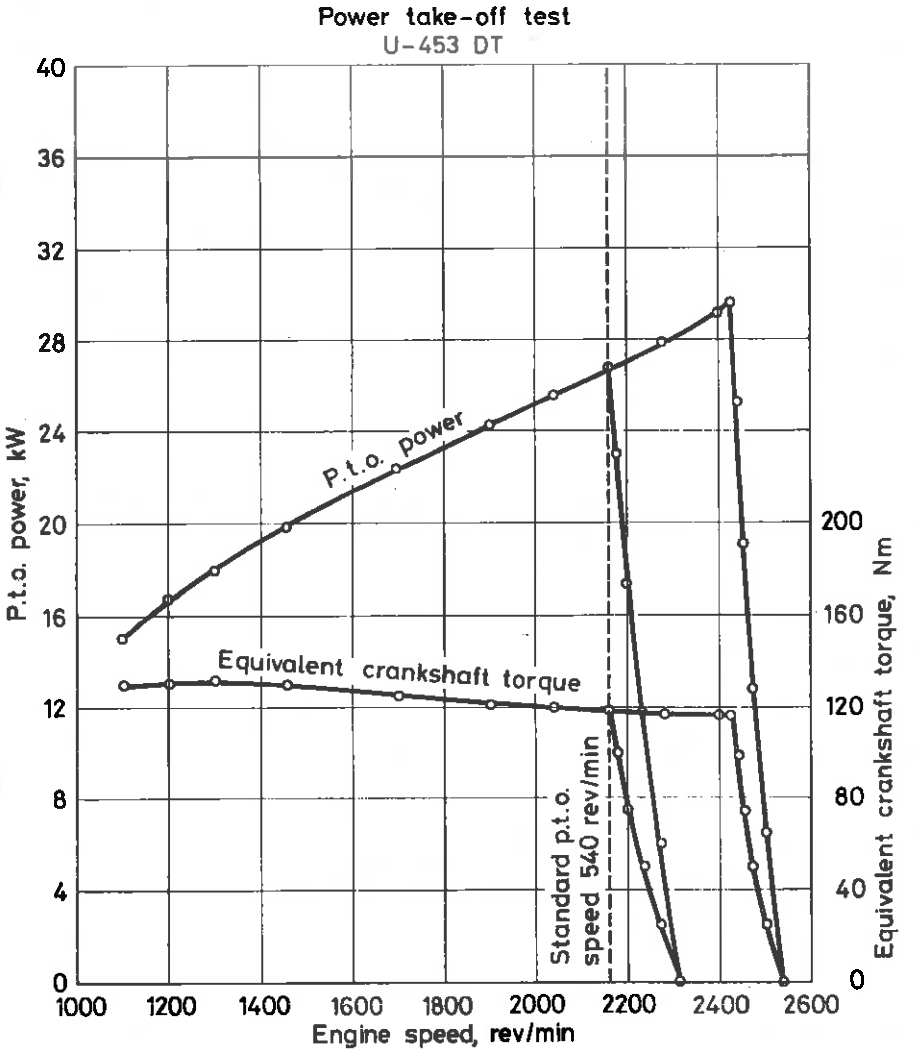
No load maximum engine speed: 2540 rev/min

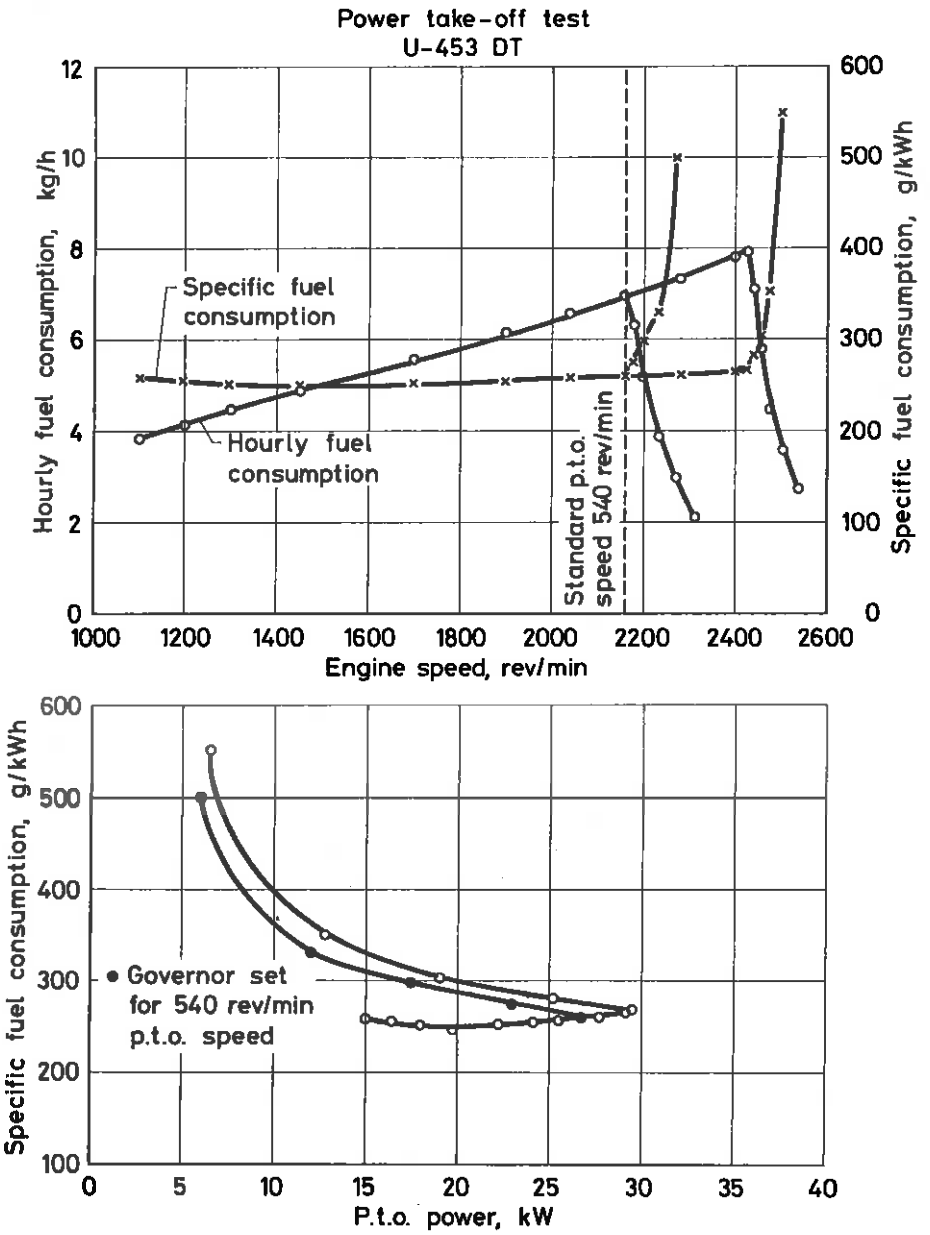
Torque (equivalent crankshaft):
at maximum power: 116 Nm

Maximum torque
(equivalent crankshaft)
(engine speed: rev/min. 1300): 132 Nm

Mean atmospheric conditions:
Temperature: 23 °C
Pressure: 101 kPa
Relative humidity: 66 %

Maximum temperatures:
Coolant: 80 °C
Engine oil: 122 °C
Fuel: 34 °C
Engine air intake: 24 °C


Power take-off test
U-453 DT
P.t.o. power, kW
Equivalent crankshaft torque, Nm
P.t.o. power
Equivalent crankshaft torque
Standard p.t.o. speed 540 rev/min
Engine speed, rev/min
0
4
8
12
16
20
24
28
32
36
40
0
40
80
120
160
200
1000
1200
1400
1600
1800
2000
2200
2400
2600


Power take-off test
U-453 DT
Hourly fuel consumption, kg/h
Specific fuel consumption, g/kWh
Specific fuel consumption
Hourly fuel consumption
Standard p.t.o. speed 540 rev/min
Engine speed, rev/min
Specific fuel consumption, g/kWh
• Governor set for 540 rev/min p.t.o. speed
P.t.o. power, kW

2. HYDRAULIC POWER AND LIFTING FORCE

Date and location of tests:	1988.08.16
Hydraulic power test	
Type of hydraulic system:	Open centre
Hydraulic fluid temperature at beginning of test:	65°C

HYDRAULIC POWER TEST

Sustained pressure with relief valve open: (Pump stalled - no)	18.6 MPa
Pump delivery rate at minimum pressure:	34.0 l/min
Flow rate corresponding to a hydraulic pressure equivalent to 90% of the actual relief valve pressure setting and corresponding hydraulic power	
Flow rate:	31.5 l/min
Pressure:	16.7 MPa
Power:	8.8 kW
Flow rate and hydraulic pressure corresponding to maximum hydraulic power	
Flow rate:	31.5 l/min
Pressure:	16.7 MPa
Power:	8.8 kW
Tapping point used for test:	Auxiliary service connection
Temperature of hydraulic fluid, if different from 65°±5°C:	65 ±5°C
Opening pressure of the unloading valve:	17.5 MPa
Closing pressure of the unloading valve:	17.2 MPa

Power Lift Test

	Height of lower hitch point above ground in down position mm	Vertical movement mm	Maximum corrected force exerted through full range kN	Corresponding pressure of hydraulic fluid MPa	Moment about rear axle kN.m	Max. tilt angle of mast from vertical Degrees
at hitch points	205	553	14.3	16.7	14.1	-
on the frame	200	610	10.5	16.7	16.7	5.6

Linkage settings for test - see table and figure in specifications

Lifting heights relative to the horizontal plane including the lower link pivot points

mm	-318	-293	-200	-100	0	+100	+200	+260	+292

Lifting forces at hitch points

(Corresponding pressure 16.7 MPa)

kN		14.3	15.1	15.7	16.0	15.9	15.5	15.2	

Lifting forces at test frame

(Corresponding pressure 16.7 MPa)

kN	11.1	11.3	11.9	12.2	12.2	12.1	11.4	11.0	10.5

Obs.: U-453 DT, if optionally fitted with 2 auxiliary cylinders, the results will be the same as for U-553 DT and U-643 DT, as mentioned below:

mm	-383	-348	-300	-200	-100	0	+100	+200	+257	+297

Lifting forces at hitch points

(Corresponding pressure 16.7 MPa)

kN		23.5	23.8	24.8	25.4	25.7	25.1	24.3	24.1	

Lifting forces at test frame

(Corresponding pressure 16.7 MPa)

kN	19.0	19.7	20.4	21.0	21.4	21.3	20.8	20.0	19.4	18.7

3. DRAWBAR PERFORMANCE

Date of tests: 1988.09.07
Type of track: Tarmacadam
Height of drawbar above ground: 370 mm
Tyre size: 7.50-20 at front, 14.9/13-28 at rear
Tyre inflation pressure150 kPa at front, 100 kPa at rear

Atmospheric conditions:

Temperature: 14 °C
Pressure: 101 kPa
Relative humidity: 75 %

Gear	Speed km/h	Drawbar pull kN	Power kW	Engine speed rev/min	Wheelslip %	Specific fuel consumption g/kWh	Specific energy kWh/l	Temperatures		
								Fuel °C	Coolant °C	Engine oil °C
MAXIMUM DRAWBAR POWER IN TESTED GEAR										
1. Creep	0.73	26.29	5.33	2467	15.0	723	1.16	26	68	90
2. Creep	1.07	26.29	7.81	2452	15.0	555	1.52	26	68	90
3. Creep	1.51	26.29	11.03	2443	15.0	471	1.80	26	68	90
4. Creep	1.98	26.29	14.46	2430	15.0	417	2.03	31	71	93
1. Slow	2.16	26.29	15.77	2428	15.0	398	2.13	33	71	93
2. Slow	3.39	22.56	21.24	2428	7.8	369	2.29	33	71	93
3. Slow	5.14	15.20	21.70	2428	4.2	355	2.38	31	71	93
4. Slow	6.79	11.77	22.20	2428	3.1	353	2.40	31	71	93
1. Fast	8.57	10.10	24.04	2428	2.5	329	2.57	32	71	93
2. Fast	13.32	5.98	22.11	2428	1.6	358	2.36	33	71	93

Drawbar Performance (continued)

Gear	Speed km/h	Drawbar pull kN	Power kW	Engine speed rev/min	Wheelslip %	Specific fuel consumption g/kWh	Specific energy kWh/l	Temperatures		
								Fuel °C	Coolant °C	Engine oil °C
TRANSMISSION AND FUEL CONSUMPTION CHARACTERISTICS (i) Maximum drawbar power in tested gear										
1. Fast	8.57	10.10	24.04	2428	2.5	329	2.57	32	71	93
(ii) 75% of pull at maximum power										
1. Fast	8.78	7.58	18.49	2433	2.0	350	2.42	32	71	93
(iii) 50% of pull at maximum power										
1. Fast	9.00	5.05	12.63	2448	1.2	418	2.02	31	71	93
(iv) Higher gear same pull as in (ii) reduced engine speed										
2. Fast	8.78	7.58	18.49	1525	2.0	293	2.89	31	71	93
(v) Higher gear as in (iii) reduced engine speed										
2. Fast	9.00	5.05	12.63	1658	1.2	329	2.57	32	71	93

III. OPTIONAL TEST RESULTS

1. MEASUREMENTS OF EXTERNAL NOISE LEVEL

Date of tests: 1988.08.01

Sound level meter: Brüel & Kjær 2209

Type of track: Tarmacadam

Gear number: 4, Fast

Travelling speed before acceleration: 19.7 km/h

Sound level: 86.0 dB (A)

2. NOISE MEASUREMENTS AT THE DRIVER'S EAR LEVEL

Date of test: 1988.08.01

Type of sound level meter and octave filter: Brüel & Kjær 2209 and 1613

Type of track: Tarmacadam

The test results are taken from the O.E.C.D. Dynamic test report, approved with number CSD 1192.

Gear number	Drawbar pull	Measured travelling speed	Sound Level		
			Front engaged	Front disengaged	Noise rating
	KN	km/h	dB(A)	dB(A)	N
Unloaded test in the gear, giving the speed nearest to 7.5 km/h					
4.S	Light load	7.4	83.5	83.0	-
Unloaded test in the gear, giving the maximum speed					
4.F	Light load	26.0	85.5	84.0	-
Test with the drawbar pull, for which the tractor gives the maximum sound level (combination of gear, giving the nearest nominal speed to 7.5 km/h and also in any gear with a sound level increase of at least 1 dB(A)).					
4.F	10.8	6.9	85.5	85.5	83 *)

*) Front Engaged

Repairs and Remarks

None

In this report all performance characteristics are given corresponding to the International System of Units.

The reference to the former used Technical System of Units is given by the following relations:

Forces:	1 N	= 0.10197 kp	or 1 kp	= 9.80665 N
Powers:	1 kW	= 1.35962 metric hp	or 1 metric hp	= 0.73550 kW
Pressures:	1 bar	= 1.01972 kp/cm^2	or 1 kp/cm^2	= 0.980665 bar
Torques:	1 Nm	= 0.10196 kpm	or 1 kpm	= 9.80665 Nm