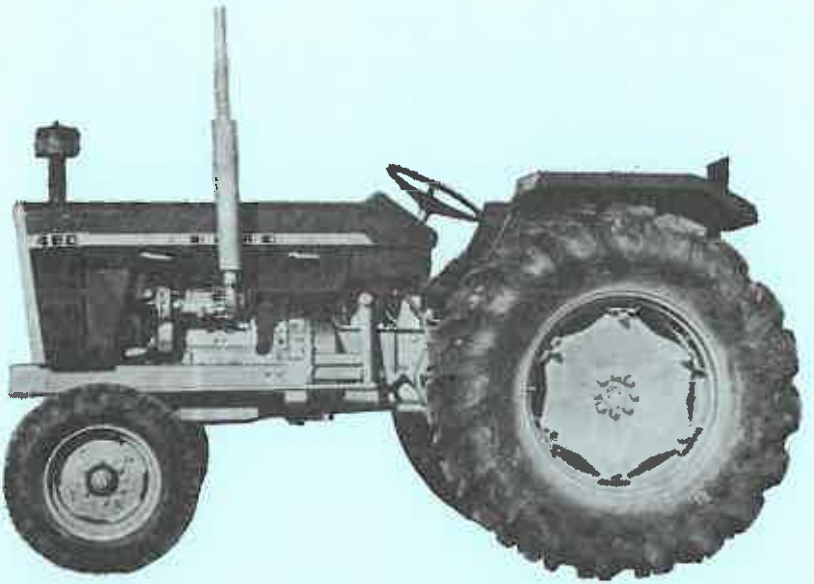
O. E. C. D. approval 592
January 1979

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



EBRO 460 tractor

Manufacturer: Motor Ibérica SA, Barcelona, Spain

DANISH GOVERNMENT FARM MACHINERY TESTING STATION

Bygholm 8700 Horsens Denmark

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 work.

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SPECIFICATION OF TRACTOR

Tractor manufacturer's name and address:	Motor Ibérica SA Barcelona, Spain
Submitted for test by:	Motor Ibérica SA Barcelona, Spain
Selected by:	Manufacturer in agreement with the Testing Station
Place of running in:	At Testing Station (Bygho
Duration of running in:	1oo hours appr.

Tractor

Make:	Motor Ibérica SA
Model:	EBRO 46o
Type:	Rear wheel driven
Serial No.:	6TX 165726

Engine

Make:	Perkins
Model:	AD 4.2o3
Type:	Water cooled 4-stroke diesel engine
Serial No.:	2o3 EA 425o D
Cylinders:	4 cylinders vertical in-line 91,44 mm bore, 127 mm stroke capacity 333o cm^3, Compression ratio 18,5:1, overhead valves
Fuel system:	Fuel feed, IMSA mechanical diaphragm pump, CAV-CONDIES single paper fuel filter, CAV-CONDIESEL injection pump type 354o FO 3o, injection pressure 175 kg/cm^2 11,4 cm^3 for 2oo stroke by 5oo rev/min
Governor:	Perkins governor incorporate in injection pump governed range of speed 49o rev/min to 2372 rev/min, rated speed 225o rev/min
Air cleaner:	Mann oil bath, oil capacity o,75 liter, situated forward of radiator, pre-cleaner of cyclone type

Exhaust silencer:	Absorption type, 1oo mm diameter, 6oo mm long, on left hand side of engine, mouth of exhaust showing upwards, exhaust pipe 46o mm long
Lubrication system:	Forced feed from eccentric rotor-pump, replaceable cartridge oil filter, oil capacity 8,25 liters, oil and filter changing period 25o hours, recommended oil viscosity: SAE 2o W/4o Multigrade
Cooling system:	Pressurized water cooling with thermostatic temperature control, assisted with 412 mm diameter belt driven 4-blade fan, cooling water capacity 15 liters, overpressure relief 49 kPa (o,49 kp/cm²)

Electrical system

Voltage:	12 Volt, negative earth
Starting device:	Bosch screw-push starter motor type: JF 12, 2,5 kW
Cold starting device:	Flame glow plug in intake manifold
Generator:	Bosch alternator type G1, 3oo W
Battery:	Ebro 6x2 Volt batteries, 125 Ah at 2o-hour rating

Transmission

Clutch:	Dry dual disc clutch, both discs are operated with the same pedal, tractor drive disc 28o mm diameter, p.t.o. drive disc 28o mm diameter
Gearbox:	Selective gear with 8 forward and 2 reverse speeds, comprising 4 forward and 1 reverse speed gearbox with high-low range selector
Rear axle and final drive:	Crown wheel and pinion with differential and reduction gear final drives, pedal-operated differential lock on rear axle
Oil capacity:	Gearbox and rear axle drive 26,5 liters, recommended oil changing period looo hours recommended oil viscosity: CS 2

Total ratios and speeds

Group of gear	Gear No.	Number of engine rev.for one rev. of driving wheel	x) Theoretical travelling speed at rated engine speed 225o rev/min m/s	(km/h)
		Forward speeds		
Low	1	31o,o	o,524	(1,89)
	2	2o5,4	o,792	(2,85)
	3	128,o	1,27o	(4,57)
	4	1o1,9	1,595	(5,74)
High	1	77,1	2,1o9	(7,59)
	2	5o,9	3,194	(11,5o)
	3	31,8	5,112	(18,4o)
	4	25,5	6,376	(22,95)
		Reverse speeds		
Low	R	286,5	o,567	(2,o4)
High	R	71,4	2,277	(8,2o)

x) Calculated with tyre rolling radius of 69o mm

Power take-off

Main:	P.t.o.-speed proportional at engine speed, driven through second disc of the dual clutch, manually engaged by hand-lever
Location:	At rear of tractor in vertical centre plan,735 mm height above ground
Dimensions:	Splined shaft 34,8x27,9x8,6 mm (1 3/8 inch), 6 splines, ISO standard
Speeds:	55o rev/min at 225o rev/min rated speed, standard p.t.o. speed 54o rev/min at 22o8 rev/min engine speed
Direction of rotation:	Clockwise viewed from tractor rear
Belt pulley	Not fitted on tractor tested
Power lift	Live hydraulic system with draft control by lower links,position control, floating position, single acting ram, Rouguet gear pump driven from engine, oil capacity 26,5 liters from gear-box and rear axle, external tapping for remote equipment

Pull attechment	
Implement linkage:	Three-point category II linkage, lift rods adjustable 2oo-56omm above ground, 2 holes for adjustment of top link, distance from centerline to rear axle 79o mm, distance from centerline to end of p.t.o.-shaft 4oo mm
Holed bar:	Not fitted on tractor tested
Swinging drawbar:	Height adjustable 36o-56o mm above ground, hole diameter 27 mm, distance from hole to rear axle centre 79o mm, distance from hole to end of p.t.o.-shaft 4oo mm, lateral adjustment 3oo mm to each side of median plane, pivot of the bar is located 1o5mm at front to rear axle centre under the tractorbody
Hitch:	Not fitted on tractor tested
Steering device	Mechanical type, worm and sector steering
Brakes	
Foot brake:	Girling double disc-brakes mounted on differential shafts, operated by foot-pedal single or interlocked
Parking brake:	Mechanically acting on left foot-brake and on both foot-brakes by interlocking, operated by hand-lever with ratchet
Wheels	
Steerings wheels:	Two at front, General "Multi Ribbed", cross-ply 6.5o-16 tyres, 6 ply rating, maximum permissible mass on each tyre 615 kg at 31o kPa inflation pressure, track width 127o mm by 5o mm steps to 174o mm, changeable by telescopic front axle
Driving wheels:	Two at rear, Firestone "All traction Field and Road", cross-ply 16.9-3o tyres, 6 ply rating, maximum mass on each tyre 19oo kg at 13o kPa inflation pressure, track width 119o-159o mm and 15oo-18oo mm by 1oo mm steps, changes by reversing wheels and offset lug rims
Wheelbase:	2o1o mm lowest ground clearance is 4oo mm at the pivot of the swingbar drawbar

Lighting

	Height above ground of centre mm	Dimensions mm	Distance from outside edge of tractor to centre mm
Head lights[x)]	1o4o	13o diam.	72o
Side lights	152o	6o x 7o	26o
Rear lights	149o	6o x 7o	35o
Reflector	16oo	12o Ø	32o

x) Unrestricted beam angle of headlights in plan view o,131 rad (7,5°) by driving-light and o,126 rad (7,2°) by meeting-light

Number of grease points

Whole tractor: 11

CONDITION DURING TEST

Masses

Tractor (without driver but with tanks full)

	On front wheels kg	On rear wheels kg	Total kg
Without ballast	726	1364	2o9o
With ballast	1o55	1575	263o

Ballast	Number of weights	Total weight (excluding water) kg	Water kg
Front wheel	2	66	-
Rear wheel	6	282	-
Additional on front	8	192	-

Track setting during tests

Front: 147o mm

Rear: 149o mm

Overall dimensions

	Length m	Width m	Height m
With ballast	3,62[1)]	2,3o	2,26[2)]
Without ballast	3,41	2,3o	2,26

1) with three-point linkage
2) to top of exhaust pipe

Seat	Upholstered seat with back rest, springs with hydraulic shock absorber
Adjustments:	Adjustable according to driver's weight, longitudinal adjustment 6o mm, height above footrest 5oo mm with 736 N (75 kp) load on seat

FUELS AND LUBRICANTS USED IN TEST

Laboratory and track tests

Fuel:	Esso diesel oil, specific gravity at 15°C: o,825 kg/l
Engine oil:	SAE 2o/3o HD
Transmission oil:	Esso tractor hydraulic oil, H 44
Hydraulic oil:	Esso tractor hydraulic oil, H 44

COMPULSORY TESTS

MAIN POWER TAKE OFF PERFORMANCE

Date and location of test: 11/8-1977 and 11/7-1978, Bygholm, Horsens

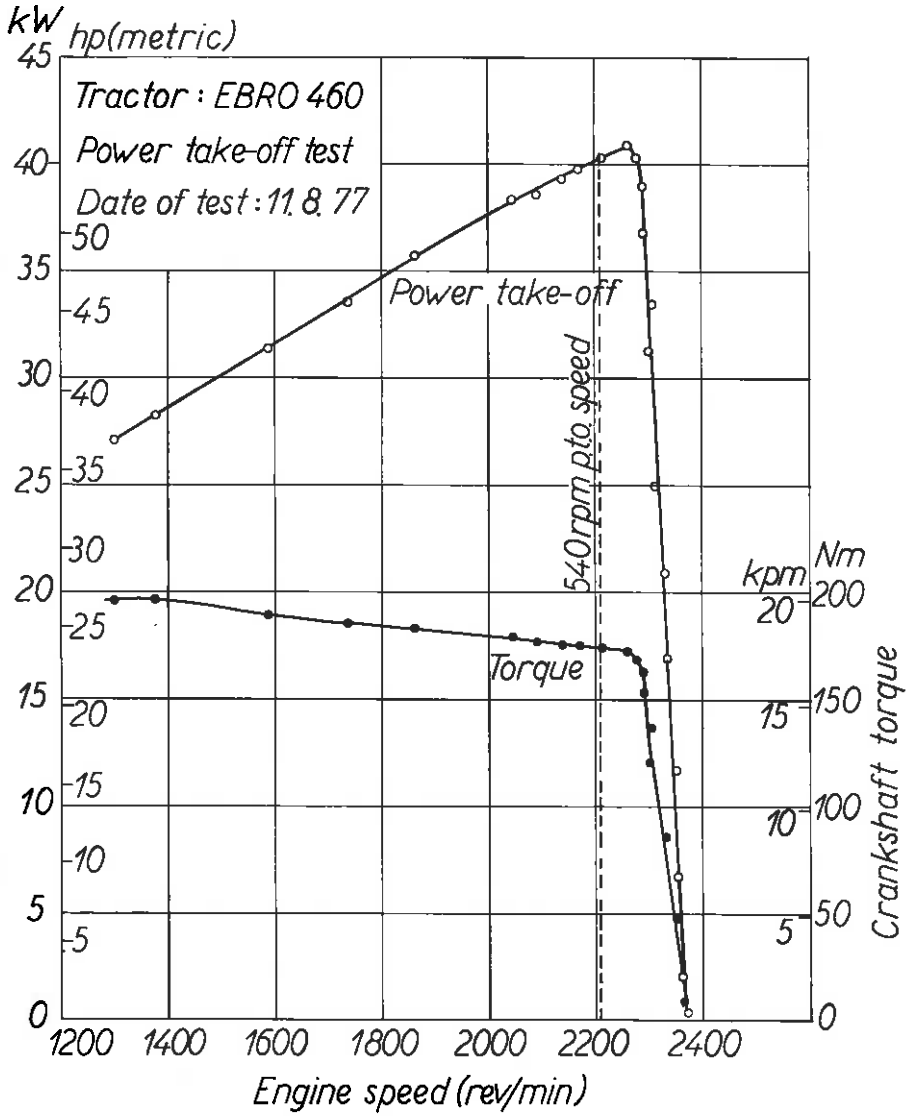
Type of dynamometer: Schenck U 2-3o

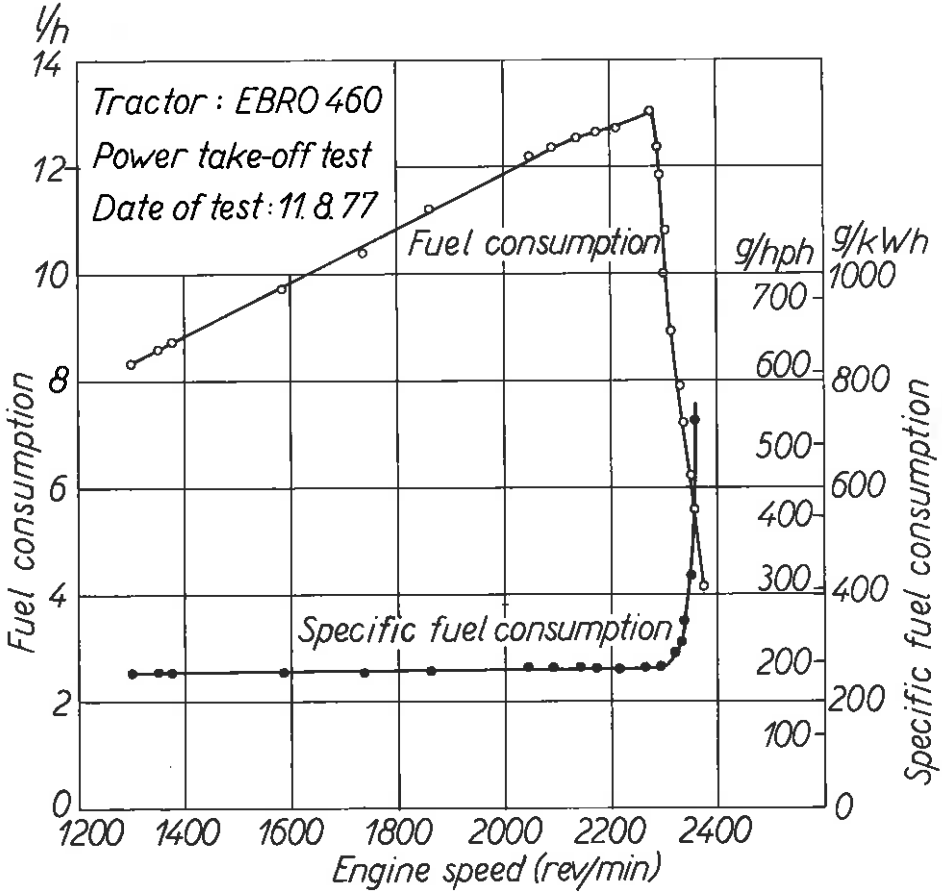
Power	Speed		Fuel consumption		
	engine	p.t.o.	kg/h	g/kWh	kWh/l
kW (metric hp)	rev/s (rev/min)	rev/s (rev/min)	(l/h)	(g/hph)	(hph/l)
At maximum power - 2 hours test					
4o,8 (55,5)	37,67 (226o)	9,22 (553)	1o,73 (13,o)	263 (193)	3,14 (4,27)
At standard p.t.o.speed 9,o rev/s (54o rev/min)					
4o,2 (54,7)	36,8o (22o8)	9,oo (54o)	1o,48 (12,7)	261 (192)	3,17 (4,31)
At the speed recommended by the manufacturer for drawbar work					
4o,7 (55,3)	37,5o (225o)	9,17 (55o)	1o,64 (12,9)	261 (192)	3,16 (4,29)
At part loads					
(i) 85 % of torque at maximum power					
35,4 (48,1)	38,28 (2297)	9,37 (562)	9,32 (11,3)	263 (194)	3,13 (4,26)
(ii) unloaded					
- -	39,53 (2372)	9,67 (58o)	3,47 (4,2)	- -	- -
(iii) 5o % of the load defined in (i)					
17,9 (24,2)	38,87 (2332)	9,5o (57o)	5,94 (7,2)	332 (243)	2,49 (3,39)
(iv) maximum power					
4o,8 (55,7)	37,67 (226o)	9,22 (553)	1o,73 (13,o)	263 (193)	3,14 (4,27)
(v) 25 % of the load defined in (i)					
9,2 (12,4)	39,2o (2352)	9,58 (575)	4,79 (5,8)	52o (383)	1,59 (2,16)
(vi) 75 % of the load defined in (i)					
26,6 (36,2)	38,55 (2313)	9,43 (566)	7,26 (8,8)	273 (2o1)	3,o2 (4,11)

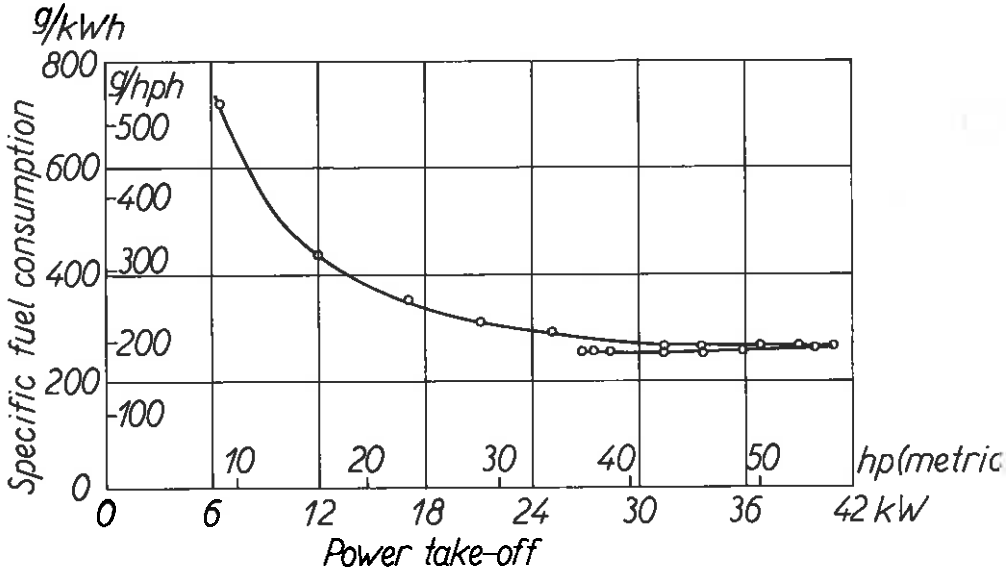
No load maximum engine speed: 39,53 rev/s (2372 rev/min)
Torque at maximum power: 173 Nm (17,6 kpm)
Maximum torque: 197 Nm at 22,5 rev/s (2o,1 kpm at 135o rev/mi

Mean atmospheric conditions: temperature 25°C
pressure 1o1,7 kPa (763 mm Hg
relative humidity 61 %

Maximum temperatures:
coolant 85°C
engine oil 85°C
fuel 23°C


kW
hp(metric)
Tractor : EBRO 460
Power take-off test
Date of test : 11. 8. 77
Power take-off
540rpm pto speed
Torque
kpm
Nm
Crankshaft torque
Engine speed (rev/min)
45
40
35
30
25
20
15
10
5
0
50
45
40
35
30
25
20
15
10
5
200
150
100
50
0
1200
1400
1600
1800
2000
2200
2400


l/h
14
12
10
8
6
4
2
0
Tractor : EBRO 460
Power take-off test
Date of test: 11.8.77
Fuel consumption
Specific fuel consumption
g/hph
700
600
500
400
300
200
100
0
g/kWh
1000
800
600
400
200
0
Fuel consumption
Specific fuel consumption
1200 1400 1600 1800 2000 2200 2400
Engine speed (rev/min)


g/kWh
800
600
400
200
0
g/hph
500
400
300
200
100
Specific fuel consumption
10 20 30 40 50
hp(metric
0 6 12 18 24 30 36 42 kW
Power take-off

DRAWBAR PERFORMANCE

Date of test: 26/9 - 17/1o-1977
and 12/7 -1978

Type of track: Tarmacadam

Height of drawbar without ballast above ground: 72o mm
Height of drawbar with ballast above ground: 39o mm

Gear number and group	Speed	Power	Drawbar pull	Engine speed	Slip of wheels	Fuel consumption		Temperatures			Atmospheric conditions		
								fuel	coolant	engine oil	temperature	relative humidity	pressure
	m/s (km/h)	kW (metric hp)	N (kp)	rev/s (rev/min)	%	kWh/l (hph/l)	g/kWh (g/hph)	°C	°C	°C	°C		kPa (mm Hg)
			(i) Maximum power (with ballast)										
1. Low	o,45 (1,62)	12,6 (17,1)	27949 (285o)	38,33 (23oo)	15	1,76 (2,39)	468 (345)	23	85	85	14	74	1o2,5 (769)
2. Low	o,68 (2,45)	19,9 (27,1)	27949 (285o)	38,33 (23oo)	15	2,15 (2,92)	384 (283)	24	85	89	14	74	1o2,5 (769)
3. Low	1,o8 (3,89)	3o,2 (41,o)	27949 (285o)	37,25 (2235)	15	2,42 (3,29)	343 (252)	24	86	9o	14	74	1o2,5 (769)
4. Low	1,36 (4,9o)	33,3 (45,3)	24517 (25oo)	38,oo (228o)	12	2,44 (3,32)	338 (249)	25	86	93	15	71	1o2,5 (769)
1. High	1,82 (6,55)	34,8 (47,3)	19123 (195o)	35,92 (2155)	9	2,6o (3,53)	318 (234)	25	86	94	15	71	1o2,5 (769)
2 High	2,8o (1o,o8)	34,3 (46,7)	12258 (125o)	35,75 (2145)	5	2,6o (3,54)	317 (233)	25	86	94	15	71	1o2,5 (769)
3. High	4,5o (16,2o)	33,1 (45,o)	7355 (75o)	34,33 (2o6o)	3	2,55 (3,46)	324 (238)	26	87	95	16	71	1o2,5 (769)
4. High	5,45 (19,62)	29,4 (4o,o)	5394 (55o)	35,oo (21oo)	2	2,26 (3,o8)	365 (268)	26	87	95	16	71	1o2,5 (769)
			(ii) Five hour test at 75 % of pull at maximum power (with ballast)										
3. Low	1,14 (4,1o)	25,4 (34,6)	2231o (2275)	38,oo (228o)	7	2,48 (3,37)	333 (245)	26	87	97	13	68	1o2,9 (772)

(iii) Five hour test at pull corresponding to 15% wheelslip in test (with ballast)

3. Low	1,08 (3,89)	30,2 (41,0)	27949 (2850)	37,25 (2235)	15	2,42 (3,29)	343 (252)	26	87	98	11	67	103,1 (773)

(iv) Maximum power (without ballast)

1. Low	0,48 (1,73)	7,6 (10,4)	15887 (1620)	38,33 (2300)	15	1,41 (1,93)	586 (428)	19	85	85	10	69	100,7 (755)
2. Low	0,70 (2,52)	11,1 (15,1)	15887 (1620)	38,33 (2300)	15	1,72 (2,34)	479 (352)	20	85	87	11	69	100,7 (755)
3. Low	1,13 (4,07)	17,9 (24,4)	15887 (1620)	38,33 (2300)	15	2,12 (2,89)	389 (286)	20	85	88	11	67	100,7 (755)
4. Low	1,43 (5,15)	22,7 (30,9)	15887 (1620)	38,00 (2280)	15	2,41 (3,29)	342 (251)	21	86	90	12	67	100,7 (755)
1. High	1,85 (6,66)	29,4 (40,0)	15887 (1620)	37,33 (2240)	15	2,56 (3,48)	323 (237)	22	86	90	12	66	100,7 (755)
2. High	2,88 (10,37)	35,3 (48,0)	12258 (1250)	35,42 (2125)	10	2,50 (3,40)	330 (242)	23	86	94	12	66	100,7 (755)
3. High	5,10 (18,36)	36,3 (49,3)	7110 (725)	37,75 (2265)	6	2,62 (3,56)	315 (232)	23	86	94	13	66	100,7 (755)
4. High	5,76 (20,74)	33,9 (46,1)	5884 (600)	34,42 (2065)	5	2,47 (3,35)	335 (246)	23	86	94	13	66	100,7 (755)

Total oil consumption during ten hours duration of tests (ii) and (iii) 54 g/h

TURNING SPACE AND TURNING CIRCLE

Wheel equipment front: 6.5o - 16

Wheel equipment rear: 16.9 - 3o

Wheel track front: 147o mm

Wheel track rear: 149o mm

	With brakes		Without brakes	
	right hand m	left hand m	right hand m	left hand m
Radius of turning space	3,39	3,48	4,o4	4,o5
Radius of turning circle	3,29	3,38	3,95	3,97

LOCATION OF CENTRE OF GRAVITY

Height above ground: 72o mm

Distance forward from the vertical plane containing the axis of the rear wheels: 7oo mm

Distance from the median place: o mm

BRAKING

Date of test: 24/11-1977

Type of track: Tarmacadam

Type of decelerometer: Tapley brake testing meter

Weight of maximum ballasted tractor: 433o kg

COLD BRAKES

		Tractor with maximum ballast	Tractor with ballast
Travelling speed	m/s (km/h)	6,13 (22,1)	6,25 (22,5)
Deceleration	m/s^2	3,1	3,o
Stopping distance	m	9,5	8,7
Force on pedal	N (kp)	235 (24,o)	2o6 (21,o)
Force on pedal to achieve a deceleration of 2,5 m/s^2	N (kp)	162 (16,5)	164 (16,7)
Brake fade characteristics			
Deceleration hot/cold	%	1o6	12o
Stopping distance cold/hot	%	114	121
Force on pedal cold/hot	%	1oo	12o

PARKING BRAKE (with ballast)

Tractor facing up slope of 16 %:	Pull on hand-brake 275 N (28 kp) tractor does not roll
Tractor facing down slope of 16 %:	Pull on hand-brake 245 N (25 kp) tractor does not roll

AMBIENT NOISE EMITTED BY THE TRACTOR

Date of test:	1o/1-1978
Type of sound level meter:	Brüel & Kjær, type 22o9
Type of track:	Tarmacadam

Result of test

Gear:	4. High
Travelling speed before acceleration:	5,12 m/s (18,4 km/h)
Sound level:	88 dB(A)

NOISE MEASUREMENT AT THE DRIVERS EAR LEVEL

Date of test:	29/3-1978
Type of sound level meter:	Brüel & Kjær, type 22o9
Type of track:	Tarmacadam

Result of test

Gear	Drawbar pull at which the tractor develops the maximal sound level N	(kp)	Travelling speed m/s	(km/h)	Sound level dB(A)
1. High x)	139oo	(1417)	2,o	(7,2)	99,o
2. High	122oo	(1244)	3,o8	(1o,9)	1o1,o
3. High	83oo	(846)	4,22	(15,2)	1o1,o
4. High	light load		6,86	(24,7)	94,o

x) the first gear tested corresponds to the travelling speed nearest to 7,5 km/h

POWER LIFT AND HYDRAULIC PUMP PERFORMANCE

Date and location of test: 6/1-1978, Bygholm, Horsens

Hydraulic fluid

Make and type:	Esso tractor hydraulic oil H 44
Viscosity:	SAE 2o/3o
Type of linkage lock for transport	hydraulic

Pump characteristics

(i)	Opening pressure of the relief valve:	13,2 MPa (135 kg/cm^2)
	Sustained pressure by the open relief valve:	13,o MPa (133 kg/cm^2)
(ii)	Pump delivery at minimum pressure and rated engine speed:	18,6 l/min
(iii)	Pump delivery rate:	17,4 l/min
	Delivery pressure:	12,8 MPa (131 kg/cm^2)
	Power:	3,8 kW (5,1 metric hp)

Linkage geometry when connected to the standard frame

		Maximum mechanical advantage		Minimum mechanical advantage	
Projected length in side view					
lower links	mm	787		787	
lift arms	mm	250		250	
lift rods	mm	694		574	
top link	mm	780		539	
Distance of lift rod connection point from pivot point of lower link	mm	364		415	
The following dimensions are given relative to the rear wheel centre line, situated 690 mm above the ground level					
lower link pivot point	mm	175 behind	160 below	175 behind	160 below
top link pivot point	mm	350 behind	258 above	350 behind	183 above
lift arm pivot point	mm	185 behind	438 above	185 behind	438 above
maximum and minimum height of lower link hitch point	mm	172 above	570 below	160 above	480 below
height of lower link hitch points when locked in transport position		Any height within lift range		Any height within lift range	

POWER LIFT PERFORMANCE

Lifting height in relation to a horizontal line through the lower link pivoting point	mm	+485	+410	+350	+320	+200	+100	0	+100	+200	+320	+332	+385	+480
Lifting force with the pressure at maximum hydraulic power														
At the hitch points														
max. mech. advantage	N		22065	19123	17750	15298	14122	13239	12749	12651 x)	12749	12798		
	(kp)		(2250)	(1950)	(1810)	(1560)	(1440)	(1350)	(1300)	(1290)	(1300)	(1305)		
min. mech. advantage	N				23438	18829	16867	15495	14612	14171 x)	14269			
	(kp)				(2390)	(1920)	(1720)	(1580)	(1490)	(1445)	(1455)			
On the frame														
max. mech. advantage	N	17456 xx)	16181 xx)	14514 xx)	13827 xx)	12553 xx)	11425	10591	9856	9169	8532	8434	8238	7845 x)
	(kp)	(1780)	(1650)	(1480)	(1410)	(1280)	(1165)	(1080)	(1005)	(935)	(870)	(860)	(840)	(800)
min. mech. advantage	N			20398 xx)	18437 xx)	15298 xx)	13533 xx)	12258	10934	10003	9267	9218	9022 x)	
	(kp)			(2080)	(1880)	(1560)	(1380)	(1250)	(1115)	(1020)	(945)	(940)	(920)	

x) Maximum force exerted throughout whole range

xx) Force at which front of tractor does lift

REPAIRS, ADJUSTMENTS AND REMARKS

No repairs or adjustments

Date:

January 1979