

**Report on test in accordance with O.E.C.D.
STANDARD CODE for the Official Testing of
Agricultural Tractors**

O. E. C. D. Approval No. **1140**

Restricted Code



FORD 1720-12x4 Manual (4WD)

Manufacturer

ISHIKAWAJIMA SHIBAURA MACHINERY Co., Ltd.

Ishishiba 1-1-1 Matsumoto City, Nagano, Japan

**Bio-oriented Technology Research Advancement Institution
(B R A I N)**

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This bulletin is based on engineering tests in accordance with the O.E.C.D. STANDARD CODE for the Official Testing of Agricultural Tractor Performance. It does not contain the evaluation of the tractor performance on practical work.

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

Test No.: 87003 /O.E.C.D.
Date of Test: December, 1987
Date of Approval: 12th Apr., 1988

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 kgf	= 9.80665	N
Powers	1 PS	= 0.7355	kW
Pressures	1 kgf/cm ²	= 98.0665	kPa

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Tractor manufacturer's name and address:	ISHIKAWAJIMA SHIBAURA MACHINERY Co., Ltd. Ishishiba 1-1-1 Matsumoto City, Nagano, Japan
Location of tractor assembly:	Ishishiba 1-1-1 Matsumoto City, Nagano, Japan
Submitted for test by:	FORD NEW HOLLAND, Inc. PA 17557, U.S.A.
Selected for test by:	The manufacturer with agreement by BRAIN
Place of running-in:	ISHIKAWAJIMA SHIBAURA MACHINERY Co., Ltd. Matsumoto Plant
Duration of running-in:	Engine and tractor 92.5 h
Location of test:	BRAIN

I. SPECIFICATIONS OF TRACTOR

TRACTOR

Make:	ISHIKAWAJIMA SHIBAURA
Model:	FORD 1720-12x4 Manual
Type:	Wheel tractor, unit construction, four-wheel driven
Number of driving wheels:	4
Serial No.:	UL 21784
1st Serial No.:	UL 21001

ENGINE

Make:	ISHIKAWAJIMA SHIBAURA
Model:	N843
Type:	Water-cooled 4-stroke diesel-engine, in-direct injection
Serial No.:	N843-04316

Cylinders

Number/Disposition:	3, vertical in line
Bore/stroke:	84 / 90 mm
Capacity:	1496 cm ³
Compression ratio:	22:1
Arrangement of valves:	Overhead
Cylinder liners (wet or dry):	Unreplaceable integral, dry

Fuel system

Fuel feed system:	Gravity feed
Filters	
Make:	TAIYO GIKEN
Model:	IK 12-100
Type:	Replaceable paper element with sediment bowl
Capacity of fuel tank:	32 l
Injection pump	
Make:	DIESEL KIKI
Model:	NP-PFR 3KD 55/2NP18
Type:	In-line
Serial No.:	7490005

Manufacturer's production setting
of injection pump

Flow rate	
(rated engine speed):	6.1±0.2 l/h
(full load):	6.1±0.2 l/h
Timing:	22.5° before TDC
Injectors	
Make:	DIESEL KIKI
Model:	105148-1170
Type:	Throttle type
Injection pressure:	15±0.5 MPa

Governor

Make:	ISHIKAWAJIMA SHIBAURA
Model:	125206250
Type:	All speed mechanical governor
Governed range of engine speed:	From 800 to 2700 rev/min
Rated engine speed:	2500 rev/min

Air cleaner

Make:	NIPPON DENSO
Model:	114100-2430
Type:	Dry, paper element, cyclone type
Location of air intake:	Above the engine under the hood
Maintenance indicator:	Clogged indicator warning light

Lubrication system

Type of feed pump:	Forced feed with trochoid pump
Type of filter(s):	Full flow with by-pass valve and replaceable cartridge
Number:	1

Cooling system

Type of coolant:	50/50 solution of permanent antifreeze and clear water
Make of pump:	NIPPON DENSO
Model of pump:	16110-6920
Type of pump:	Centrifugal
Specification of fan:	Axial
Number of fan blades:	5
Fan diameter:	340 mm
Coolant capacity:	5.6 l
Type of temperature control:	Thermostat
Superpressure system:	90 kPa

Starting system

Make:	mitsubishi
Model:	M002T54085
Type:	Solenoid, pre-engaged, reduction
Starter motor power rating:	12 V, 2.0 kW
Cold starting aid:	Electrical glow plug
Safety device:	Operable only with main shift lever and P.T.O. control lever in neutral position

Electrical system

Voltage:	12 V
Generator	Alternator
Make:	MITSUBISHI
Model:	A1T 25087
Type:	Three phase alternator
Power:	35 A, 0.42 kW
Battery(Number of accumulators):	1
Rating:	70 Ah at 20 hours

Exhaust system

Make:	ISHIKAWAJIMA SHIBAURA
Type:	Multi-chamber absorption-expansion type
Location:	Vertical on the left side of tractor

TRANSMISSION TO WHEELS

Clutch(travel and power take-off)

Make:	DAIKIN
Model:	0015225151
Type:	Double acting; Dry dual disk
Number of plates:	1
Diameter of plates:	225mm
Method of operation:	Pedal operated

Gear box

Make:	ISHIKAWAJIMA SHIBAURA
Type:	Mechanical
Arrangement:	3 forward and 1 reverse speed gears with 4 ranges
Number of gears:	12 forward and 4 reverse speeds

Rear axle and final drives

Make:	ISHIKAWAJIMA SHIBAURA
Type:	Bevel gear type differential; spur gear final drives
Differential lock	
Type:	Differential lock in rear axle (Mechanical)
Method of engagement:	Pedal operated
Method of disengagement:	Self disengaged

Front axle and final drives

Make:	ISHIKAWAJIMA SHIBAURA
Type:	Bevel gear type differential and final drives
Differential lock	None

Total ratios and traveling speeds

Gear No.	Group	Number of engine revolutions for one revolution of the driving wheels	Nominal traveling speed at rated engine speed of 2500 rev/min km/h (*)
Forward			
1st	1-1	415.636	1.20
2nd	1-2	313.290	1.59
3rd	1-3	250.806	1.98
4th	2-1	179.283	2.77
5th	2-2	135.137	3.68
6th	2-3	108.185	4.60
7th	3-1	80.608	6.17
8th	3-2	60.759	8.19
9th	3-3	48.641	10.23
10t	4-1	40.304	12.35
11t	4-2	30.379	16.38
12th	4-3	24.320	20.46
Reverse			
1st	1-R	289.072	1.72
2nd	2-R	124.690	3.99
3rd	3-R	56.062	8.87
4th	4-R	28.031	17.75

(*)Calculated with a tyre dynamic radius index of 528 mm.

Number of revolutions of front wheels
for one revolution of rear wheels : 1.62

POWER TAKE-OFF

Main power take-off

Type:	Semi-independent P.T.O.
Method of engagement:	Operable by clutch pedal
Number of shafts:	1
Method of changing power take-off shafts ends and speeds:	None

Power take-off proportional to engine speed

540 rev/min

Location:	At rear of tractor in tractor's median plane
Diameter of power take-off shaft end:	35mm
Number of splines:	6, in conformity with ISO 500/1979, except that length of effective portion of splines is by 10 mm shorter than ISO standard
Height above ground:	520mm
Distance from the median plane of the tractor:	0 mm
Distance behind rear wheel axle:	266.5 mm
P.T.O. speed at rated engine speed:	603 rev/min
Engine speed at standard power take-off speed:	2237rev/min
Ratio of rotation speeds (engine speed/p.t.o. speed):	4.143
Power restriction and maximum torque:	28.0kW, 530 N·m
Direction of rotation (viewed facing driving end):	Clockwise

POWER LIFT

Make:	ISHIKAWAJIMA SHIBAURA
Type:	Hydraulic power lift in unit construction
Type of hydraulic system:	Open center, position control, floating position and flow control valve (two lever lift system with draft and position control: optional)
Type and number of cylinder:	Single acting, 1
Type of linkage lock for transport:	Hydraulically closed by flow control valve
Relief valve pressure setting:	14.7+0.6 MPa
Opening pressure of cylinder safety valve:	24.5+0.5 MPa
Lift pump type:	Gear pump
Transmission between pump and engine:	Directly driven by engine
Type and number of filters:	Replaceable cartridge, 1
Site of oil reservoir:	In rear transmission case

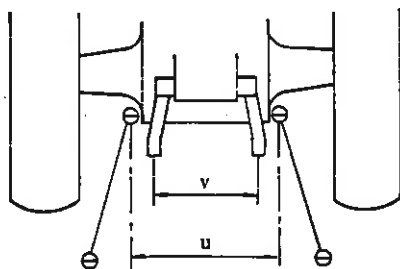
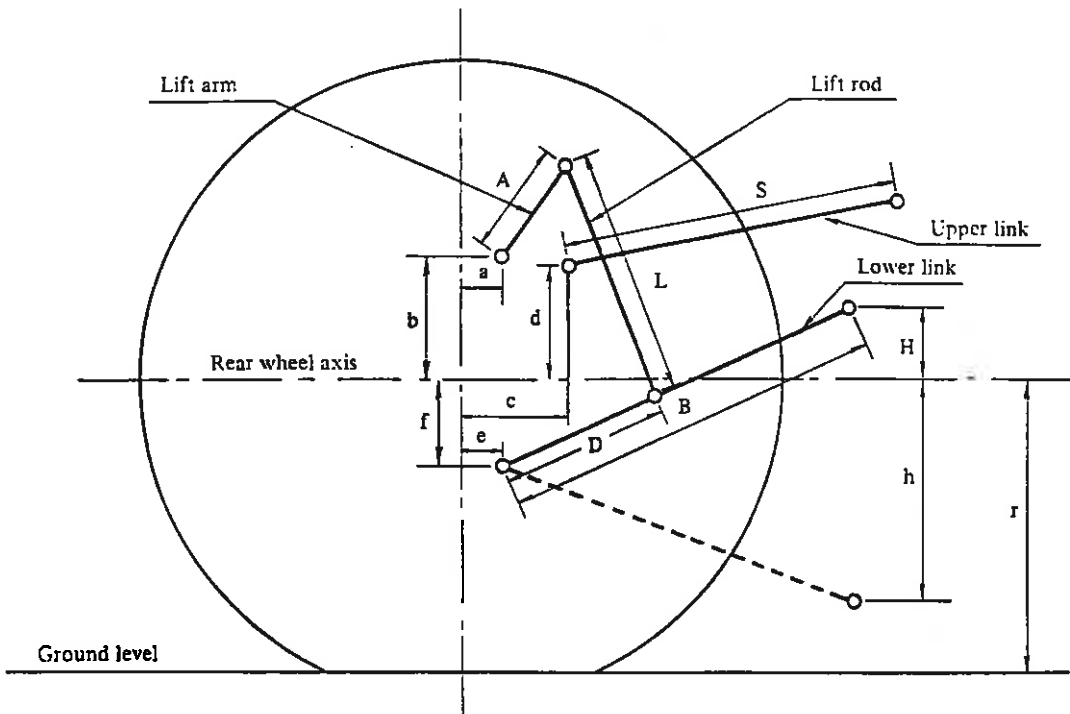
Type, number and location of tapping points:
 Maximum volume of oil available to external cylinders:

NPTF 3/8 tapping, 1, At right side of clutch housing
 27 l

Three-point linkage

Category:

In conformity with categories 1 in ISO 730/3-1982



Lift test - Linkage geometry

Dimensions of linkage geometry (when connected to the standard frame)

		Dimension or range mm	Settings used in test mm
Length of lift arms	(A)	280	
Length of lower links	(B)	803	
Distance of lift arm pivot point from rear wheel axis	horizontally vertically	(a) 39 (b) 293	
Horizontal distance between the 2 lower link points	(u)	452	
Horizontal distance between the 2 lift arm end points	(v)	524	
Length of upper link	(S)	from 440 to 700	700
Distance of upper link pivot point from rear wheel axis	horizontally vertically	(c) 248.5 (d) 230, 260	260
Distance of lower link pivot point from rear wheel axis	horizontally vertically	(e) 30 (f) 115	
Distance of lower link pivot points to lift rod pivot points on lower links	(D)	375	
Length of lift rods	(L)	from 400 to 475	400
Height of lower hitch points relative to the rear wheel axis			
in low position	(h)	from 148 to 522	340
in high position	(H)	from 198 to 345	345
Height above ground of lower hitch points when locked transport position(*)		from -7 to 860	from 175 to 860

(*) Assuming r = dynamic radius index (ISO 4251/1-1984). 515 mm

SWINGING DRAWBAR

Optional, not fitted on tested tractor

TRAILER HITCH

Type:
Hole diameter:

Extension type
26 mm

Height above ground: 348 mm
 Distance of hitch point from rear wheel axis, horizontally: From 442 to 622 mm

Distance of hitch point from power take-off shaft end
 Vertically: 179 mm
 Horizontally: From 176 to 356 mm
 Maximum vertical permissible load: 4.9 kN

HOLED DRAWBAR

Number of holes: 7
 Distance between holes: 80 mm
 Hole diameter: 22 mm
 Thickness/width of the drawbar: 25/75 mm
 Height above ground
 Minimum: 0 mm
 Maximum: 860 mm
 Horizontal distance to power take-off shaft end (rear): 564 mm

STEERING

Make: SUMITOMO EATON
 Model: UBS 100B16A2A
 Type: Hydrostatic steering
 Method of operation: Steering wheel operated hydraulically
 Pump: Gear type
 Ram: One double acting cylinder
 Working pressure: 9.8 MPa

BRAKESService brake

Make: ISHIKAWAJIMA SHIBAURA
 Type: Wet disc, internal sliding mechanically
 Method of operation: Pedal operated, divided pedal of service brake, for normal use locked together
 Trailer braking take-off: None

Parking brake

Type: In common with service brake
 Method of operation: Depressed by brake pedals and latched by hand lever

WHEELS

Number
 Front: 2, driving/steering
 Rear: 2, driving
 Wheelbase: 1650 mm

Track width adjustment

	Minimum mm	Maximum mm	Adjustment method
Front	1170	—	Not available
Rear	1100	1490	Interchanging right and left wheels, and/or resetting rim and disc

PROTECTIVE STRUCTURE

Make: ISHIKAWAJIMA SHIBAURA
 Model: FORD 19SA 9072
 Type: 2-post frame of steel tube
 Manufacturer's name and address: ISHIKAWAJIMA SHIBAURA MACHINERY Co.,Ltd. Ishishiba 1-1-1 Matsumoto City, Nagano, Japan
 Protective device: Frame, not tiltable
 O.E.C.D. approval number: None

DRIVER'S SEAT

Make: BOSTROM
 Type of suspension: Coil spring
 Type of damping: Rubber
 Range of adjustment
 Longitudinal: 120 mm
 Vertical: 30 mm

LIGHTING

	Height above ground of center mm	Size mm	Distance from outside edge of tractor to median plane mm
Headlights	1090	108x65	613
Flashers	1413	∅119	165
Rearlights	1273	56.5x56.5	250
Reflectors	1167	64.5x45	253

TEST CONDITIONS

Overall dimensions

Length:	3079 mm
Width	
Minimum:	1390 mm
Maximum:	1778 mm
Height	
Top of protective structure:	2150 mm
Top of exhaust:	2028 mm
<u>Ground clearance</u> (unballasted tractor):	290 mm

Clearance-limiting part: Front differential case

Tractor mass (with frame)

	Without driver kg	With driver kg
Unballasted	Front	560
	Rear	718
	Total	1278
Ballasted	Front	682
	Rear	1173
	Total	1855

Ballast

	Number of weights	Mass (total) kg	Water kg
Front	—	—	—
Rear	10	300	187
Additional	3	90	—

Tyres and track width specifications

	Front wheels	Rear wheels	
Tyres:			
Dimensions	7-14	11.2-24	
Ply rating	4	4	
Type	Cross-ply	Cross-ply	
Maximum load (tyre manufacturer's):	3.63	8.29	(kN)
Inflation pressure (tyre manufacturer's):	180	120	(kPa)
Dynamic radius index:	322	515	(mm)
Chosen track width:	1170	1215	(mm)

Oils and lubrication

Capacity and change interval

	Capacity l	Oil change h	Filter change h
Engine	4.5	100	200
Gear box	27	300	300
Front axle	5.0	300	—
Rear axle	In common with gear box		
Final drive (front)	In common with front axle		
Final drive (rear)	In common with gear box		
Hydraulic system	In common with gear box		
Steering	1.8	600	—

Specifications (SAE, API)

		<u>Recommended</u>	<u>Used during test</u>
Engine oil			SAE 10W/30
Type:	Below 0°C	SAE 10W or SAE 10W/30	
	From 0°C to 25°C	SAE 20 or SAE 10W/30	
	Over 25°C	SAE 30 or SAE 10W/30	
Viscosity:	68.2 cSt at 40°C		
	11.4 cSt at 100°C		
Classification:	API CC or CD		
Transmission oils			As recommended
Type:	SAE 80		
Viscosity:	72.27 cSt at 40°C		
	9.30 cSt at 100°C		
Classification:	API GL-4		
Hydraulic fluid			As recommended
Type:	In common with transmission oils		
Steering oil			As recommended
Type:	SAE 32		
Viscosity:	32.0 cSt at 40°C		
	5.5 cSt at 100°C		
Classification:	API GL-3		
Grease			
Number of lubrication points:		10	

Fuel

Type : Diesel fuel, No.2 in conformity with JIS (Japanese Industrial Standard)

Density at 15°C: 0.835g/cm³

TEST RESULTS

COMPULSORY TESTS RESULTS

(1) MAIN POWER TAKE-OFF

Date and location of tests:
Type of dynamometer:

8th Dec., 1987, BRAIN, Omiya
DC electrical, MEIDENSHA EB-DH1

Power kW	Speed		Fuel consumption			Specific energy kW·h/l
	Engine rev/min	P.T.O. rev/min	Hourly		Specific g/kW·h	
			kg/h	l/h		
1.1 Maximum power - 2-hour test						
18.60	2500	604	5.10	6.12	274	3.04
1.2 Power at rated engine speed						
18.60	2500	604	5.10	6.12	274	3.04
1.3 Standard power take-off speed(540 rev/min)						
17.59	2237	540	4.67	5.61	265	3.14
1.4 Part loads						
1.4.1 The torque corresponding to maximum power at rated engine speed						
18.60	2500	604	5.10	6.12	274	3.04
1.4.2 85 % of torque obtained in 1.4.1						
16.26	2594	626	4.61	5.54	283	2.94
1.4.3 75 % of torque defined in 1.4.2						
12.27	2612	630	3.77	4.53	307	2.71
1.4.4 50 % of torque defined in 1.4.2						
8.23	2627	634	3.02	3.63	367	2.27
1.4.5 25 % of torque defined in 1.4.2						
4.14	2646	638	2.33	2.80	562	1.48
1.4.6 Unloaded						
0.0	2662	643	1.70	2.04	-	0.0

1.5 Part loads at standard power take-off speed (540 rev/min)

Power kW	Speed		Fuel consumption			Specific energy kW·h/l
	Engine rev/min	P.T.O. rev/min	Hourly		Specific g/kW·h	
			kg/h	l/h		
1.5.1 The torque corresponding to maximum power						
17.60	2237	540	4.67	5.61	265	3.14
1.5.2 85 % of torque obtained in 1.5.1						
15.25	2286	552	4.13	4.97	271	3.07
1.5.3 75 % of torque defined in 1.5.2						
11.60	2315	559	3.36	4.04	290	2.87
1.5.4 50 % of torque defined in 1.5.2						
7.82	2336	564	2.65	3.19	339	2.45
1.5.5 25 % of torque defined in 1.5.2						
3.97	2353	568	2.03	2.44	512	1.63
1.5.6 Unloaded						
0.0	2378	574	1.39	1.67	—	0.0

No load maximum engine speed: 2662 rev/min

Torque (equivalent crankshaft) at maximum power: 71.0 N·m

Maximum torque (equivalent crankshaft): 85.2 N·m
(engine speed: 1700 rev/min)

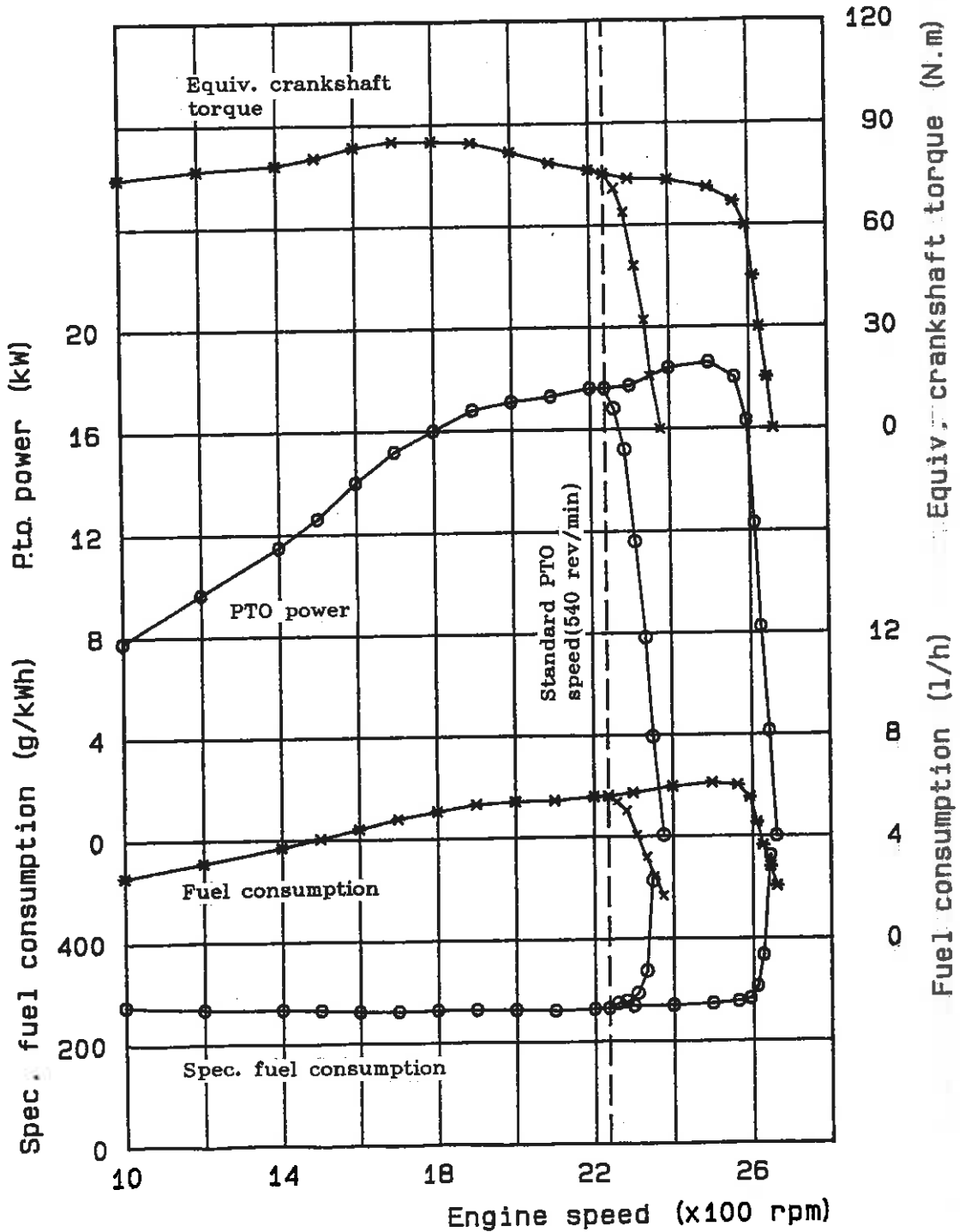
Mean atmospheric conditions

Temperature: 21 °C
Pressure: 103.4 kPa
Relative humidity: 17 %

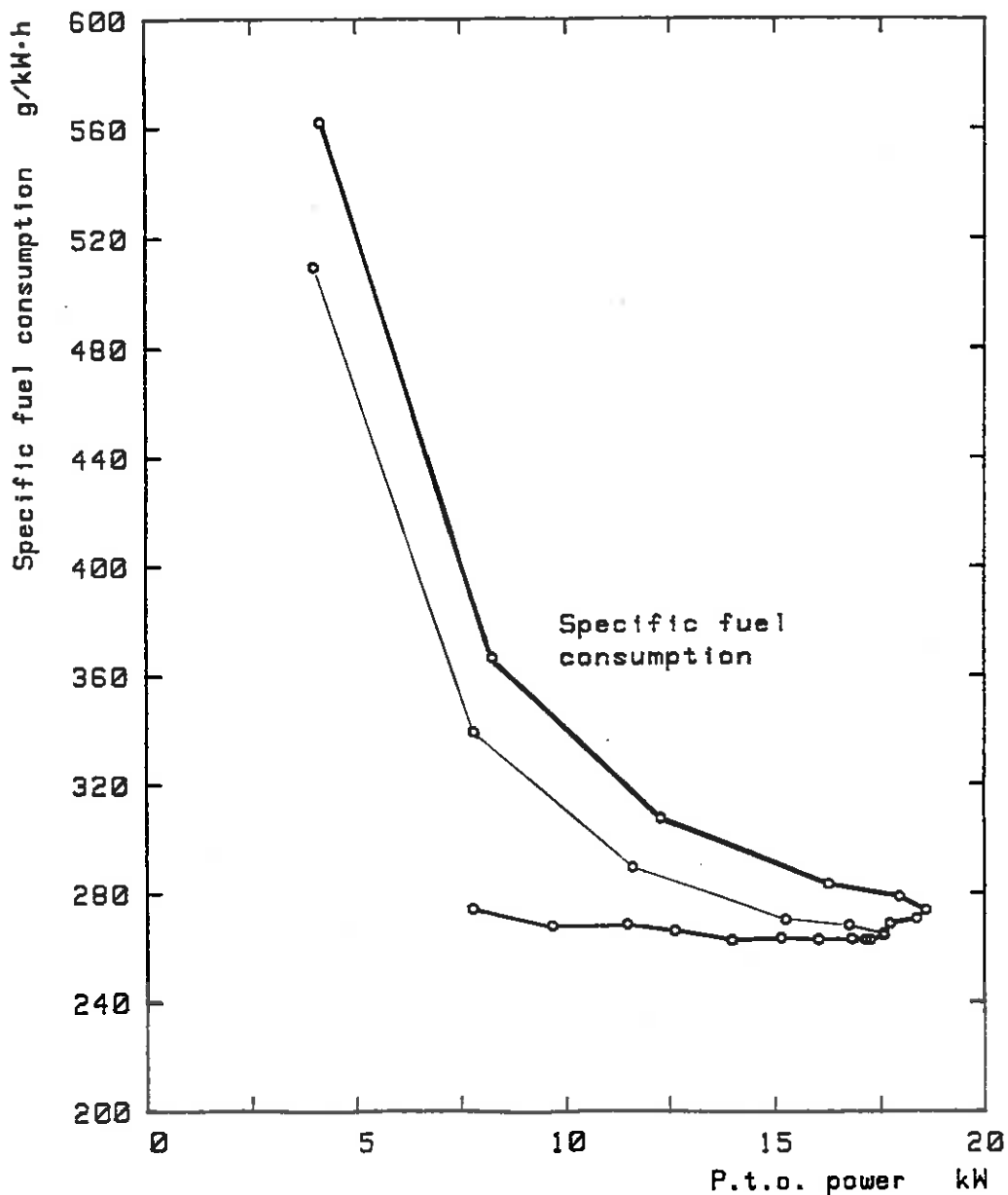
Maximum temperatures

Coolant: 79 °C
Engine oil: 103 °C
Fuel: 27 °C
Engine air intake: 26 °C

P.T.O. PERFORMANCE



P . T . O . P E R F O R M A N C E



(2) HYDRAULIC POWER AND LIFTING FORCE

Date of tests: 10th Dec., 1987

2.1 Hydraulic power test

Sustained pressure with relief valve open:
(pump not stalled) 15.3 MPa

Pump delivery rate at minimum pressure: 29.85 l/min

Flow rate corresponding to a hydraulic pressure
equivalent to 90 per cent of the actual relief
valve pressure setting and corresponding
hydraulic power

Flow rate: 27.68 l/min
Pressure: 13.72 MPa
Power: 6.33 kW

Flow rate and hydraulic pressure corresponding
to maximum hydraulic power

Flow rate: 29.10 l/min
Pressure: 13.53 MPa
Power: 6.56 kW

Tapping point used for test: At right side of clutch housing

Opening pressure of the unloading valve: Not applicable

Closing pressure of the unloading valve: Not applicable

2.2 Power lift test

	Height of lower hitch points 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 wheel axle kN·m	Maximum tilt angle of mast from vertical Degrees
At hitch points	175	685	10.14	13.5	-	-
On the frame	150	923	6.24	13.5	9.00	20

Linkage setting for test - see page 7 and 8.

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

mm	-270	-225	-200	-100	0	100	200	300	400	460	500	575
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Lifting forces at hitch points (corresponding pressure 13.5 MPa)

kN	-	10.14	10.31	10.80	10.85	10.62	10.71	10.97	11.40	11.40	-	-
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Lifting forces at test frame (corresponding pressure 13.5 MPa)

kN	9.55	-	9.52	9.35	8.94	8.45	7.94	7.43	7.02	-	6.64	6.24
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(3) DRAWBAR POWER AND FUEL CONSUMPTION (UNBALASTED TRACTOR)

Tyre size and pressure:
Front: 7-14 180 kPa
Rear: 11.2-24 120 kPa

Date of tests: 10th Dec., 1987
Type of track: Concrete

Height of drawbar above ground: 334 mm

Gear	Power kW	Drawbar pull kN	Speed km/h	Engine speed rev/min	Slip of wheels %	Specific fuel consumption g/kW.h	Specific energy kW.h/l	Temperature		Atmospheric conditions	
								Fuel oil	Engine oil	Tempera- ture °C	Relative humidity %

1. Maximum power in tested gears

1-1	3.29	11.08	1.07	2643	15.0	817	1.018	19	63	83	11	60	102.8
1-2	4.38	11.08	1.42	2635	15.0	658	1.263	20	58	84	11	60	102.8
1-3	5.43	11.08	1.76	2628	15.0	585	1.419	21	64	87	11	60	102.8
2-1	7.54	11.08	2.45	2599	15.0	451	1.840	21	65	88	10	62	102.8
2-2	9.92	11.08	3.22	2580	15.0	416	1.995	21	64	88	10	62	102.8
2-3	12.41	11.08	4.03	2580	15.0	402	2.063	23	69	94	10	62	102.8
3-1	13.88	9.32	5.36	2534	14.2	366	2.261	23	70	97	10	62	102.8
3-2	14.82	7.16	7.45	2498	8.9	347	2.385	23	77	97	10	62	102.8
3-3	14.46	5.39	9.66	2502	5.7	351	2.358	25	59	96	10	62	102.8

2. Fuel consumption

2.1	In selected gear at maximum power and nearest to 7.5 km/h												
3-2	14.82	7.16	7.45	2498	8.9	347	2.385	23	77	97	10	62	102.8
2.1.1	75 % of pull at maximum power at rated speed												
3-2	11.97	5.39	7.99	2577	4.1	377	2.211	17	51	83	9	62	102.8
2.1.2	50 % of pull at maximum power at rated speed												
3-2	8.31	3.63	8.24	2600	2.0	436	1.910	18	47	87	9	62	102.8
2.1.3	Next higher gear at reduced engine speed; same pull and travelling speed as in 2.1.1												
3-3	11.97	5.39	7.99	2070	4.4	338	2.464	18	36	86	9	62	102.8
2.1.4	Next higher gear at reduced engine speed; same pull and travelling speed as in 2.1.2												
3-3	8.31	3.63	8.24	2080	1.9	394	2.111	18	38	87	9	62	102.8

OPTIONAL TEST RESULTS

(4) DRAWBAR PERFORMANCE (BALLASTED TRACTOR)

Tyre size and pressure:
 Front: 7-14 180 kPa
 Rear: 11.2-24 120 kPa

Date of tests: 11th Dec., 1987
 Type of track: Concrete

Height of drawbar above ground: 314 mm

Gear	Power kW	Drawbar pull kN	Speed km/h	Engine speed rev/min	Slip of wheels %	Specific fuel consump- tion g/kW.h	Specific energy kW.h/l	Temperature			Atmospheric conditions		
								Fuel oil OC	Coolant oil OC	Engine OC	Tempera- ture OC	Relative humidity %	Pressure kPa
1-1	3.98	13.73	1.04	2625	15.0	695	1.196	20	53	83	11	72	102.1
1-2	5.22	13.73	1.37	2601	15.0	559	1.485	20	61	84	11	72	102.1
1-3	6.45	13.73	1.69	2572	15.0	520	1.599	20	45	86	11	72	102.1
2-1	9.06	13.73	2.98	2597	15.0	450	1.846	19	38	87	10	75	102.1
2-2	11.94	13.73	3.13	2571	15.0	404	2.052	21	55	91	10	75	102.1
2-3	13.64	12.75	3.85	2470	12.8	382	2.177	20	66	88	10	75	102.1
3-1	14.42	9.61	5.40	2482	9.3	355	2.340	21	83	90	9	86	102.1
3-2	14.21	6.86	7.46	2457	4.7	350	2.374	21	62	91	9	86	102.1

Maximum power in tested gears (with ballast)

(5) NOISE MEASUREMENT AT THE DRIVER'S EAR

Date of tests: 19th Dec., 1987
 Sound level meter
 Make: RION
 Model: Impulse sound level meter
 Type: NA-61
 Type of track: Concrete

Gear number	Drawbar pull	Measured travelling speed	Sound level	
			Front engaged	Front disengaged
	kN	km/h	dB(A)	dB(A)
Unloaded test in the gear giving the speed nearest to 7.5 km/h				
3-2	light load	8.17	89	88.5
Unloaded test in the gear giving the maximum speed				
4-4	light load	21.24	88.5	88.5
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)]				
3-2	6.57	7.49	89	88.5

REPAIRS AND ADJUSTMENTS DURING TESTS None

REMARKS None

