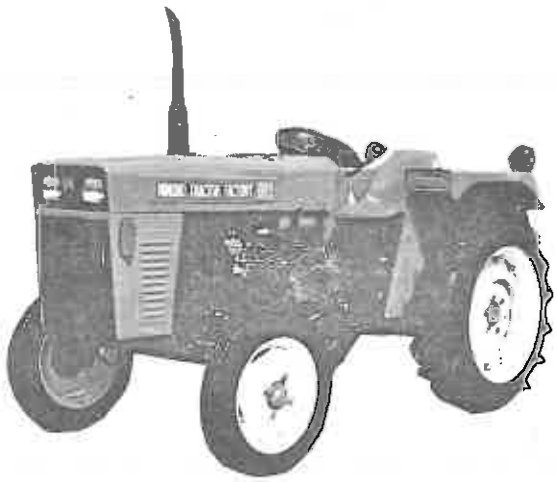
CAMTC

Report on test in accordance with the O.E.C.D. RESTRICTED CODE (CODE II) for the official testing of agricultural tractors

OECD Approval No 1313 Restricted code

Approval Date: 23 / 5 / 1991



Ben Ye 250 Two–Wheel Drive

Manufactured by NingBo Tractor Works

NingBo, China

Test No:91SJ002

Date: Oct. 1989

China Agricultural Machinery Testing Centre

40 Shi Li He Donghuan Nanlu

100021, Beijing China

CAMTC

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CAMTC

–Tractor manufacturer's name and address:	Ningbo Tractor Works. Ningbo, China.
–Location of tractor assembly:	The manufacturer
–Submitted for test by:	The manufacturer
–Selected for test by:	The manufacturer with the agreement of the CAMTC.
–Place of running–in:	CAMTC Beijing, China
–Duration of running–in:	48 hours
–Location of test:	CAMTC Beijing, China

I. SPECIFICATIONS OF TRACTOR

TRACTOR

–Make / Model / Type:	Ningbo Tractor Works / Ben Ye–250 / 2 Wheel–Drive
–Number of driving wheels:	2
–Serial No:	1209
–1st Serial No:	0001

ENGINE

–Make / Model / Type:	Ningbo Engine works / 295 / 4 stroke diesel, Water cooling, naturally aspirated
–Serial No:	15626

Cylinders

–Number / disposition:	2 / vertical, in line
–Bore / stroke:	95 / 115 mm / mm
–Capacity:	1630 cm^3
–Compression ratio:	19+1 : 1
–Arrangemment of valves:	over head, in line
–Cylinder liners (wet or dry):	wet
–Supercharging:	None

Fuel system

–Fuel feed system:	Plunger transfer pump
–Make / Model / Type of fuel filter(s):	Zhejiang Linhai Filter works, C506A paper cartridge, replaceable
–Capacity of fuel tank:	33 dm^3
–Make / Model / Type of injection pump:	Wuxi pump and injection works / 2I24 8 left 1000 / 2–cylinder plunger
–Serial No:	2 I 102
–Manufacturer's production setting of injection pump:	
• Flow rate (rated engine speed and full load):	5.6 dm^3 / h
• Timing:	15～19 ° before T.D.C
–Make / Model / Type of injectors:	Wuxi pump and injection works / 4S1 / single–hole nozzle
–Injection pressure:	12.5 ± 0.5 MPa

Governor

–make / Model / Type:	Wuxi pump and injector works / Mechanical / centrifugal
–Governed range of engine speed:	From 600 to 2200 rev / min
–Rated engine speed:	2000 rev / min

Air cleaner

–Pre–cleaner:	None
–Main cleaner:	
• Make / Model / Type:	Yangzhou Air–clean works / K 1317, paper cartridge, horizontal left side of engine
• location of air intake:	Front of engine
–Maintenance indicator:	None

Lubrication system

–Type of feed pump:	Rotor
–Type od filter(S):	J0810, paper filter cartridge

–Number:	1

Cooling system

–Type of coolant:	water
–Type of pump:	centrifugel, belt driven
–Specification of fan or blower:	Belt driven, Axial flow type
–Number of fan blades:	4
–Fan diameter:	310 mm
–Coolant capacity:	7.2 dm^3
–Type of temperature control:	Thermostat
–Superpressure system:	None

Starting system

–Make / Model / Type:	Shandong Liaocheng or Shanghai Motor works QD12D, solenoid engaged
–Starter motor power rating:	1.5 kW
–Cold starting aid:	preheater
–Safety device:	Main shift level to be in neutral position

Electrical system

–Voltage:	12 (Negative earth) V
–Generator:	Alternator
• Make:	CIXI Electrical Machinery Plant
• Model:	2JF200
• Type:	Belt driven
• Power	14 V, 0.2 kW
–Battery (Number of accumulators):	1
• Rating	98 Ah at 20 hours

Exhaust system

–Make / Model / Type:	Ningbo Tractor Works / BY–250

–Location:	Right–hand side of engine, vertical

TRANSMISSION TO WHEELS

Clutch(travel and power take–off / travel alone)

–Make / Model / Type:	Ningbo Tractor Work / Dry / constant engaging
–Number of plates:	1
–Diameter of plates:	228 mm
–Method of operation:	Pedal operated

Gear box

–Make / Model / Type:	Ningbo Tractor Works / BY–250 / Mechanical
–Arrangement:	GEAR BOX with 4 forward and 1 reverse speed, GROUP GEAR with 2 ranges (low and high).
–Number of gears:	8 forward gears, 2 reverse gears
–Available options:	None

Rear axle and final drives

–Make / Model / Type:	Ningbo Tractor Works / Bevel gear type differential spur gear final drives
–Differential lock:	None

Front axle and final drives

–Make / Model / Type:	Ningbo Tractor Works / Telescopic axle
–Differential lock:	None

Three–point linkage

–Category:	**1 to ISO standard 730 / 1–1979.**
–Category adapter:	**None**

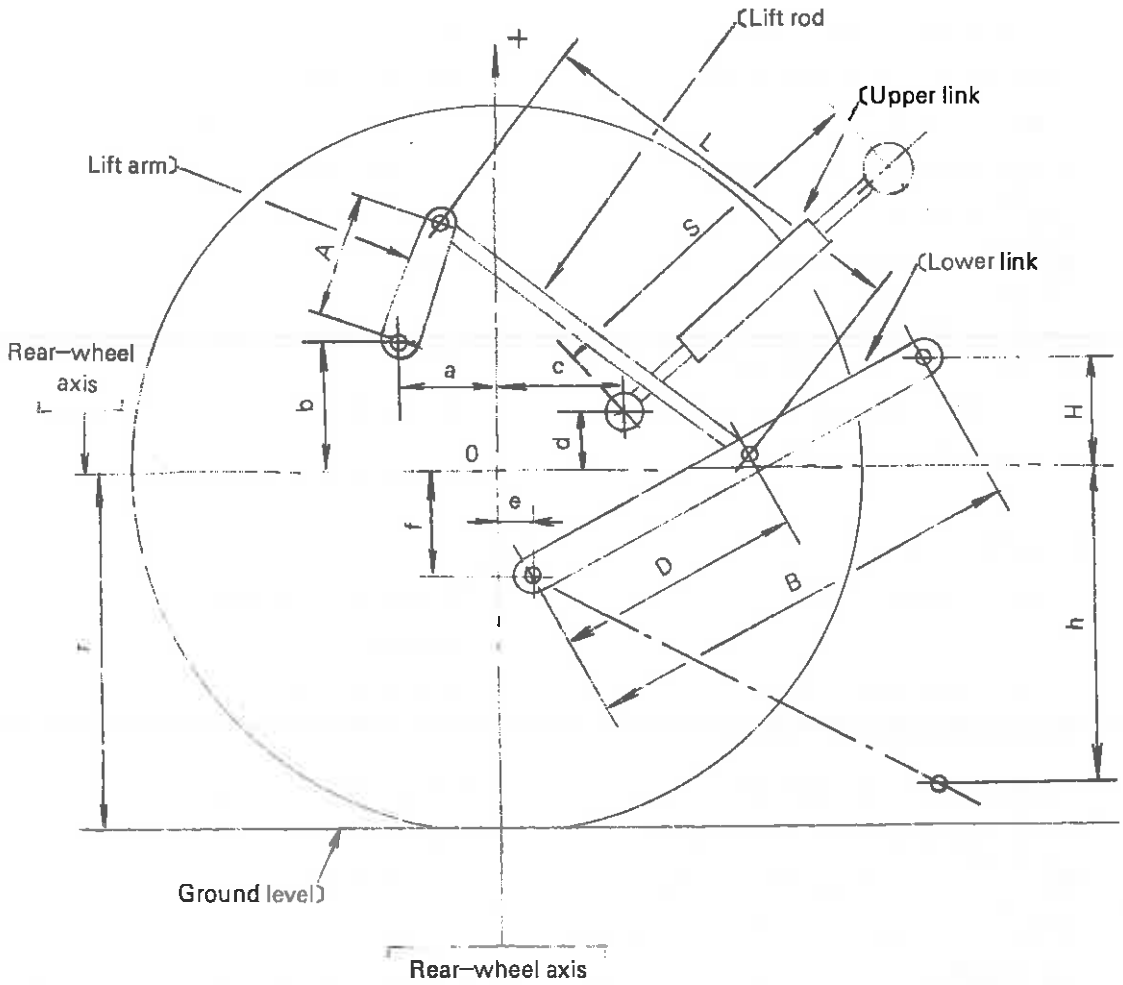


Figure 2.1

Lift test–Linkage geometry

–location:	At rear of the tractor
–Diameter of power take–off shaft end:	35 mm
–Number of splines:	6, in conformity with ISO 500 / 1979
–Height above ground:	492 mm
–Distance from the median plane of the tractor:	0 mm
–Distance behind rear–wheel axis:	285 mm
–PTO speed at rated engine speed (2000 rev / min):	540 rev / min
–Engine speed at standard power take–off speed:	2000 rev / min
–Ratio of rotation speeds (engine speed / p.t.o. speed):	3.704 : 1
–Power restriction and maximum torque:	None
–Direction of rotation (viewed from behind tractor):	clock wise

POWER LIFT

–Make / Model / Type:	Ningbo Tractor Works make partial separated units
–Type of hydraulic system:	open centre system
–Type and number of cylinders (single–or double–acting):	single acting
–Type of linkage lock for transport:	Hydraulic lock
–Relief valve pressure setting (tolerance):	15.7–16.7 MPa
–Opening pressurs of cylinder safety valve (if fitted):	17.0–17.5 MPa
–Lift pump type:	306 Gear pump
–Transmission between pump and engine:	Gear driven form engine
–Type and number of filters:	None Type, 1
–Site of oil reservair:	in the hydraulic power lift housing
–Type, number and location of tapping points:	Thread, 1, Right side of hydraulic power ilft housing
–Maximum volume of oil available to external cylinders:	5 dm^3

Three–point linkage

–Category: 1 to ISO standard 730 / 1–1979.

–Category adapter: None

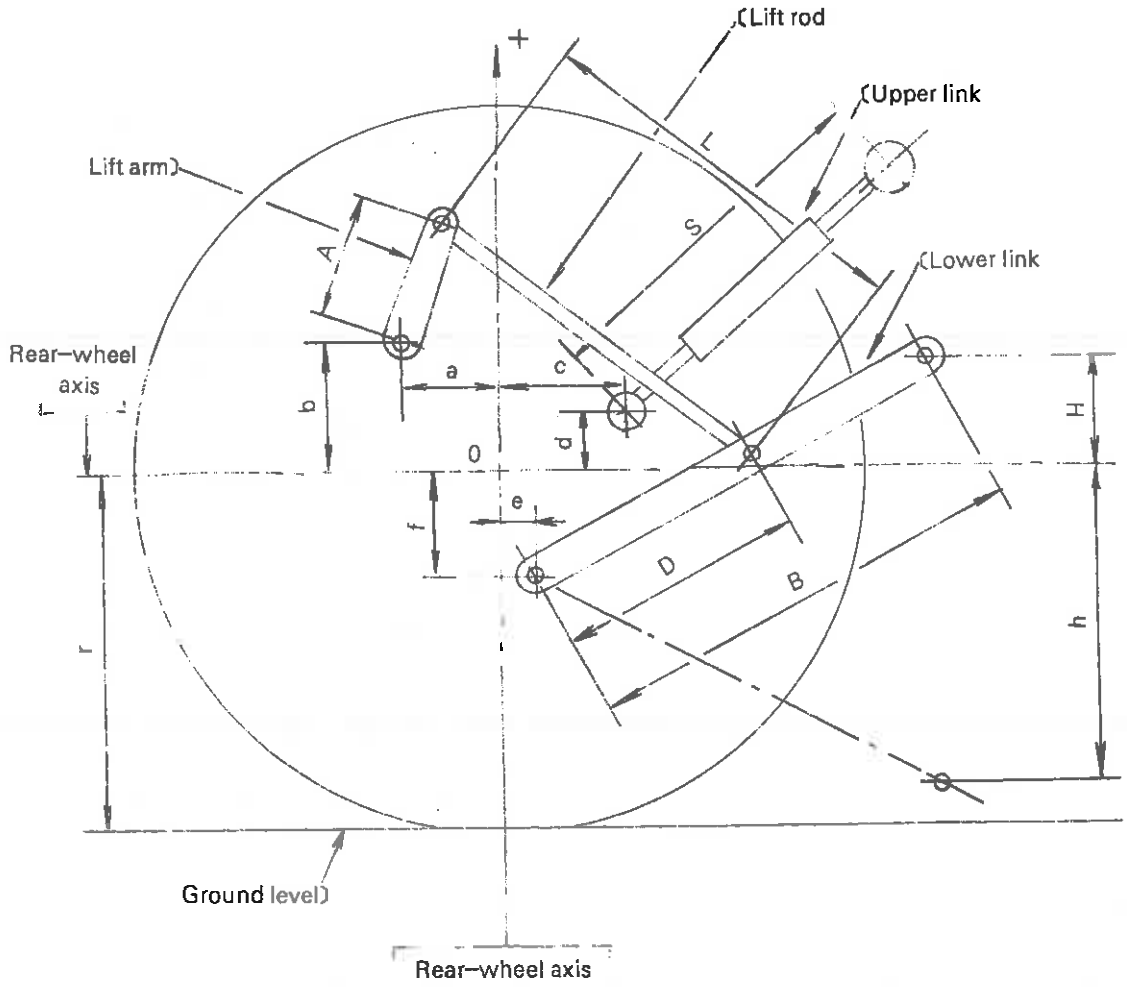


Figure 2.1

Lift test–Linkage geometry

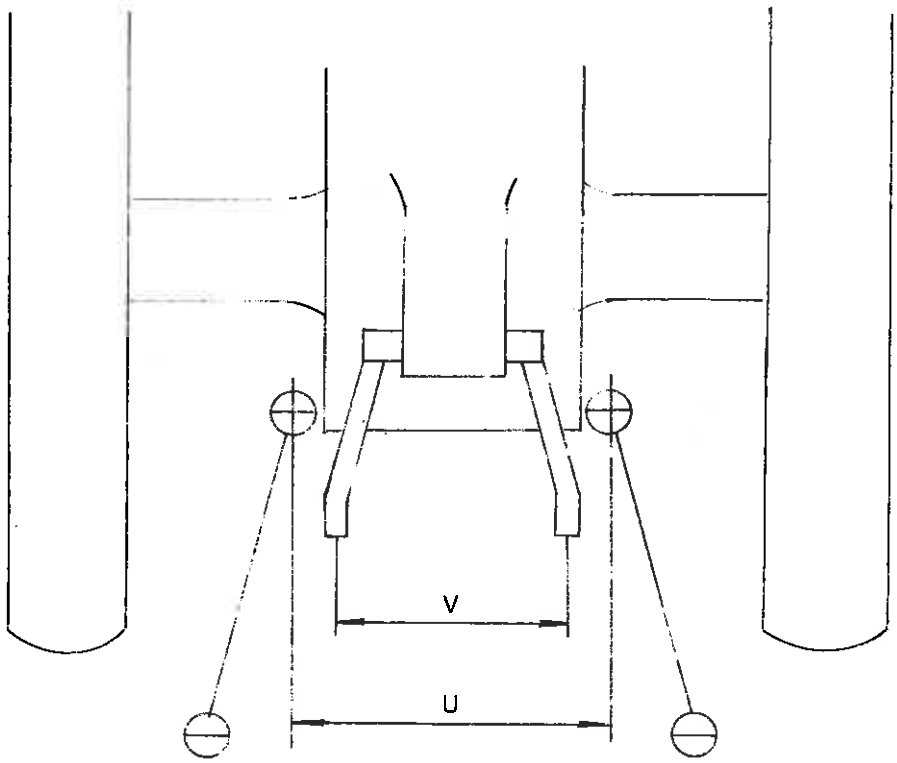


Figure 2.2

Lift test–Linkage geometry

		Dimension or range mm	Settings used in test mm
length of lift arms	(A)	240	240
Length of lower links	(B)	816	816
Distance of lift arm pivot: horizontally	(a)	−68	−68
point from rear−wheel axis: vertically	(b)	304.5	304.5
Horizontal distance between the 2 lower link points	(u)	478	478
Horizontal distance between the 2 lift arm end points	(v)	460	460
Length of upper link	(s)	from 450 to 650	495
Distance of upper link pivot point from rear: horizontally	(c)	286	286
wheel axis : vertically	(d)	342	342
Distance of lower link pivot point from rear: horizontally	(e)	−28	−28
wheel axis : vertically	(f)	97	97
Distance of lower link pivot points to lift rod pivot points on lower links	(D)	430	430
Length of lift rods	(L)	from 380 to 480	420
Height of lower hitch points relative to the rear−wheel axis:			
−in low position	(h)	from 260 to 420	298
−in high position	(H)	from 190 to 350	294
Height above ground of lower hitch points when locked in transport position (*)		Any height within lift range	

Table 2.1 − Dimensions of linkage geometry

(when connected to the standard frame)

(*) Assuming r = tyre dynamic radius index of 498 mm ISO 4251 / 1−1984.

SWINGING DRAWBAR None

TRAILER HITCH None

HOLED DRAWBAR

–Number of holes:	1
–Hole diameter:	35 mm
–Thickness / width of the drawbar:	75 / 150 mm
–Height above ground	
• Minimum	310 mm
• Maximum	420 mm
–Horizontal distance to power take–off shaft end (rear):	40 mm

STEERING

–Make / Model / Type:	Ningbo steering works / spherical worm and roller
–Method of operation:	Manual operated
• Pump (s):	Not applicable

BRAKES

Service brake

–Make / Model / Type:	Ningbo Tractor Works / shoe–type
–Method of operation:	operated by pedal, coupled or independent
–Trailer braking take–off:	Hydraulic brake or air brake, operated by tractor pedals.

Parking brake

–Type:	Mechanical
–Method of operation:	pedals locked by ratchet

WHEELS

–Number	4
• Front:	2, steering
• Rear:	2, driving
–Wheelbase:	1550 mm

–Track width adjustment

	Minimum mm	Maximum mm	Adjustment method
Front	1000	1400	Telescopic axle
Rear	1000	1400	Interchanging right and left wheels and / or resetting rims and discs

PROTECTIVE STRUCTURE None

DRIVER'S SEAT

–Make / Model / Type: Ningbo Tractor Works / BY–250

–Type of suspension: spring

–Type of damping: None

–Range of adjustment:

- Longitudinal: 50 mm
- Vertical: None

MISCELLANEOUS

–Additional seat: None

LIGHTING

	Height above ground of centre mm	Size mm	Distance from outside edge of lights to median plane of tractor mm
Headlights	1060	140 × 90	120
Sidelights	900	130 × 50	268
Rearlights	1275	D 135	460
Brake light	1110	D70	460

II. TEST CONDITIONS

Overall dimensions

Length mm	Width		Height at top of	
	minimum mm	maximum mm	protective structure mm	exhaust silencer mm
2750	1360	1650	–	2075

Ground clearance(unballasted tractor): 310 mm

–Clearance–limiting part: Drawbar clevis in lowest position

Tractor mass(unballasted tractor)

(without frame / roll guard / cab / other):

	Without driver kg	With driver kg
Front	525	530
Rear	689	759
Total	1214	1289

Tyres and track width specifications

	Front	Rear
Tyres:		
• dimensions	4.00–16	9.5–24
• ply rating	4	6
• type	cross ply	cross ply
• maximum load (tyre manufacturer's)	2.25 kN	6.08 kN
• maximum load (tractor manufacturer's)	2.25 kN	6.08 kN
• inflation pressure (tyre manufacturer's)	180–200kPa	80–120 kPa
• dynamic radius index	305 mm	498 mm
Chosen track width:	1100 mm	1100 mm

Oils and lubrication

–Capacity and change interval

	Capacity dm^3	Oil change h	Filter change h
Engine	6	250	250
Gear box	18.5	500	–
Front axle	–	–	–
Rear axle	the oil comes from gear box		–
Final drive (front)	–	–	–
Final drive (rear)	the oil comes from gear box		–
Hydraulic system	8.8	500	–
steering	0.9	–	–

–Specifications (SAE, API, Mil. L, ISO)

	Recommended	Used during test
Engine oil		
• Type:	SAE 10W / 30	HC–11
• Viscosity:	71.5 cst at 50℃	11 cst at 100℃
• Classification:	API CC	SY 1152–79
Transmission oils		
• Type:	SAE 80	
• Viscosity:	44.2 cst at 50℃	same as engine oil
• Classification:	API GL–4	
Hydrarlic fluid		
• Type:		
• Viscosity:	same as transmission	same as engine oil
• Classification:	oil	
Steering oil		
• Type:		
• Viscosity:	same as transmission	same as engine oil
• Classification:	oil	

–Grease:

• Number of lubrication points: 27

Fuel

–Type: No: 0 Diesel fuel in conformity with GB252–81

–Density at 15℃: 0.848 g / cm^3

Ⅲ. TEST RESULTS

COMPULSORY TESTS RESULTS

1. MAIN POWER TAKE-OFF

–Date and location of tests: 25th December 1989, CAMTC

–Type of dynamometer: SCHENCK eddy current brake W400

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						
17.13	2000	540	4.50	5.33	263	3.21
1.2 POWER AT RATED ENGINE SPEED						
17.13	2000	540	4.50	5.33	263	3.21
1.3 STANDARD POWER TAKE–OFF SPEED (540 ± 10 rev / min)						
17.13	2000	540	4.50	5.33	263	3.21
1.4 PART LOADS						
1.4.1 the torque corresponding to maximum power at rated engine speed						
17.13	2000	540	4.50	5.33	263	3.21
1.4.2 85% of torque obtained in 1.4.1						
15.08	2067	558	4.04	4.78	268	3.15
1.4.3 75% of torque defined in 1.4.2						
11.54	2104	568	3.43	4.06	297	2.85
1.4.4 50% of torque defined in 1.4.2						
7.78	2134	576	2.64	3.12	339	2.49
1.4.5 25% of torque defined in 1.4.2						
3.97	2159	583	2.04	2.41	514	1.64
1.4.6 unloaded						
0	2178	588	1.45	1.72	–	–

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 PART LOADS AT STANDARD POWER TAKE-OFF SPEED (540 rev / min)

1.5.1 the torque corresponding to maximum power

17.13	2000	540	4.50	5.33	263	3.21

1.5.2 85% of torque obtained in 1.5.1

15.08	2067	558	4.04	4.78	268	3.15

1.5.3 75% of torque defined in 1.5.2

11.54	2104	568	3.43	4.06	297	2.85

1.5.4 50% of torque defined in 1.5.2

7.78	2134	576	2.64	3.12	339	2.49

1.5.5 25% of torque defined in 1.5.2

3.97	2159	583	2.04	2.41	514	1.64

1.5.6 unloaded

0	2178	588	1.45	1.72	–	–

–No load maximum engine speed: 2178 rev / min

–Torque (equivalent crankshaft)

at maximum power: 81.8 Nm

–Maximum torque (equivalent crankshaft): 97.2 Nm

(engine speed: 1400 rev / min)

–Mean atmospheric conditions:

- Temperature: 17 ℃
- Pressure: 102.5 kPa
- Relative humidity: 66 %

–Maximum temperatures

- Coolant: 84 ℃
- Engine oil: 89 ℃
- Fuel: 17 ℃
- Engine air intake: 17 ℃

2 . HYDRAULIC POWER AND LIFTING FORCE

–Date of tests: 27th Decembr 1989

2.1 HYDRAULIC POWER TEST

–Sustained pressure with relief valve open: 16.7 MPa

–Pump delivery rate at minimum pressure: 10.5 l / min

	Flow rate l / min	Pressure MPa	Power kW
Flow rate corresponding to a hydraulic pressure equivalent to 90 per cent of the actual relief valve pressure setting and corresponding hydraulic power	9.67	15.0	2.42
Flow rate and hydraulic pressure corresponding to maximum hydraulic power	9.67	15.0	2.42

–Tapping point used for test: At right of tractor

Temperature of hydraulic fluid, if different from 65 ± 5℃ : 65 ± 5℃

2.2 POWER LIFT TEST

	at the hitch point	on the frame
Height of lower hitch points above ground in down position	200 mm	200 mm
Vertical movement	580 mm	718 mm
Maximum corrected force exerted through full range	8.2 kN	4.2 kN
Corresponding pressure of hydraulic fluid	15.0 MPa	15.0 MPa
Moment about rear–wheel axis	6.46 kN.m	5.87 kN.m
Maximum tilt angle of mast from vertical	–	19 degrees

–Linkage settings for test – see Table 2.1 and Figures 2.1 and 2.2

Lifting heights relative to the horizontal plane including the lower link pivot points											
mm	–222	–200	–186	–100	0	+100	+200	+300	+394	+400	496

Lifting forces (the values measured are corrected to correspond to a hydraulic pressure equivalent to 90% of the actual relief valve pressure setting or to maximum power delivered by the hydraulic system, whichever is lower)

at the hitch points kN			8.9	9.2	9.3	9.2	8.8	8.4	8.2		
Corresponding pressure: 15.0 MPa											
at the frame kN	8.4	8.5		8.0	7.3	6.8	6.1	5.3		4.7	4.2
Corresponding pressure: 15.0 MPa											

3.DRAWBAR POWER AND FUEL CONSUMPTION (UNBALLASTED TRACTOR)

Date of tests: 28th December 1989

Type of track: concrete

	Tyre inflation pressure	
Height of drawbar above ground	Front	Rear
380 mm	180 kPa	100 kPa

Gear and range	Power	Drawbar pull	speed	Engine speed	Slip of wheels	Specific fuel consumption
	kW	kN	km / h	rev / min	%	g / kWh
3.1. MAXIMUM POWER IN TESTED GEARS						
2	5.11	7.68	2.39	2132	15	434
3	8.23	7.63	3.89	2120	15	382
4	12.93	7.96	5.85	2069	14	370
5	14.71	6.86	7.72	2060	9	346
6	14.88	5.56	9.64	2003	8	327
3.2 FUEL CONSUMPTION						
3.2.1 in selected gear, at maximum power						
6	14.88	5.56	9.64	2003	8	327
3.2.1.1 75% of pull at maximum power at rated speed						
6	12.04	4.19	10.35	2097	5	337
3.2.1.2 50% of pull at maximum power at rated speed						
6	8.44	2.84	10.72	2120	4	359
3.2.1.3 next higher gear at reduced engine speed; same pull and travelling speed as						
7 *						
3.2.1.4 next higher gear at reduced engine speed; same pull and travelling speed as						
7 *						
3.2.2 in selected gear nearest to 7.5 km / h						
4	12.93	7.96	5.85	2069	14	370
3.2.2.1 75% of pull at maximum power at rated speed						
4	10.70	5.96	6.47	2100	8	388
3.2.2.2 50% of pull at maximum power at rated speed						
4	7.52	3.98	6.80	2124	5	443
3.2.2.3 next higher gear at reduced engine speed; same pull and travelling speed as						
5	10.76	5.96	6.51	1724	8	323
3.2.2.4 next higher gear at reduced engine speed; same pull and travelling speed as						
5	7.58	3.98	6.85	1745	5	345

* The forward speed exceeds the safety limit of tesing epuipment,

specific energy	Temperature			Atmospheric conditions		
	Fuel	Coolant	Engine oil	Temperature	Relative humidity	Pressure
kWh / l	℃	℃	℃	℃	%	kPa
1.96	15	76	84	2	49	103.7
2.23	16	77	91	2	49	103.7
2.30	16	79	91	2	49	103.7
2.46	14	78	86	2	49	103.7
2.60	13	82	88	2	49	103.7
2.60	13	82	88	2	49	103.7
2.52	13	86	90	2	49	103.7
2.37	12	79	90	2	49	103.7
in 3.2.1.1						
in 3.2.1.2						
2.30	16	79	91	2	49	103.7
2.19	14	64	78	2	49	103.7
1.92	14	50	64	2	49	103.7
in 3.2.2.1						
2.63	12	72	83	2	49	103.7
in 3.2.2.1						
2.46	11	70	80	2	49	103.7

so next higher gear at reduced engine speed has not been made.

Gear and range	Power	Drawbar pull	speed	Engine speed	Slip of wheels	Specific fuel consumption
	kW	kN	km / h	rev / min	%	g / kWh
3.1. MAXIMUM POWER IN TESTED GEARS						
2	5.11	7.68	2.39	2132	15	434
3	8.23	7.63	3.89	2120	15	382
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3.2.1.2 50% of pull at maximum power at rated speed						
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3.2.1.3 next higher gear at reduced engine speed; same pull and travelling speed as						
7 *						
3.2.1.4 next higher gear at reduced engine speed; same pull and travelling speed as						
7 *						
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4	12.93	7.96	5.85	2069	14	370
3.2.2.1 75% of pull at maximum power at rated speed						
4	10.70	5.96	6.47	2100	8	388
3.2.2.2 50% of pull at maximum power at rated speed						
4	7.52	3.98	6.80	2124	5	443
3.2.2.3 next higher gear at reduced engine speed; same pull and travelling speed as						
5	10.76	5.96	6.51	1724	8	323
3.2.2.4 next higher gear at reduced engine speed; same pull and travelling speed as						
5	7.58	3.98	6.85	1745	5	345

* The forward speed exceeds the safety limit of tesing epuipment,

–Abnormal vibration: None

–Brake heating method: Driving

6.3 PARKING BRAKING DEVICE TESE

	Uphill	Downhill
Braking device control force	0.17 kN	0.22 kN

7. MEASUREMENT OF EXTERNAL NOISE LEVEL

–Date of tests: 29th December 1989

–Type of sound level meter Bruel δ Kjaer 2218

–Type of track: Concrete

–Gear number: 8

–Travelling speed before acceleration: 22.18 km / h

–Sound level: 84 dB (A)

8. REPAIRS None

9. REMARKS None

Test carried out by: He zunian、Tang zhenqiu、Bai yuchun、Geng zhanbin、
Liu xuejun、Tang zhaoyu、Liu xu、Chen xinghe

officer in charge: Wang yuanxiang

signed: WANG LIANSHENG Chief Engineer

XIE YAN MOU Deputy Director

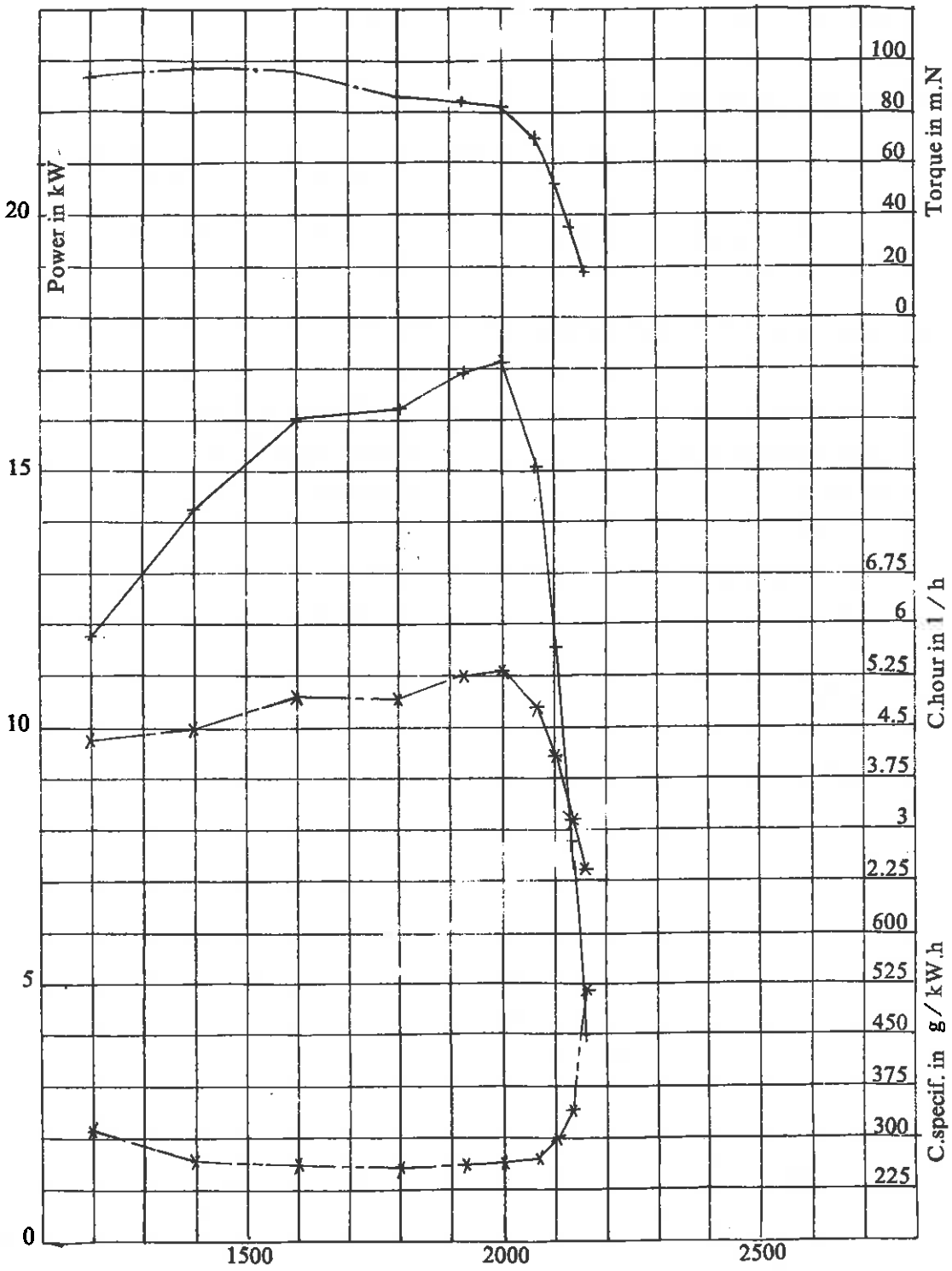
Date: 26. 2. 1991

Test curves of PTO test stand

Tractor plate No. BY–250 Mode:4 × 2LS

Test No. 89TJ141

Date: 89.12.25



Test curves of PTO test stand

Test No.89TJ141

Tractor plate No.BY−250 Mode:4 × 2LS

Date: 89.12.25

