CAMTC

Report on test in accordance with the OECD STANDARD CODE FULL CODE (CODE I) for the official testing of agricultural tractors

OECD Approval No: 1484 Full Code
Approval Date: 15 SEP. 1993



JIANGSU -504 tractor with 4WD

Manufactured by Qingjiang Tractor Works
Jiangsu, China
223001, China

Test No: 93OS203

Date: June 1993

China Agricultural Machinery Testing Centre
Shi Li He Donghuan Nanlu
Beijing, 100021, China

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JS −504 CAMTC OECD No. 1484 Full CODE

− Tractor manufacturer's name and address:	Qing Jiang Tractor Works Jiangsu China
− Location of tractor assembly:	The manufacturer
− Submitted for test by:	The manufacturer
− Selected for test by:	The manufacturer with the agreement of CAMTC
− Place of running−in:	The manufacturer
− Duration of running−in:	50 h
− Location of tests:	CAMTC

I. SPECIFICATIONS OF TRACTOR

TRACTOR

− Make / Model / Type:	Qing Jiang Tractor Works / Jisngsu−504 / General−purpose four−wheel drive tractor for both dry land and paddy field jobs
− Number of driving wheels:	4
− Serial N ° :	2027
− 1st Serial N ° :	11055

ENGINE

− Make / Model / Type:	Yangzhou Diesel Engine Works / 495T / 4 Stroke, water cooling, swirl combusion chamber, direct injection, naturally aspirated
− Serial N°:	12364

Cylinders

− Number / Disposition:	4 / Vertical, in line
− Bore / Stroke:	95 / 115 mm / mm
− Capacity:	3260 cm^3
− Compression ratio:	20
− Arrangement of valves:	Overhead
− Cylinder liners:	Wet

Fuel system

− Fuel feed system:	Piston fuel feed pump

– Make / Model / Type of fuel filter(s):	C0708A-1 / paper element type
– Capacity of fuel tank:	46 dm^3
– Make / Model / Type of injection pump:	Wuxi injector and plunger Pump Works / 4I24, 8left-1000 / plunger in line
– Serial N ° :	2190
– Manufacturer's production setting of injection pump:	
• Flow rate (rated engine speed and full load):	10.00 dm^3 / h
• Timing:	16 ° ± 2 ° before T.D.C.
– Make / Model / Type of injectors:	Wuxi Injector and Plunger Pump Works / ZS4S1A
– Injection pressure:	11.8-12.3 MPa

Governor

– Make / Model / Type:	Wuxi Injector and Plunger Pump Works / T7B / steel ball, centrifugal all-speed
– Governed range of engine speed:	From 550 to 2160 rev / min
– Rated engine speed:	2000 rev / min

Air cleaner

– Pre-cleaner	
• Make / Model / Type:	Yangzhou filter factory / Cyclone incorporated into main
– Main cleaner	
• Make / Model / Type:	Yangzhou filter factory / K1317A / paper element

Lubrication system

– Type of feed pump:	Rotor
– Type of filter(s):	Paper element
– Number:	1

Cooling system

– Type of coolant:	Water
– Type of pump:	Centrifugal, belt driven
– Specification of fan:	
– Number of fan blades:	4

- Fan diameter:	380 mm
- Coolant capacity:	14 dm^3
- Type of temperature control:	Thermostat
- Superpressure system:	45 KPa

Starting system

- Make / Model / Type:	Wujing motor factor / QD1315D / Electrical, solenoid engaged
- Starter motor power rating:	2.5 kW
- Cold starting aid:	Electric plug
- Safety device:	Main shift gear in neutral position

Electrical system

- Voltage:	12 V
- Generator	
• Make / Model / Type:	Shanghai Automobile Eletrical Machinery Factory / 2JF200 / Belt driven, alternator
• Power:	0.2 kW
- Battery (Number of accumulators):	2
• Rating:	150 Ah at 20 hours

Exhaust system

- Make / Model / Type:	Yangzhou Diesel Engine Works / YZ-50 / expension silencer
- Location:	Right-hand side of engine, vertical

TRANSMISSION TO WHEELS

Clutch(travel and power take-off)

- Make / Model / Type:	Qing Jiang Tractor Works / Dry,dual-acting
- Mumber of plates:	1
- Diameter of plates:	280 mm
- Method of operation:	Foot pedal

Gear box

- Make / Model / Type:	Qing Jiang Tractor Works / QJ-504 / mechanical

- Arrangement: GEAR BOX with 4 forward and 1 reverse speed
  GROUPGEAR with 2 ranges (low and high)
- Number of gears: 8 forward , 2 reverse

Rear axle and final drives

- Make / Model / Type: Qing Jiang Tractor Works / Crown whee land pinion bevel gear differential,spur gear final drives
- Differential lock:
  - Type: Mechanical
  - Method of engagement: Hand level operated
  - Method of disengagement: Self disengaging

Front axle and final drives

- Make / Model / Type: Qing Jiang Tractor Works / Crown whee land pinion bevel gear differential,bevel gear final drives
- Driven from: Form front gear box

Total ratios and travelling speeds

Gear No.	Group or range	Number of engine revolutions for one revolution of the driving wheels	Nominal travelling speed(*) at rated engine speed of 2000 rev / min km / h
forward 1	L1	227.36	2.12
2	L2	151.19	3.19
3	L3	92.72	5.21
4	L4	68.67	7.03
1	H1	56.84	8.48
2	H2	37.80	12.76
3	H3	23.18	20.84
4	H4	17.17	28.12
reverse R	L H	172.76 43.19	2.79 11.16

(*) Calculated with a tyre dynamic radius index of 640mm (ISO 4251 / 1-1984).
Number of revolutions of front wheels for one revolution of rear wheels: 1.52

POWER TAKE–OFF

Main power take–off

– Type:	Semi–independent
– Method of engagement:	By hand lever
– Number of shafts:	1
– Method of changing power take–off shaft speeds:	By shifting gear lever

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:	6, in conformity with ISO 500 / 1979
– Height above ground:	685 mm
– Distance from the median plane of the tractor:	0 mm
– Distance behind rear wheel axis:	226 mm
– PTO speed at rated enging speed (2000 rev / min):	540 rev / min
– Engine speed at standard power take–off speed:	2000 rev / min
– Ratio of rotation speeds (enging speed / p.t.o speed):	3.7037
– Power restriction and maximum torque:	35.3 kW 528 N.m
– Direction of rotation (viewed from behind tractor):	Clockwise

1000 rev / min

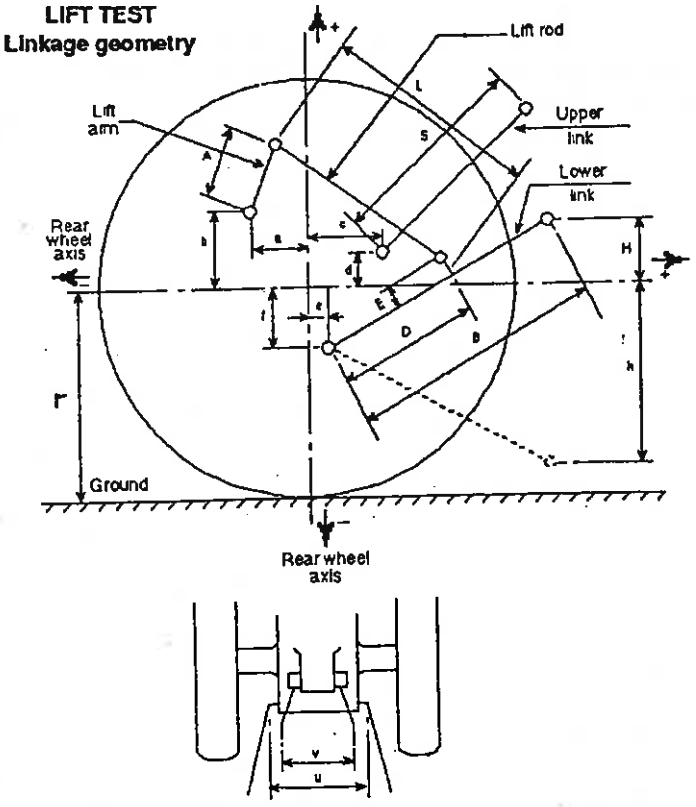
– Location:	At rear of tractor
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– Height above ground:	685 mm
– Distance from the median plane of the tractor:	0 mm
– Distance behind rear wheel axis:	226 mm
– PTO speed at rated engine speed (2000 rev / min):	978 rev / min
– Engine speed at standard power take–off speed:	2045 rev / min
– Ratio of rotation speeds (engine speed / p.t.o speed):	2.045
– Direction of rotation (viewed from behind tractor):	Clockwise

POWER LIFT

– Make:	Qing Jiang Tractor Works
– Type of hydraulic system:	Semi-remotely mounted, open system
– Type and number of cylinders:	1, Single-acting
– Type of linkage lock for transport:	Hydraulic lock
– Opening pressure of cylinder safety valve:	17+0.5 MPa
– Lift pump type:	Gear
– Transmission between pump and engine:	Driven from gear box
– Type and number of filters:	1, metal mesh filter
– Site of oil reservoir:	Transmission housing
– Type, number and location of tapping points:	1, thread, on centre housing top cover
– Maximum volume of oil available to external cylinders:	5 dm^3

Three-point linkage

– Category:	in conformity with categories 2 of ISO 730 / 1-1990
– Category adapter:	None



Tadle 1.1-Dimensions of linkage geometry (when connected to thestandard frame)

		Dimension or range mm	Settings used in test mm
Length of lift arms	(A)	230	230
Length of lower links	(B)	900	900
Distance of lift arm pivot : horizontally	(a)	66 forward	66
point from rear wheel axis : vertically	(b)	429	429
Horizontal distance between the two lower link points	(u)	494	494
Horizontal distance between the two lift arm end points	(v)	508	508
Length of upper link	(s)	from 474 to 660	590
Distace of upper link pivot point from rear : horizontally	(c)	277,279,281	279
wheel axis : vertically	(d)	347,310,273	310
Distance of lower link pivot point from rear : horizontally	(e)	14 forword	14
wheel axis : vertically	(f)	141	141
Distance of lower link pivot points to lift rod pivot points on lower links	(D)	450,565	450
Length of lift rods	(L)	from 610 to 720	672
Height of lower hitch points relative to the rear wheel axis			
- in low position	(h)	from 36 to 564	440
- in high position	(H)	from 106 to 378	200
Height above ground of lower hitch points when locked in transport position(*)		from 746 to 1018	/

(*)Assuming(r) = tyre dynamic radius index of 640mm (ISO 4251 / 1-1984).

TRAILER HITCH

– Type:	Fixed
– Hole diameter:	34 mm
– Height above ground:	685 mm
– Distance of hitch point from rear wheel axis, horizontally:	619 mm
– Distance of hitch point from power take-off shaft end	
• Vertically:	0 mm
• Horizontally:	395 mm
– Maximum vertical permissible load:	8.0 kN

STEERING

– Make / Model / Type:	Zhengjiang Hydaulic elements Works / BYZ-100 / Cycloid full hydraulic
– Method of operation	
• Pump(s):	Gear type, CBN-E310
• Ram(s):	SGD50X160-L, double-acting
– Working pressure:	7 ± 0.5 MPa

BRAKES

Service brake

– Make / Model / Type:	Qing Jiang Tractor Work / Disc
– Method of operation:	Coupled or independent pedals
– Trailer braking take-off:	Air brake, operated by tractor pedals

Parking brake

– Type:	Disc
– Method of operation:	Pedal locked by ratchet

WHEELS

– Number	
• Front:	2, steering, driving
• Rear:	2, driving
– Wheelbase:	2050 mm

- Track width adjustment:

	Minimum mm	Maximum mm	Adjustment method
Front	1420	1520	Reversing wheels and offset lug rims
Rear	1350	1650	Reversing wheels and offset lug rims

DRIVER'S SEAT

- Make / Model / Type: Wuxi damping seat factory / C3M1 / Suspension
- Type of suspension: Parallelogram linkage
- Type of damping: spring
- Range of adjustment
  - Longitudinal: ± 35 mm
  - Vertical: 0 mm

LIGHTING

	Height above ground of centre mm	Size mm	Distance from outside side edge to median plane of tractor mm
Headlights	1405	140 × 90	209
Sidelights	1500	128 × 56	676
Rearlights	1580	Φ134	697

Ⅱ. TEST CONDITIONS

Overall dimensions

	Lenght	Width		Height at top of	
		minimum	maximum	protective structure	exhaust silencer
	mm	mm	mm	mm	mm
Ballasted	3590	1800	2100	/	2290
Unballasted	3475	1660	1960	/	2290

Ground clearance(unballasted tractor): 360 mm

– Clearance – limiting part: Under the front differential cast

Tractor mass

(Without frame):

	Ballasted		Unballasted	
	Without driver kg	With driver kg	Without driver kg	With driver kg
Front	1318	1324	1146	1152
Rear	1671	1740	1267	1336
Total	2989	3064	2413	2488

Ballast

	Weights		Water kg
	Number	Total mass kg	
Front	6	136	/
Rear	12	440	/
Optinal	/	/	/

Tyres and track width specifications

	Front	Rear
Tyres:		
• dimensions	9.5 / 9-24	11-32
• ply rating	4	6
• type	Cross ply	Cross ply
• maximum load (tyre maunfacturer's)	7.3 kN	10.0 kN
• maximum load (tractor maunfacturer ' s)	5.9 kN	6.50 kN
• inflation pressure (tyre manufacturer's)	140 kPa	140 kPa
• dynamic radius index	494 mm	640 mm
Chosen track width	1420 mm	1350 mm

Oils and lubrication

– Capacity and change interval:

	Capacity dm^3	Oil change h	Filter change h
Engine	14	250	500–1000
Gear box	16	1000	/
Front axle	6.5	1000	/
Rear axle	common with gear box		
Final drive (front)	6	1000	/
Final drive (rear)	4.6	1000	/
Hydraulic system	8	500	/
Steering	4	500	/

– Specifications

	Recommended	Used during test
Engine oil • Type: • Viscosity: • Classification:	SAE 100W / 30 9.3–12.5 cst at 100℃ API CC	CA30 10.0—12.5 cst at 100℃ GB 5323—85
Transmission oil • Type: • Viscosity: • Classification:	Same as engine oil	Same as engine oil
Hydraulic fluid • Type: • Viscosity: • Classification:	Same as engine oil	Same as engine oil
Steering oil • Type: • Viscosity: • Classification:	Same as engine oil	Same as engine oil

Grease:

• Number of lubrication points: 32

Fuel

–Type: No.0 diesel fuel in conformity with GB 252–87 (Chinese stanard)

–Density at 15℃ : 0.848 g / cm^3

Ⅲ. TEST RESULTS

COMPULSORY TESTS RESULTS

1. MAIN POWER TAKE-OFF

- Date and location of tests: 28th May 1993 / CAMTC
- Type of dynamometer: SCHENCK W700

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						
32.9	2000	540	8.45	9.97	257	3.30
1.2 POWER AT RATED ENGINE SPEED						
32.9	2000	540	8.45	9.97	257	3.30
1.3 STANDARD POWER TAKE-OFF SPEED (540 ± 10 rev / min)						
32.9	2000	540	8.45	9.97	257	3.30
1.4 PART LOADS 1.4.1 the torque corresponding to maximum power at rated engine speed						
32.9	2000	540	8.45	9.97	257	3.30
1.4.2 85% of torque obtained in 1.4.1						
28.8	2062	557	7.57	8.93	263	3.22
1.4.3 75% of torque defined in 1.4.2						
21.8	2081	562	6.07	7.17	278	3.05
1.4.4 50% of torque defined in 1.4.2						
14.6	2096	566	4.69	5.54	321	2.64
1.4.5 25% of torque defined in 1.4.2						
7.4	2122	573	3.52	4.16	476	1.78
1.4.6 unloaded						
0	2133	576	2.43	2.87	/	/

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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						
32.9	2000	540	8.45	9.97	257	3.30
1.5.2 85% of torque obtained in 1.5.1						
28.8	2062	557	7.57	8.93	263	3.22
1.5.3 75% of torque defined in 1.5.2						
21.8	2081	562	6.07	7.17	278	3.05
1.5.4 50% of torque defined in 1.5.2						
14.6	2096	566	4.69	5.54	321	2.64
1.5.5 25% of torque defined in 1.5.2						
7.4	2122	573	3.52	4.16	476	1.78
1.5.6 unloaded						
0	2133	576	2.43	2.87	/	/

- No load maximum engine speed: 2133 rev / min
- Torque (equivalent crankshaft) at maximum power at rated engine speed: 157 N.m
- Maximum torque (equivalent crankshaft): 177 N.m
  (engine speed: 1462 rev / min)
- Mean atmospheric conditions
  - Temperature: 28℃
  - Pressure: 101.0 kPa
  - Relative humidity: 62%
- Maximum temperatures
  - Coolant: 101℃
  - Engine oil: 110℃
  - Fuel: 26℃
  - Engine air intake: 33℃

2. HYDRAULIC POWER AND LIFTING FORCE

- Date of tests: 4th, May, 1993

2.1 HYDRAULIC POWER TEST

- Sustained pressure with relief valve open: 18.0 MPa
- Pump delivery rate at minimum pressure: 21.9 1/min

	Flow rate	Pressure	Power
	1/min	MPa	kW
Flow rate corresponding to a hydraulic pressure equivalent to 90 per cent of the actual relief valve pressure setting and corresponding hydraulic power	19.2	16.0	5.13
Flow rate and hydraulic pressure corresponding to maximum hydraulic power	19.2	16.0	5.13

- Tapping point used for test: Auxiliary service connection
- Temperature of hydraulic fluid 62℃

2.2 POWER LIFT TEST

	at the hitch point	on the frame
Height of lower hicht points above ground in down position	200 mm	177 mm
Vertical movement	635 mm	799 mm
Maximum corrected force exerted through full range	15.2 kN	9.1 kN
Corresponding pressure of hydraulic fluid	16.2 MPa	16.2 MPa
Moment about rear wheel axis	13.47 kN.m	13.61 kN.m
Maximum tilt angle of mast from vertical	-	10 degrees

– Linkage setting for test: see Table 1.1 and figures 1.1

Lifting heights relative to the horizontal plane including the lower link pivot points												
mm	−322	−300	−299	−200	−100	0	+100	+200	+300	+336	+400	+477
Lifting forces(the values measured are corrected to correspdnd to a hydraulic pressure equivalent to 90% of the actual relief valve pressure setting of the hydraulic lift system)												
at the hitch point kN	/	/	15.2	16.0	16.2	16.1	15.7	15.5	15.4	15.3	/	/
Corresponding pressure: 16.2 MPa												
at the frame kN	14.9	14.5	/	14.1	13.4	12.6	11.6	10.9	10.1	/	9.4	9.1
Corresponding pressure: 16.2 MPa												

3. DRAWBAR PERFORMANCE

– Date of tests: June, 1993

– Type of track: Concrete

		Tyre inflation pressure	
	Height of drawbar above ground	Front	Rear
Unballasted	700 mm	110 kPa	110 kPa
Ballasted	695 mm	110 kPa	110 kPa

Gear and range	Power	Drawbar pull	Speed	Engine speed	Slip of wheels	Specific fuel Consumption	Specific energy	Temperature			Atmospheric conditions		
								Fuel	Coolant	Engine oil	Temperature	Relative humidity	Pressure
	kW	kN	km / h	rev / min	%	g / kWh	kWh / l	℃	℃	℃	℃	%	kPa
3.1 MAXIMUM POWER IN TESTED GEARS (unballasted tractor)													
L2	14.55	18.06	2.90	2088	15.1	399.4	2.11	30	83	99	24	60	100.4
L3	23.56	18.24	4.65	2059	15.3	367.2	2.30	28	87	101	23	65	100.4
L4	26.40	14.55	6.53	1988	10.2	338.6	2.49	25	92	102	24	60	100.4
H1	27.85	12.36	8.11	1993	7.0	326.3	2.59	27	93	102	24	60	100.4
3.2 MAXIMUM POWER IN TESTED GEARS (ballasted tractor)													
L1	11.50	21.34	1.94	2102	15.3	422.5	2.00	31	76	93	21	55	99.9
L2	17.82	22.04	2.91	2085	15.0	361.9	2.33	32	79	95	21	55	99.9
L3	26.25	20.36	4.64	1990	12.8	342.5	2.46	32	76	96	20	60	100.6
L4	27.53	14.88	6.66	1990	7.8	328.0	2.57	35	78	99	20	61	100.6
H1	28.94	12.66	8.23	1998	5.4	308.3	2.74	30	80	100	20	65	100.6
3.3.1 FIVE HOUR TEST at 75% of pull at maximum power with ballast 300 kg													
H1	22.69	9.39	8.70	2078	3.9	325.7	2.59	40	78	98	29	45	100.2
3.3.2 FIVE HOUR TEST at pull corresponding to 15% wheelslip													
L2	18.11	22.02	2.96	2088	—	—	—	40	90	100	28	40	100.1

Oil consumption during ten hours duration of tests 3.3.1 and 3.3.2 : 49 g / h

Note:In CAMTC the safety speed of drawbar testing is within the limits of 12km / h

4 TURNING AREA AND TURNING CIRCLE

Wheel equipement if several set of tyres are tested.

	With brakes		Without brakes	
	Right hand	Left hand	Right hand	Left hand
	m	m	m	m
Radius of turning area	7.84	7.90	8.76	8.72
Radius of turning circle	7.52	7.58	8.44	8.40

5. LOCATION OF CENTRE OF GRAVITY

- Height above ground: 778 mm
- Distance forward from the vertical plane containing the axis of the rear wheels: 950 mm
- Distance from the median plane of the tractor: 2 mm

6. BRAKING

- Date of tests: 2nd June 1993
- Type of track: Concrete
- Speed before application of brakes: 30.00 km / h

6.1 COLD SERVICE BRAKING DEVICE TEST

Ballasted tractor	Braking device control force N	100	150	250	350	450	550	600
	Mean deceleration m / s^2	1.06	1.41	2.17	2.75	2.97	3.11	3.11
Unballasted tractor	Braking device control force N	100	150	250	350	450	550	600
	Mean deceleration m / s^2	0.85	1.17	1.80	2.43	2.80	2.96	2.96

6.2 FADE TEST

Ballasted tractor	Braking device control force N	100	150	250	350	450	550	600
	Mean deceleration m / s^2	0.72	1.06	1.64	2.27	2.71	2.87	2.87

- Maximum deviation of tractor from its original course: 0
- Abnormal vibration: None
- The brakes were heated by: pulling

6.3 PARKING BRAKING DEVICE TEST

	Up	Down
Braking device control force,	430 N	384 N

7. MEASUREMENT OF EXTERNAL NOISE LEVEL

- Date of test: 2nd June 1993
- Sound level meter, Make / Model / Type: B & K 2235
- Type of track: Concret
- Gear number: H4
- Travelling speed before acceleration: 22.46 km / h
- Sound level: 85.1 dB(A)

Ⅳ. REPAIRS AND ADJUSTMENTS DURING TESTS: None

Ⅴ. REMARKS None

Test carried out by: Wang Yuanxiang, Tang Zhaoyu, Gen Zhanbin, Zhang Menghua

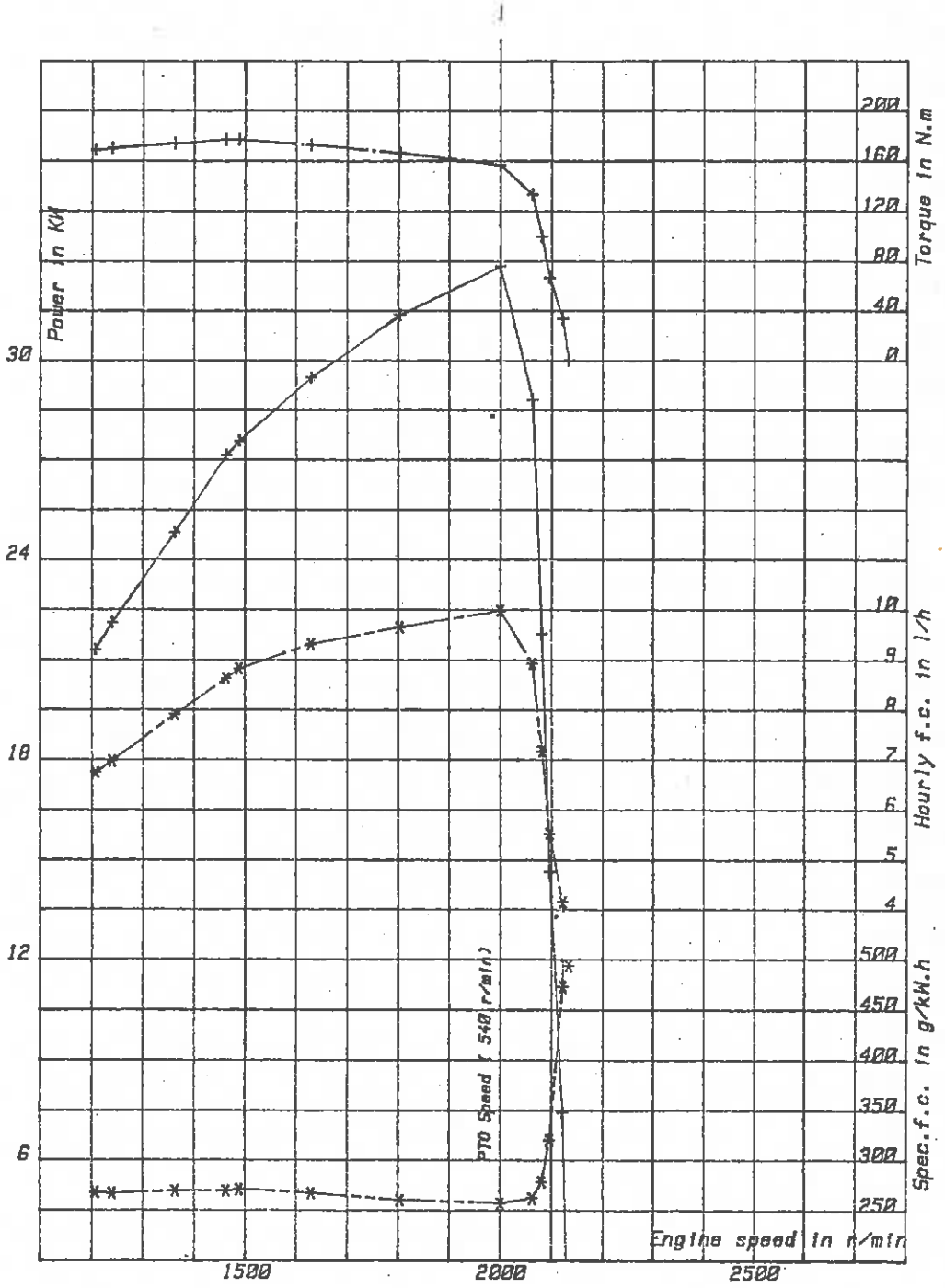
Officer in charge: Bu Yuxiang

Chief of Tractor Testing division: Li Xi Jiang 李希江

For the director: Wang Lian Sheng 王连生

ANNEX

MAIN POWER TAKE-OFF TEST CURVES



MAIN POWER TAKE-OFF TEST CURVES

