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: 1486 Full Code

Approval Date: 16 Sep. 1993



SHANXI— 200 tractor with 2WD

Manufactured by Shan Xi Tractor Works

Fuping, Shan Xi

Box. 711700 China

Test No: 93OS205

Date: Nov. 1992

China Agricultural Machinery Testing Centre

Shi Li He Donghuan Nanlu

Beijing, 100021, China

SX-200 CAMTC OECD No. 1486 Full Code

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SX-200 CAMTC OECD No. 1486 Full Code

Tractor manufacturer's name and address:	Shanxi Tractor Works Fuping, Shanxi,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:	Shanxi Tractor Works
- Duration of running-in:	30h
- Location of tests:	CAMTC, Beijing, China

I. SPECIFICATIONS OF TRACTOR

TRACTOR

- Make / Model / Type:	Shanxi Tractor Works / SX200 / 2 Wheel Drive
- Number of driving wheels:	2
- Serial No:	492

ENGINE

- Make / Model / Type:	Hunan Hengyang Jianxiang Diesel Engine Works / TY290TA / 4 stroke, direct injection, naturally aspirated diesel, water cooling
- Serial No:	671

Cylinders

- Number / disposition:	2 / Vertical, in line
- Bore / stroke:	90 / 100 mm / mm
- Capacity:	1272 cm^3
- Compression ratio:	18:1
- Arrangement of valves:	Over head, in line
- Cylinder liners:	Wet

Fuel system

- Fuel feed system:	Fuel feed by pump

-Make / Model / Type of fuel filter(s):	Jiangsu Yangzhou Filter Works / C0506B / paper cartridge, replaceable
-Capacity of fuel tank:	21 dm^3
-Make / Model / Type of injection pump:	Wuxi pump and Injector Works, Series I, 2-Cylinder plunger
-Serial number:	382
-Manufacturer's production setting of injection pump:	
• Flow rate (rated engine speed and full load):	4.4 dm^3 / h
• Timing:	22 ° -28 ° before T.D.C.
-Model / Moder / Type of injectors:	TS-4100, 4-hole nozzle
-Injection pressure:	$18.13^{+0.49}$MPa
Governor	
- Model / Type:	T7B, / Centrifugal, full-range
- Governed range of engine speed:	from 630 to 2440 rev / min
- Rated engine speed:	2300 rev / min
Air cleaner	
- Pre-cleaner	
• Make / Type:	Shanxi Yongji plant protection Machinery Factory / Centrifugal
• Location of air intake:	Left side of the fuel tank
- Main cleaner	
• Make / Type	Shanxi Yongji plant Protection Machinery Factory / Two-stage oil bath
- Maintenance indicator:	None
Lubrication system	
- Type of feed pump:	JZX1018 Rotor
- Type of filter(s):	J0708, Paper element
- Number:	1
Cooling system	
- Type of coolant:	Water
- Type of pump:	Centrifugal, belt driven

– Specification of fan:	Axial flow type, belt driven
– Number of fan blades:	4
– Fan diameter:	280 mm
– Coolant capacity:	8 dm^3
– Type of temperature control:	Thermostat, Wax type
– Superpressure system:	None

Starting system

– Make / Model / Type:	QD1231 or QD1242, Electric or Manual
– Starter motor power rating:	1.5 kW
– Cold starting aid:	Electric heating plugs
– Safety device:	Main shift lever in neutral position

Electrical system

– Voltage:	12 V
– Generator	
• Make / Model / Type:	Kaifeng Electrical Machinery Factory / 2JF200 / belt driven
• Power:	0.2 kW
– Battery (Number of accumulators):	1, 6-Q-75, Lead acid
• Rating:	75Ah at 20 hours

Exhaust system

– Make / Model:	Jianxiang Diesel Engine Works, SX200
– Location:	Right-hand side of engine, vertical

TRANSMISSION TO WHEELS

Clutch

– Make / Model / Type:	Own make, SX200, single plate, dry, constant engaging, Travel and Power Takc-Off
– Number of plates:	1
– Diameter of plates:	228.6 mm
– Method of operation:	By pedal

Gear box

- Make / Model / Type: Own make, SX200, Spur gear
- Arrangement: Gear box with 3 forwards and 1 reverse speed, GROUP GEAR with 2 ranges (low and high), Mechanical
- Number of gears: 6 forwards and 2 reverses
- Available options: None

Rear axle and final drives

- Make / Model / Type: Own make / Crown wheel and pinion bevel gear differential, spur gear final drives
- Differential lock:
  - Type: Mechanical
  - Method of engagement: By hand level
  - Method of disengagement: By hand level

Front axle and final drives

- Make / Model / Type: Own make / Balanced arm

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 2300 rev / min km / h
1	L1	183.05	2.18
2	L2	92.67	4.30
3	L3	63.24	6.30
4	H1	45.69	8.70
5	H2	23.13	17.23
6	H3	15.78	25.26
R1	L	230.81	1.73
R2	H	57.61	6.92

(*) Calculated with a tyre dynamic radius index of 470mm (ISO 4251 / 1-1984).

POWER TAKE-OFF

Main power take-off

– Type:	Not independent
– Method of engagement:	By hand lever, driven by the main cluch
– Number of shafts:	1

Power take-off proportional to engine speed

540 rev / min

– 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:	470 mm
– Distance from the median plane of the tractor:	0 mm
– Distance behind rear wheel axis:	280 mm
– PTO speed at rated enging speed (2300 rev / min):	598 rev / min
– Engine speed at standard power take-off speed:	2077 rev / min
– Ratio of rotation speeds (engine speed / p.t.o speed):	3.846
– Power restriction and maximum torque:	13.2 kW 247 N.m
– Direction of rotation (viewed from behind tractor):	Clockwise

Power take-off proportional to ground speed

None

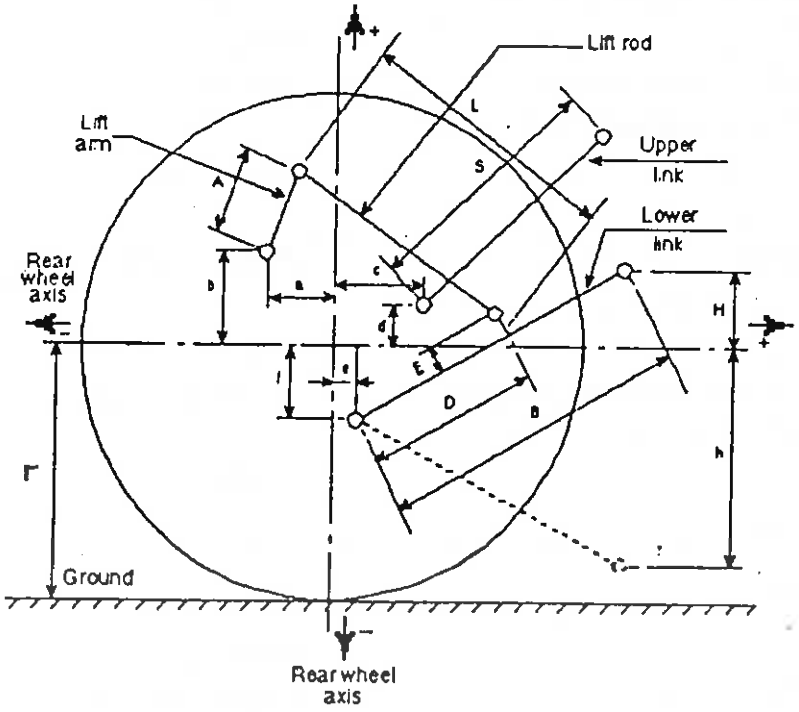
POWER LIFT

– Make:	Own make
– Type of hydraulic system:	Height control, open centre system
– Type and number of cylinders:	Single acting, 1
– Type of linkage lock for transport:	Hydraulic lock
– Relief valve pressure setting :	12.5^{+1}MPa
– Opening pressure of cylinder safety valve:	None
– Lift pump type:	CBN-E306L-X_1, gear pump
– Transmission between pump and engine:	Gear driven from gearbox

– Type and number of filters:	1
– Site of oil reservoir:	In the hydraulic power lift housing
– Type, number and location of tapping points:	Thread, 1, Right side of hydraulic power lift housing
– Maximum volume of oil available to external cylinders:	9 dm^3

Three-point linkage

– Category:	0, in conformity with IN to ISO 730 / 2-1979
– Category adapter:	None



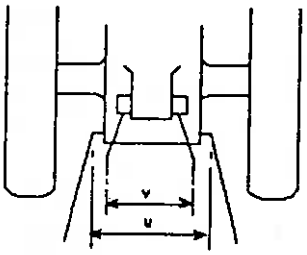


Table 1.1-Dimensions of linkage geometry

		Dimension or range mm	Settings used in test mm
Length of lift arms	(A)	190	190
Length of lower links	(B)	500	500
Distance of lift arm pivot: horizontally	(a)	30	30
point from rear wheel axis: vertically	(b)	299	299
Horizontal distance between the two lower link points	(u)	304	304
Horizontal distance between the two lift arm end points	(v)	325	325
Length of upper link	(s)	from 390 to 565	435
Distace of upper link pivot point from rear : horizontally	(c)	230	230
wheel axis : vertically	(d)	215	215
Distance of lower link pivot point from rear : horizontally	(e)	155	155
wheel axis : vertically	(f)	110	110
Distance of lower link pivot points to lift rod pivot points on lower links	(D)	250	250
Length of lift rods	(L)	from 370 to 515	465
Height of lower hitch points relative to the rear wheel axis			
- in low position	(h)	from 287 to 26	265
- in high position	(H)	from 119 to 344	190
Height above ground of lower hitch points when locked in transport position (*)		from 590 to 815	/

(*) Assuming the dynamic index radius = 470mm (ISO 4251 / 1-1984)

TRAILER HITCH

– Type:	Fixed, U type
– Hole diameter:	31 mm
– Height above ground:	470 mm
– Distance of hitch point from rear wheel axis, horizontally:	555 mm
– Distance of hitch point from power take-off shaft end	
• Vertically:	5 mm
• Horizontally:	275 mm

STEERING

– Make / Model / Type:	Wrom and crankpin
– Method of operation:	Manual operated

BRAKES

Service brake

– Make / Model / Type:	Own make, shoe type
– Method of operation:	Operated by pedals, coupled or independent
– Trailer braking take-off:	Air brake

Parking brake

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

WHEELS

– Number	
• Front:	2, steering
• Rear:	2, driving
– Wheelbase:	1465 mm

– Track width adjustment:

	Minimum mm	Maximum mm	Adjustment method
Front	950	950	None
Rear	900	1020	Change rim position on axle and Reversing wheel

DRIVER'S SEAT

– Make / Model / Type: Own make, SX200
– Type of suspension: None
– Type of damping: spring
– Range of adjustment
• Longitudinal: 80 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	1000	140 × 100	190
Sidelights	1100	80 × 60	520
Rearlights	1140	D120	470

II. TEST CONDITIONS

Overall dimensions

	Lenght	Width		Height at top of	
		minimum	maximum	protective structure	exhaust silencer
	mm	mm	mm	mm	mm
Ballasted	2530	1235	1235	/	1875
Unballasted	2530	1216	1216	/	1880

Ground clearance(unballasted tractor): 320 mm

– Clearance – limiting part: Under the rear axle housing

Tractor mass

Without protective structure:

	Ballasted		Unballasted	
	Without driver kg	With driver kg	Without driver kg	With driver kg
Front	450.0	454.0	450.0	452.5
Rear	720.0	791.0	562.0	634.5
Total	1170.0	1245.0	1012.0	1087.0

Ballast

	Weights		Water kg
	Number	Total mass kg	
Front	0	0	0
Rear	4	158	0
Optinal	/	/	/

Tyres specifications

	Front	Rear
Tyres:		
• dimensions	4.00–16	8.3–24
• ply rating	4	6
• type	cross ply	cross ply
• maximum load (tyre maunfacturer's)	2.35 kN	6.15 kN
• inflation pressure (tyre manufacturer's)	200–250 kPa	80–150 kPa
• dynamic radius index	296 mm	470 mm
Chosen track width:	950 mm	950 mm

Oils and lubrication

- Capacity and change interval:

	Capacity dm^3	Oil change h	Filter change h
Engine	3.3	250	250
Gear box	11.0	1000	
Front axle	/	/	/
Rear axle	common with gear box	common with gear box	/
Final drive (front)	/	/	
Final drive (rear)	common with gear box	common with gear box	
Hydraulic system	9.0	1000	
Steering	0.4	1000	

- Specifications (SAE, API, MIL.L, ISO)

	Recommended	Used during test
Engine oil		
• Type:	SAE 10 W / 30	CA30
• Viscosity:	9.3-12.5 cst at 100℃	10.0-12.5 cst at 100℃
• Classification:	API CC	GB 5323-85
Transmission		
• Type:	85W / 90	HL-20
• Viscosity:	15-19 cst at 100℃	17.8-22 cst at 100℃
• Classification:	API GL-2	SYB 1103-62S
Hydraulic fluid		
• Type:	Same as engine oil	Same as engine oil
• Viscosity:		
• Classification:		
Steering oil		
• Type:	Same as trans. oil	Same as trans. oil
• Viscosity:		
• Classification:		

Grease:

• Number of lubrication points: 15

• Fuel

- Type: N.0, in conformity with national standard.

- Density at 15℃: 0.848 g / cm^3

Ⅲ • TEST RESULTS

COMPULSORY TESTS RESULTS

1.MAIN PPWER TAKE-OFF

-Date and location of tests: 17th November, 1992, CAMTC

-Type of.dynamometer SCHENCK eddy current brake 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						
13.53	2300	598	3.69	4.36	273	3.10
1.2 POWER AT RATED ENGINE SPEED						
13.53	2300	598	3.69	4.36	273	3.10
1.3 STANDARD POWER TAKE-OFF SPEED (540 rev / min)						
12.50	2077	540	3.26	3.85	261	3.24
1.4 PART LOADS 1.4.1 the torque corresponding to maximum power at rated engine speed						
13.53	2300	598	3.69	4.36	273	3.10
1.4.2 85% of torque obtained in 1.4.1						
11.66	2340	608	3.22	3.81	276	3.07
1.4.3 75% of torque defined in 1.4.2						
8.87	2377	618	2.63	3.11	297	2.85
1.4.4 50% of torque defined in 1.4.2						
6.02	2404	625	2.14	2.53	356	2.38
1.4.5 25% of torque defined in 1.4.2						
3.04	2427	631	1.63	1.93	536	1.58
1.4.6 unloaded						
0	2442	635	1.24	1.47	/	/

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						
12.50	2077	540	3.26	3.85	261	3.24
1.5.2 85% of torque obtained in 1.5.1						
10.81	2100	546	2.83	3.35	262	3.23
1.5.3 75% of torque defined in 1.5.2						
8.21	2123	552	2.33	2.75	284	2.98
1.5.4 50% of torpue defined in 1.5.2						
5.55	2146	558	1.86	2.20	336	2.52
1.5.5 25% of torpue defined in 1.5.2						
2.78	2173	565	1.40	1.65	503	1.68
1.5.6 unloaded						
0	2200	572	1.03	1.22	/	/

- No load maximum engine speed: 2442 rev / min
- Torque (equivalent crankshaft) at maximum power: 56.2N.m
- Maximum torque (equivalent crankshaft): 66.6 N.m
(engine speed: 1665 rev / min)
- Mean atmospheric conditions
  - Temperature: 10℃
  - Pressure: 102.1 kpa
  - Relative humidity: 25.5%
- Maximum temperatures
  - Coolant: 72℃
  - Engine oil: 99℃
  - Fuel: 10℃
  - Engine air intake: 10℃

2. HYDRAULIC POWER AND LIFTING FORCE

- Date of tests: 20th, November, 1992

2.1 HYDRAULIC POWER TEST

- Sustained pressure with relief valve open: 14.5 MPa
- Pump delivery rate at minimum pressure: 12.0 l / min

	Flow rate	Pressure	Power
	l / 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	7.50	13.00	1.63
Flow rate and hydraulic pressure corresponding to maximum hydraulic power	11.55	11.25	2.17

- Tapping point used for test: Right side of hydraulic power lift housing
- Temperature of hydraulic fluid: 68℃
- Opening pressure of the unloading valve: None
- Closing pressure of the unloading valve: None

2.2 POWER LIFT TEST

	at the hitch point	on the frame
Height of lower hicht points above ground in down position	200 mm	50 mm
Vertical movement	455 mm	755 mm
Maximum corrected force exerted through full range	7.61 kN	4.01 kN
Corresponding pressure of hydraulic fluid	13.0 MPa	13.0 MPa
Moment about tear wheel axis	4.91 kN.m	5.03 kN.m
Maximum tilt angle of mast from vertical	–	14.5 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	−310	−200	−160	−100	0	+100	+200	+295	+300	+400	+445
Lifting forces(the values measured are corrected to correspond to a hydraulic pressure equivalent to 90% of the actual relief valve pressure setting of the hydraulic lift system.)											
at the hitch point kN			7.70	7.88	7.88	7.84	7.70	7.61			
Corresponding pressure: 13.0 MPa											
at the frame kN	5.90	5.90		5.88	5.86	5.50	5.00		4.55	4.19	4.01
Corresponding pressure: 13.0 MPa											

3. DRAWBAR PERFORMANCE

- Date of tests: 23th~27th November, 1992
- Type of track: Concrete

		Tyre inflation pressure	
	Height of drawbar above ground	Front	Rear
Unballasted	480 mm	210 kPa	120 kPa
Ballasted	480 mm	210 kPa	120 kPa

Gear and range	Power	Drawbar pull	Speed	Engine speed	Slip of wheels	Specific fuel Consumption	Specific energy	Tempersture			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)													
2(L2)	6.61	6.02	3.95	2373	15.0	401	2.14	13	65	96	9	40	102.1
3(L3)	10.11	6.42	5.67	2300	15.0	364	2.35	13	64	97	9	40	102.1
4(H1)	11.37	4.89	8.37	2297	9.3	323	2.65	13	65	97	10	40	102.1
3.2 MAXIMUM POWER IN TESTED GEARS (ballasted tractor)													
1(L1)	4.03	7.22	2.01	2402	15.3	506	1.69	10	68	65	8	40	102.1
2(L2)	7.81	7.60	3.70	2338	15.3	408	2.10	12	67	76	8	40	102.1
3(L3)	8.85	7.20	4.43	2320	15.5	352	2.42	12	67	84	8	40	102.1
4(H1)	10.13	5.00	7.29	2300	7.5	317	2.70	13	66	90	9	40	102.1
3.3.1 FIVE HOUR TEST at 75 per cent of pull at maximum power													
4(H1)	8.12	3.75	7.80	2333	5.1	335	2.56	13	65	84	9	40	102.1
3.3.2 FIVE HOUR TEST at pull corresponding to 15 per cent wheelslip in test 3.2, with additional ballast 160kg													
3(L3)	9.12	7.19	4.57	2315	—	—	—	12	64	80	8	40	102.1

0il consumption during ten hours duration of tests 3.3.1 and 3.3.2 : 29 g / h

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

4. TURNING AREA AND TURNING CIRCLE

		Tyre size	Track width
Details of wheel equipement:	front	4.00-16	950
	rear	8.30-24	950

	With brakes		Without brakes	
	Right hand	Left hand	Right hand	Left hand
	m	m	m	m
Radius of turning area	2.64	2.61	2.97	2.96
Radius of turning circle	2.53	2.50	2.86	2.85

5. LOCATION OF CENTRE OF GRAVITY

- Height above ground: 595 mm
- Distance forward from the vertical plane containing the axis of the rear wheels: 610 mm
- Distance from the median plane of the tractor: R1mm

6. BRAKING

- Date of tests: 23th November, 1992

6.1 COLD SERVICE BRAKING DEVICE TEST

Ballasted tractor	Braking device control force N	150	250	350	450	550	600
	Mean deceleration m/s^2	1.50	2.30	2.73	3.12	3.25	3.25
Unballasted tractor	Braking device control force N	150	250	350	450	550	600
	Mean deceleration m/s^2	1.40	2.03	2.60	3.02	3.19	3.19

6.2 FADE TEST

Ballasted tractor	Braking device control force, N	150	250	350	450	550	600
	Mean deceleration, m/s^2	1.35	2.20	2.50	2.73	3.00	3.00

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

6.3 PARKING BRAKING DEVICE TEST

	Up	Down
Braking device control force,	0.17 kN	0.20 kN

7. MEASUREMENT OF EXTERNAL NOISE LEVEL

- Date of test: 23th November, 1992
- Sound level meter, Make / Model / Type: B & K 2235
- Type of track: Concrete
- Gear number: 6(H3)
- Travelling speed before acceleration: 20.5 km / h
- Sound level: 83.5 dB(A)

IV. REPAIRS AND ADJUSTMENTS DURING TESTS: None

V. REMARKS: None

Test carried out by : Gen Zhan Bin, Bai Yu Chun

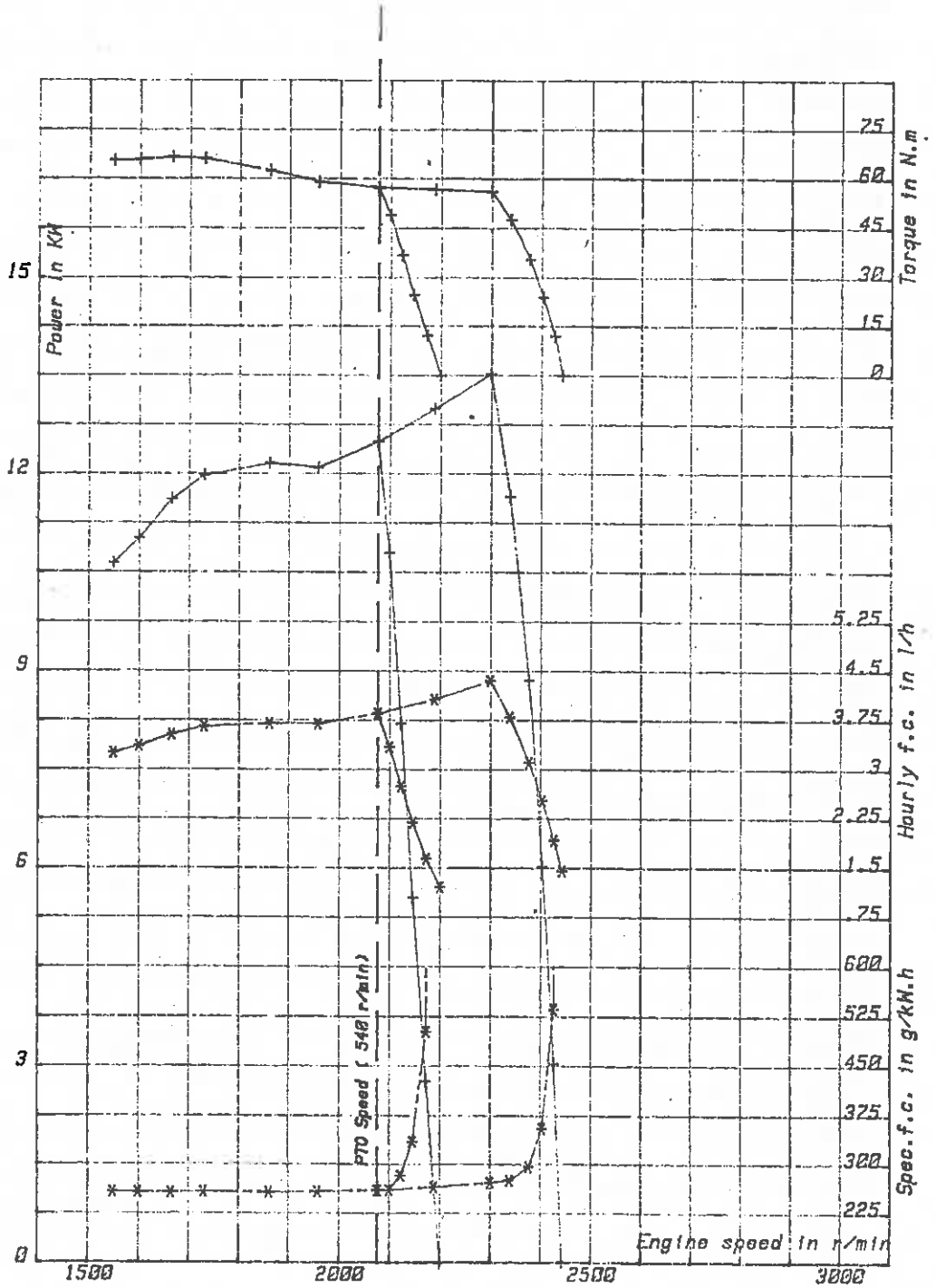
Officer in Charge : Wang yuan xiang

Chief of Tractor Testing Division : Li Xi Jiang 李希江

For the director : Wang Lian Sheng

ANNEX

MAIN POWER TAKE–OFF TEST CURVES



MAIN POWER TAKE-OFF TEST CURVES

