COTTEC

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TEST AND
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OECD TEST REPORT OF TS—25 AGRICULTURAL TRACTOR (CODE I)

Report on test in accordance with the OECD standard code for the official testing of agricultural tractor performance (C(87)53(Final), Code I)



OECD Approval
No. 1240
Date Feb. 26, 1990

Tested Tractor
Make: Shandong Tractor Works
Model: Tai Shan-25
Type: Standard

Submitted for test by
Name: Shandong Tractor Works
Address: Yanzhou, Shandong, China
Tel: 3682 Cable: 2151

This report includes 24 pages and may only be duplicated as a whole

TABLE OF CONTENTS

Page

SPECIFICATIONS OF TRACTOR ..... (3)

TEST CONDITIONS ..... (12)

TEST RESULTS ..... (15)

COMPULSORY TESTS ..... (15)

1. Main power take-off performance ..... (15)
2. Hydraulic power and lifting force ..... (17)
3. Drawbar performance ..... (19)
4. Turning area and turning circle ..... (20)
5. Location of centre of gravity ..... (20)
6. Braking ..... (20)
7. Measurement of external noise level ..... (21)

REPAIRS AND ADJUSTMENTS DURING TESTS ..... (22)

REMARKS ..... (22)

ANNEX I Main power take-off test curves ..... (23)

This report has been approved by the OECD Co-ordinating Centre in Paris (CEMAGREF) on Feb. 26,1990 Approved No. 1240

TS—25 COTTEC Test No. 891434 OECD No. 1240

Tractor manufacturer' s name and address:	Shandong Tractor Works Yanzhou, Shandong, China
Location of tractor assembly:	The manufacturer
Submitted for test by:	The manufacturer
Selected for test by:	The manufacturer with the agreement of the COTTEC
Place of running-in:	COTTEC, Luoyang, Henan, China
Duration of running-in:	31 hours
Location of test:	COTTEC, Luoyang, Henan, China

SPECIFICATIONS OF TRACTOR

TRACTOR

—Make:	Shandong Tractor Works
—Model:	Tai Shan-25
—Type:	Standard
—Number of driving wheels:	2
—Serial No. :	1641
—1st Serial No. :	1641

ENGINE

—Make:	Own make
—Model:	295T
—Type:	4 stroke, swirl chamber diesel
—Serial No. :	381

Cylinders

—Number:	2	
—Disposition:	Vertical, in line	
—Bore/Stroke:	95/115	mm
—Capacity:	1630	cm^3
—Compression ratio:	19/1	
—Arrangement of valves:	Over head, in line	
—Cylinder liners:	Wet	

Fuel system

—Fuel feed system:	Plunger transfer pump

—Fuel filter:		
. Make:	Biangpu Tractor Accessory Works	
. Model /type:	C0708A2, paper catridge, replaceable	
—Capacity of fuel tank:	48	dm^3
—Injection pump		
. Make:	Huangxian Pump and Injector Works	
. Model/type:	No. 1 in line plunger	
. Serial No. :	981	
—Manufacturer' s production setting of injection pump:	In line; plunger	
. Flow rate (rated engine speed and full load):	6.6	dm^3/h
. Timing:	17±2° before T. D. C.	
—Injectors:		
. Make:	Huangxian Pump and Injector Works	
. Model/Type:	ZS4S10, Single-hole	
. Injection pressure:	11.8	MPa

Governor

—Make:	Huangxian Pump and Injector Works	
—Model/type:	Mechanical, incorporated into fuel injection pump	
—Governed range of engine speed:	700～2200	rev/min
—Rated engine speed:	2000	rev/min

Air cleaner

—Pre-cleaner:		
. Make:	Hezhe Mechanical Accessory Works	
. Model/Type:	Cyclone, incorporated into main	
. Location of air intake:	Left side of engine	
—Main cleaner:		
. Make:	Hezhe Mechanical Accessory Works	
. Model/Type:	85F 2400, Oil bath with mesh screen	
—Maintenance indicator:	None	

Lubrication system

—Type of feed pump:	Rotor	
—Type & Number of filter(s):	J0708, paper, replaceable, 1	

Cooling system

—Type of coolant:	Water	
—Type of pump:	Centrifugal, belt driven	

—Description of fan:	Axial flow type, belt driven	
—Number of fan blades:	4	
—Fan diameter:	310	mm
—Coolant capacity:	10	dm^3
—Type of temperature control:	Thermostat	
—Superpressure system	None	

Starting system

—Make:	Wujin Electrical Machinery Factory	
—Model/Type:	ST—95 electrical motor, solenoid pre-engaged	
—Starter motor power rating:	1.5	kW
—Cold starting aid:	Preheater	
—Safety device:	Main shift lever in neutral position	

Electrical system

—Voltage:	12 (Negative earth)	V
—Generator:		
. Make:	Liaocheng Electrical Machinery Factory	
. Model/Type:	JF01C alternator, belt driven	
. Power:	0.18	kW
—Battery (number of accumulators):		
. Model/Type:	3—Q(A)—120, lead acid	
. Number:	2	
. Rating:	120	Ah at 20 hours rating

Exhaust system

—Make:	Own make	
—Model/Type:	TS—25	
—Location:	Right-hand side of engine, vertical	

TRANSMISSION TO WHEELS

Clutch

—Make:	Own make	
—Model/Type:	TS—25, dry, single plate, constant mesh	
—Number of plate(s):	1	
—Diameter of plate(s):	228.6	mm
—Method of operation:	Mechanically by pedal	

Gear box

—Make: Own make
—Model/Type: TS—25, Spur gear
—Arrangment: (4+1)×2 compound gear
—Number of gears: 8 forwards and 2 reverses
—Available options: None

Rear axle and final drives

—Make: Own make
—Model/Type: Crown wheel and pinion bevel gear differential, spur gear final drives

—Differential lock:
. Type: Mechanical
. Method of engagement: By pedal
. Method of disengagement: Self-disengaging

Front axle

—Make: Own make
—Model/Type: Balanced arm, telescopic axle

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
1	L	191.99	1.94
2	L	152.06	2.45
3	L	93.42	4.00
4	L	58.91	6.34
5	H	48.99	7.62
6	H	38.81	9.62
7	H	23.83	15.66
8	H	15.03	24.83
R_1	L	205.75	1.81
R_2	H	52.51	7.11

* Calculated with a tyre dynamic radius index of 495 mm (ISO 4251/1—1984)

POWER TAKE-OFF

Main power take-off

—Type:	Non—independent	
—Method of engagement:	By hand level	
—Number of shafts:	1	
—Method of changing power take—off shaft ends and speeds:	Changing speeds by level	

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:	588	mm
—Distance from the median plane of the tractor:	0	mm
—Distance behind rear wheel axis:	207	mm
—PTO speed at rated engine speed:	596	rev/min
—Engine speed at standard power take-off speed:	1813	rev/min
—Ratio of rotation speeds (engine speed/p. t. o. speed):	3. 3557	
—Power restriction and maximum torque: (Manufacturers recomendation)	17 kW 270 N • m	
—Direction of rotation(viewed from behind tractor):	Clockwise	

1000 rev/min

—Location:	At rear of tractor	
—Diameter of power take-off shaft end:	35	mm
—Number of splines:	6, not in conformity with ISO 500/1979	
—Height above ground:	588	mm
—Distance from the median plane of the tractor:	0	mm
—Distance behind rear wheel axis:	207	mm
—PTO speed at rated engine speed:	1128	rev/min
—Engine speed at standard power take-off speed:	1773	rev/min

—Ratio of rotation speeds (engine speed/p. t. o. speed):	1.773
—Direction of rotation (viewed from behind tractor):	Clockwise
Power take-off proportional to ground speed:	None

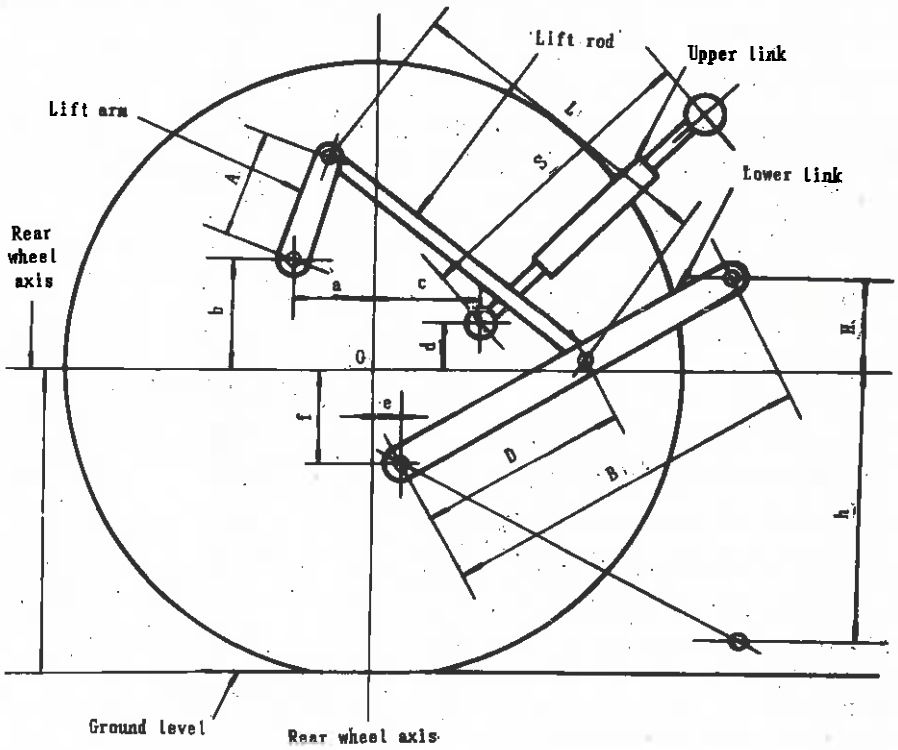
POWER LIFT

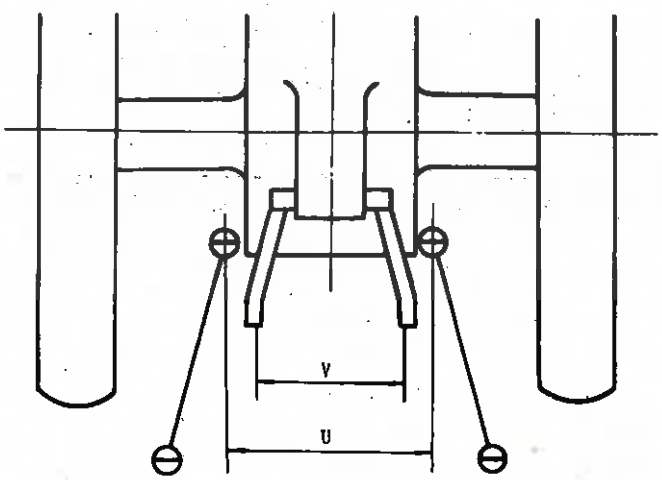
—Make:	Yiexian Agricultural Machinery works
—Type of hydraulic system:	Partial separated units, open centre system
—Type and number of cylinders:	Single acting, 1
—Type of linkage lock for transport:	Mechanical
—Relief valve pressure setting:	17.7 MPa
—Opening pressure of cylinder safety valve:	None
—Life pump type:	CB306, gear pump
—Transmission between pump and engine:	Gear driven from gearbox
—Type and number of filter(s):	Screen filter, 1
—Site of oil reservior:	In the trans. housing
—Tapping point(s)	
• Type:	Thread
• Number:	1
• Location:	Left side of rockshaft housing
—Maximum volume of oil available to external cylinders:	4 dm^3

Three point linkage

—Category:	I to ISO 730/1—1979
—Category adapter:	None
—Linkage geometry:	See next page and following table

Linkage geometry:





			Dimension or range * mm	Setting used in test mm
Length of lift arms		(A)	174	
Length of lower links		(B)	800	800
Distance of lift arm pivot point from rear wheel axis:	Horizontally	(a)	3	
	Vertically	(b)	381.5	
Horizontal distance between the 2 lower link points:		(u)	402	
Horizontal distance between the 2 lift arm end points		(v)	420	
Length of upper link		(S)	from 470 to 620	590
Distance of upper link pivot point from rear wheel axis:	Horizontally	(c)	238	
	Vertically	(d)	342.5	
Distance of lower link pivot point from rear wheel axis:	Horizontally	(e)	24	
	Vertically	(f)	61.5	
Distance of lower link pivot points to lift rod pivot points on lower links		(D)	345	
Length of lift rods		(L)	from 440 to 600	520
Height of lower hitch points relative to the rear wheel axis:				
in low position		(h)	from 70 to 518	295
in high position		(H)	from 420 to 82	265
Height above ground of lower hitch points when locked in transport position			865	

* Assuming (r) with a tyre dynamic index of 495 mm (ISO 4251/1—1984)

TRAILER HITCH

—Type:	Fixed	
—Hole diameter:	25	mm
—Height above ground:	436	mm
—Distance of hitch point from rear wheel axis, horizontally:	546	mm

—Distance of hitch point from power take-off shaft end:		
. Vertically:	20	mm
. Horizontally:	339	mm
—Maximum vertical permissible load:	10.0	kN

HOLED DRAWBAR None

STEERING

—Make:	Own make
—Model/Type:	Spherical worm and roller
—Method of operation:	Manual operated

BRAKES

Service brake

—Make:	Own make
—Model/Type	Dry, shoe type
—Method of operation:	By pedals, coupled or independent
—Trailer braking take-off:	Air brake, operated by tractor pedals

Parking brake

—Type:	Mechanical
—Methed of operation:	Foot pedals, locked by ratchet

WHEELS

—Number		
. Front:	2, steering	
. Rear:	2, driving	
—Wheelbase:	1700	mm
—Track width adjustment:		

	Minimum mm	Maximum mm	Adjustment method
Front	1100	1500	Extending telescopic
Rear	1100	1500	Reversing wheels and off-set lug rims

DRIVER'S SEAT

—Make: Own make

—Model/Type: TS-25
—Type of suspension: Spring
—Type of damping None
—Range of adjustment:
. Longitudinal: 65 mm
. Vertical: 0 mm

MISCELLANEOUS
—Additional seat: None

LIGHTING

	Height above ground of center mm	Size mm	Distance from outside edge of lights to median plane of tractor mm
Headlight	1090	140×90	150
Sidelight	1090	135×50	295
Rearlight	1185	D140	580
Brakelight	—	—	—

TEST CONDITIONS

OVERALL DIMENSIONS

	Length mm	Width		Height at top of	
		Minimum mm	Maximum mm	protective structure mm	exhaust silencer mm
Ballasted	3085	1310	1470	—	1945
Unballasted	3085	1310	1350	—	1950

GROUND CLEARANCE(unballasted tractor): 430 mm
—Clearance limiting part: Under the rear axle

TRACTOR MASS

Without protective structure:

	Ballasted		Unballasted	
	Without driver kg	With driver kg	Without driver kg	With driver kg
Front	585	604	585	600
Rear	896	952	716	776
Total	1481	1556	1301	1376

BALLAST

	Weights		Water
	Number	Total mass kg	kg
Front	—	—	0
Rear	4	180	0
Optional	—	—	—

TYRE 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
Inflation pressure (tyre manufacturer's)	200—250 kPa	100—120 kPa
Dynamic radius index	305 mm	495 mm
Chosen track width:	1100 mm	1100 mm

OILS AND LUBRICATION

Capacity and change interval:

	Capacity dm³	Oil change h	Filter change h
Engine	6.5	400	200
Gear box	8.5	1200	
Rear axle	Common with gear box	—	not filter
Final drive (rear)	1.6×2	1200	
Hydraulic system	6.5	1200	500
Steering	—	—	—

Specifications:

	Recommended	Used during test
Engine oil		
Type:	SAE 10W/30	HC—11
Viscosity:	11.4 cSt at 100℃	11 cSt at 100℃
Classification:	API CC	SY 1152—79
Transmission oil		
Type:	SAE 80	HC—14
Viscosity:	9.3 cSt at 100℃	14 cSt at 100℃
Classification:	API GL—4	SY 1152—79
Hydraulic fluid		
Type:	Same as trans. oil	Same as trans. oil
Viscosity:		
Classification:		
Steering oil		
Type:	Multi—purpose grease	Multi—purpose grease
Viscosity:		
Classification:		

Grease

—Type: Multi—purpose grease

—Number of lubrication points: 13

Fuel

—Type: No. 0 diesel fuel in conformity with GB 252-81 (China standard)

—Density at 15°C: 0.848 g/cm³

TEST RESULTS

COMPULSORY TESTS RESULTS

1. MAIN POWER TAKE-OFF

—Date and location of tests: Sep. 7, 1989, COTTEC

—Type of dynamometer: LPA—Bedienpult 250 elec. dynamometer

Power	Speed		Fuel consumption			Specific energy
	Engine	P. T. O.	Hourly		Specific	
kW	rev/min	rev/min	kg/h	l/h	g/kW • h	kW • h/l
1. 1 MAXIMUM POWER—TWO HOURS TEST						
16. 8	1948	580	4. 44	5. 23	265	3. 20
1. 2 POWER AT RATED ENGINE SPEED						
16. 5	2000	596	4. 46	5. 26	270	3. 14
1. 3 STANDARD POWER TAKE-OFF SPEED (540±10 rev/min)						
15. 8	1813	540	4. 42	5. 21	266	3. 19
1. 4 PART LOADS						
1. 4. 1 The torque corresponding to max. power at rated engine speed						
16. 5	2000	596	4. 46	5. 26	270	3. 14
1. 4. 2 85% of the torque obtained in 1. 4. 1						
14. 2	2028	604	3. 90	4. 60	274	3. 10
1. 4. 3 75% of the torque defined in 1. 4. 2						
10. 9	2065	615	3. 20	3. 77	294	2. 89
1. 4. 4 50% of the torque defined in 1. 4. 2						
7. 4	2085	621	2. 52	2. 97	343	2. 47
1. 4. 5 25% of the torque defined in 1. 4. 2						
3. 7	2109	628	1. 90	2. 24	517	1. 64
1. 4. 6 Unloaded						
0. 7	2126	633	1. 42	1. 67	—	—

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	1/h		
1. 5 PART LOADS AT STANDARD POWER TAKE-OFF SPEED						
1. 5. 1 The torque corresponding to maximum power						
15. 8	1813	540	4. 42	5. 21	266	3. 19
1. 5. 2 85% of the torque obtained in 1. 5. 1						
13. 7	1850	551	3. 65	4. 30	266	3. 19
1. 5. 3 75% of the torque defined in 1. 5. 2						
10. 6	1900	566	2. 97	3. 50	280	3. 03
1. 5. 4 50% of the torque defined in 1. 5. 2						
7. 2	1928	574	2. 29	2. 70	321	2. 64
1. 5. 5 25% of the torque defined in 1. 5. 2						
4. 2	1958	583	1. 80	2. 12	427	1. 99
1. 5. 6 Unloaded						
0. 6	1988	592	1. 25	1. 47	—	—

—No load maximum engine speed:	2126	rev/min
—Equivalent crankshaft torque at maximum power:	82. 2	N • m
—Maximum Equivalent crankshaft torque: (Engine speed: 1300 rev/min)	91. 7	N • m
—Mean atmospheric conditions		
. Temperature:	29	℃
. Pressure:	99. 3	kPa
. Relative humidity:	52	%
—Maximum temperatures		
. Coolant:	98	℃
. Fuel:	52	℃
. Engine air intake:	34	℃
. Engine oil:	108	℃

2. HYDRAULIC POWER AND LIFTING FORCE

—Date of test: Sep. 21, 1989

2.1 HYDRAULIC POWER TEST

—Sustained pressure with relief valve open: 17.7 MPa

—Pump delivery rate at minimum pressure: 13.03 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	11.87	16.2	3.20
Flow rate and hydyaulic pressure corresponding to max. hydraulic power	12.51	15.5	3.23

—Tapping point used for test: Left side of rockshaft housing

—Temperature of hydraulic fluid: 61 ℃

—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 hitch points above ground in down position	mm	200	162
Vertical movement	mm	600	737
Maximum corrected force exerted throught full range	kN	6.90	4.88
Corresponding pressure of hydraulic fluid	MPa	15.5	15.5
Moment about rear wheel axle	kN • m	5.68	7.00
Maximum tilt angle of mast from vertical	degrees	—	10.5

—Linkage setting for test: see above table and figures

Lifting heights relative to the horizontal plane inculding the lower link pivot points									
mm	—230	—200	—100	0	100	200	300	330	430
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, which is lower)									
At the hitch point kN	6.90	7.08	7.68	7.82	7.80	7.68	7.67	7.68	
Corresponding pressure: 15.5 MPa									
At the frame kN	7.23	7.20	7.10	6.84	6.46	6.00	5.50	5.35	4.88
Corresponding pressure: 15.5 MPa									

3. DRAWBAR PERFORMANCE

—Date of tests: Sep. 16～20, 1989

—Type of track: Concrete

Height of drawbar above ground:
Unballasted: 515 mm
Ballasted: 510 mm

Tyre inflation pressure:
Front: 176 kPa
Rear: 98 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/kW • h	kW • h/l	℃	℃	℃	℃	%	kPa
3.1 MAXIMUM POWER IN TESTED GEARS (unballasted tractor)													
3(L3)	7.5	7.77	3.47	2006	14.9	417	2.03	42	80	86	28	54	99.7
4(L4)	11.5	7.72	5.37	1941	14.8	376	2.26	43	84	89	28	54	99.7
5(H1)	13.0	7.29	6.44	1921	13.0	344	2.47	45	86	90	30	53	99.7
6(H2)	13.7	5.82	8.49	1907	8.8	327	2.59	46	87	91	30	52	99.7
3.2 MAXIMUM POWER IN TESTED GEARS (ballasted tractor)													
1(L1)	4.9	10.31	1.70	2065	15.0	546	1.55	40	78	86	29	50	100.4
2(L2)	6.1	10.31	2.12	2032	15.0	426	1.99	43	81	87	29	50	100.4
3(L3)	9.6	10.11	3.42	1995	14.7	363	2.34	43	84	89	30	50	100.4
4(L4)	13.4	8.95	5.38	1912	11.4	333	2.55	45	88	90	31	50	100.4
5(H1)	14.2	7.77	6.57	1907	9.9	315	2.69	46	88	92	32	50	100.4
6(H2)	14.3	6.02	8.55	1918	7.2	311	2.73	47	88	92	32	50	100.4
3.3 TEN—HOUR TEST (ballasted tractor)													
3.3.1 FIVE-HOUR TEST at 75% of pull at maximum power													
5(H1)	11.4	5.78	7.12	1999	7.0	339	2.50	43	84	90	30	50	100.4
3.3.2 FIVE-HOUR TEST at pull corresponding to 15% wheelslip without additional ballast.													
3(L3)	9.9	10.32	3.47	1983	—	—	—	46	87	91	32	50	100.4

Oil consumption during ten hours duration of tests 3.3.1 and 3.3.2 : 35 g/h

4. TURNING AREA AND TURNING CIRCLE

Details of wheel equipment:

	Tyre size	Track mm
Front	4.00—16	1100
Rear	9.5—24	1100

	With brakes		Without brakes	
	Right hand m	Left hand m	Right hand m	Left hand m
Radius of turning area	2.76	2.93	3.07	3.21
Radius of turning circle	2.64	2.81	2.95	3.09

5. LOCATION OF CENTRE OF GRAVITY

—Height above ground: 660 mm

—Distance forward from the vertical plane containing the axle of the rear wheels: 732 mm

—Distance from the median plane of the tractor: L 1.6 mm

6. BRAKING

—Date of tests: Sep. 20, 1989

—Type of track: Concrete

—Speed before application of brakes: 24.9 km/h

6.1 COLD SERVICE BRAKING DEVICE TEST

Ballasted tractor	Braking device control force N	212	281	357	425	501	593
	Mean deceleration m/s^2	1.62	2.03	2.38	2.88	3.25	3.42
Unballasted tractor	Braking device control force N	190	285	361	437	517	615
	Mean deceleration m/s^2	1.11	2.71	2.94	3.03	3.02	3.22

6.2 FADE TEST

Ballasted tractor	Braking device control force N	190	273	369	445	524	608
	Mean deceleration m/s^2	1.00	1.42	1.88	2.42	2.68	2.91

—Maximum deviation of tractor from its original course: 0 mm
—Abnormal vibration: None
—The brakes were heated by: Driving

6.3 PARKING BRAKING DEVICE TEST

	Up	Down
Braking device control force N	195	195

7. MEASUREMENT OF EXTERNAL NOISE LEVEL

—Date of tests: Sep. 20,1989
—Sound level meter, Make/Model/Type: B&K 2209
—Type of track: Concrete
—Gear number: 8
—Travelling speed before acceleration: 18.6 km/h
—Sound level: 82.0 dB(A)

REPAIRS AND ADJUSTMENTS DURING TESTS:

None

REMARKS:

In COTTEC the safety limit speed of drawber testing equipment is 12 km/h, so we only do drawbar power test in the gears which the speed is below 12 km/h.

Director of the COTTEC
Senior engineer

罗光辉

Luo Guanghui

Responsible engineer for these tests:
Senior engineer

钱进

Qian Jin

Vice-director of the COTTEC
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孙殿俊

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Members of the tractor test board:
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Vice-director of the COTTEC
Senior engineer

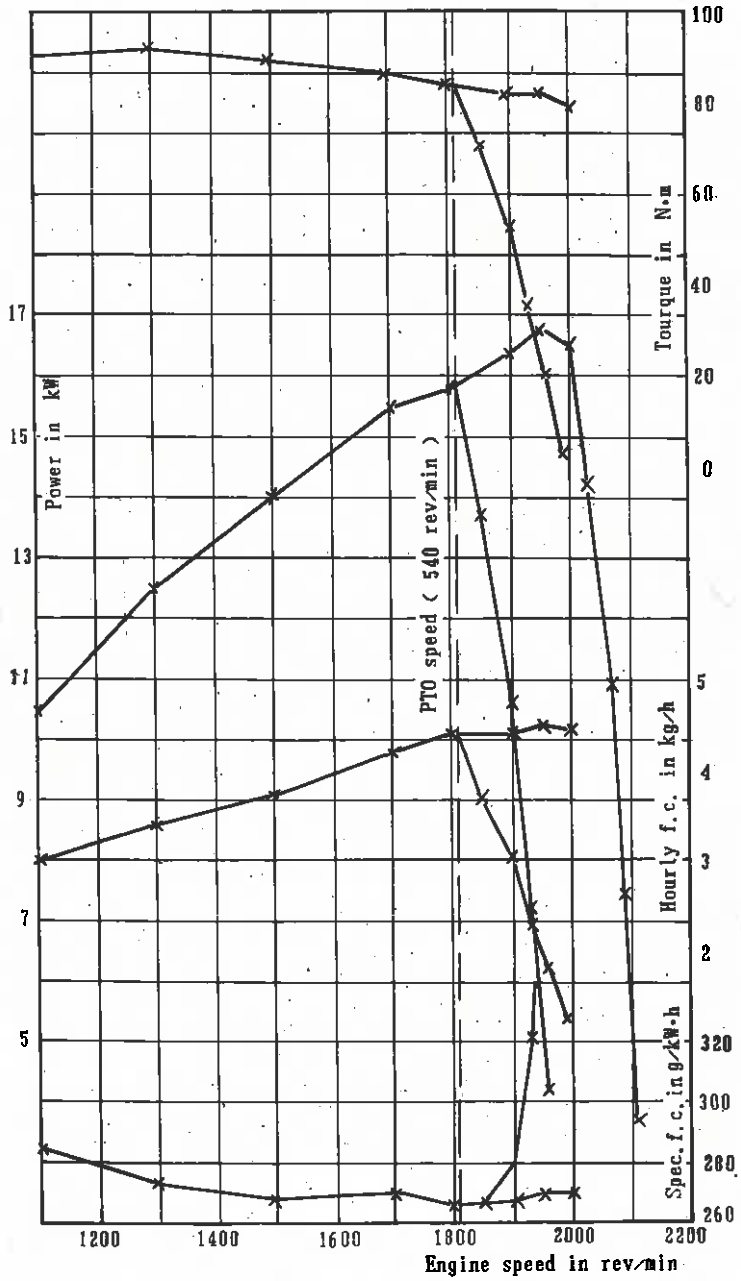
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Zhu Yinwu

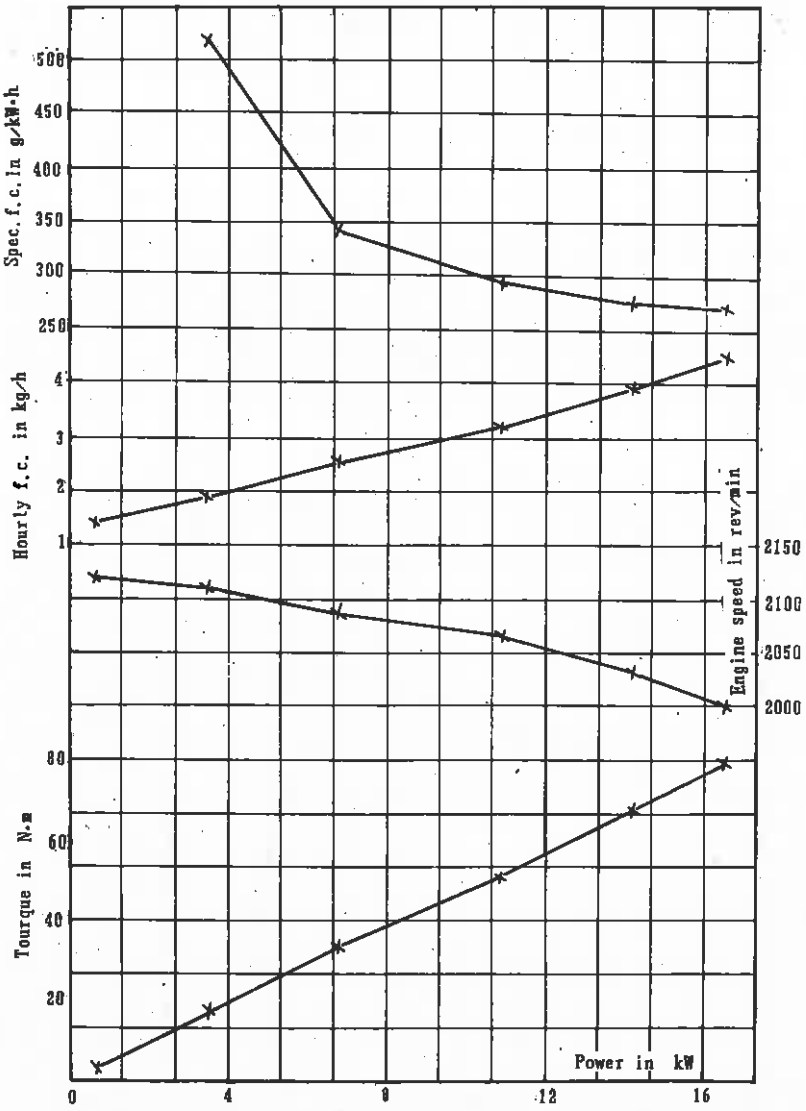
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ANNEX I

MAIN POWER TAKE-OFF TEST CURVES



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