COTTEC

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OECD TEST REPORT OF JIANGSU 654(4WD) 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.1/1 873 Full Code
Date Jan.6,2000

Tested Tractor
Make: Jiangsu
Model: 654
Type: 4WD

Submitted for test by
Name: Yituo Qingjiang Tractor Co., Ltd
Address: Huaiyin, Jiangsu, China
Tel: 86 517 3932141
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This report includes 26 pages and may only be duplicated as a whole

JS – 654 COTTEC Test No.9902 OECD No.1/1 873

TABLE OF CONTENTS

Page

SPECIFICATIONS OF TRACTOR ..... (3)

TEST CONDITIONS ..... (14)

TEST RESULTS ..... (17)

COMPULSORY TESTS ..... (17)

1. Main power take-off performance ..... (17)

2. Hydraulic power and lifting force ..... (19)

3. Drawbar performance ..... (21)

4. Turning area and turning circle ..... (22)

5. Location of centre of gravity ..... (22)

6. Braking ..... (22)

7. Measurement of external noise level ..... (23)

OPTIONAL TEST

8. Low temperature starting ..... (23)

REPAIRS AND ADJUSTMENTS DURING TESTS ..... (24)

REMARKS ..... (24)

ANNEX I Main power take-off test curves ..... (25)

This report has been approved by the OECD Co-ordinating Centre (CEMAGREF) in Antony (France) on. Jan. 6, 2000 Approved No. 1/1 873 Full code

JS－654　　COTTEC Test No.9902　　OECD No.1/1 873

Tractor manufacturer's name and address:	Yituo Qingjiang Tractor Co.Ltd. Huaiyin, Jiangsu, 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:	48 hours
Location of test:	COTTEC, Luoyang, Henan, China

SPECIFICATIONS OF TRACTOR

TRACTOR

—Make:	JIANGSU
—Model:	654
—Type:	4WD
—Number of driving wheels:	4
—Serial No.:	1762
—1st Serial No.:	1762

ENGINE

—Make:	China Yituo Group Co.Ltd.Diesel Engine Co.Ltd.
—Model:	LR4105T7
—Type:	4-stroke, water cooling, direct injection
—Serial No.:	9908647

Cylinders

—Number:	4	
—Disposition:	Vertical, in line	
—Bore/Stroke:	105/125	mm
—Capacity:	4330	cm^3
—Compression ratio:	17:1	
—Arrangement of valves:	Overhead, in line	
—Cylinder liners:	Wet	

Fuel system

—Fuel feed system:	Forced feed type	
—Fuel filter:		
·Make:	Yangzhou Agricultural Machinery Accessory works	
·Model/type:	C07085, paper cartridge, replaceable	
—Capacity of fuel tank:	53	dm^3
—Injection pump		
·Make:	China Yituo Group Co. Ltd Pump and Injector Works	
·Model/type:	I Serial, 4-cylinder plunger	
·Serial No.:	211	
—Manufacturer's production setting of injection pump:		
· Flow rate (at rated engine speed and full load):	13.61	dm^3/h
·Timing;	20 ± 1°before T.D.C.	
—Injectors:		
·Make:	China Yituo Group Co. Ltd Pump and Injector Works	
·Model/Type:	Long neck, single hole	
·Injection pressure:	20.1 ± 0.5	MPa

Governor

—Make:	China Yituo Group Co. Ltd Pump and Injector Works	
—Model/type:	Mechanical, centrifugal	
—Governed range of engine speed:	600 ~ 2380	rev/min
—Rated engine speed:	2200	rev/min

Air cleaner

—Pre-cleaner:	None	
—Main-cleaner		
·Make:	Bangbu Air-cleaner Works	
·Model/Type:	Oil bath	
·Location of air intake:	Left-hand side of engine	
·Maintenance indicator:	None	

Lubrication system

—Type of feed pump:	JX0811A Gear Pump	
—Type & Number of filter(s):	FL100 Full flow, Centrifugal, 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:	6	
—Fan diameter:	450	mm
—Coolant capacity:	17	dm^3
—Type of temperature control:	Thermostat	
—Superpressure system	20	kPa

Starting system

—Make:	Hubei Automobile Electrical Machinery Factory	
—Model/Type:	QD154E, D.C. solenoid engaged	
—Starter motor power rating:	3.7	kW
—Cold starting aid:	Eletrothermic plug	
—Safety device:	Main shift lever in neutral position	

Electrical system

—Voltage:	12(Negative earth)	V
—Generator:		
·Make:	Hubei Automobile Electrical Machinery Factory	
·Model/Type:	JFZ15219A, Alternator, belt driven	
·Power:	0.7	kW
—Battery(number of accumulators):		
·Model/Type:	3－QA－150, Lead accumulator	
·Number:	2	
·Rating:	150	Ah at 20 hours rating

Exhaust system

—Make:	Own make	
—Model/Type:	JS－654, expansion type, silencer	
—Location:	Right-hand side of the engine, vertical	

TRANSMISSION TO WHEELS

Clutch(Travel and Power Take-off)

—Make: Own make
—Model/Type: Singleplate, Dry, Double acting, constant engaging
—Number of plate(s): 2
—Diameter of plate(s): 280 mm
—Method of operation: By pedal

Gear box

—Make: Own make
—Model/Type: JS-654, Spur gear, planetary reduction. Compound.

—Description

	Forward	Reverse
Number of gears	4	1
Number of ranges/groups	Low/High	Low/High
Total of arrangements	8	2

—Available options: None

Rear axle and final drives

—Make: Own make
—Model/Type: Crown wheel and pinion spiral bevel gear differential, spur gear final drives fixed inside of the rear box.

—Differential Look:
- Type: Mechanical
- Method of engagement: Manual by lever
- Method of disengagement: Self disengaging

Front axle and final drives

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

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 2200 rev/min km/h
1	L	227.91	2.43
2	L	151.52	3.64
3	L	92.85	5.94
4	L	68.86	8.01
1	H	56.98	9.68
2	H	37.88	14.56
3	H	23.23	23.74
4	H	17.21	32.05
R_1	L	172.90	3.19
R_2	H	43.19	12.77

* Calculated with a tyre dynamic radius index of 665.0mm(ISO 4251/1－1992)
Number of revolutions of front wheels for one revolution of rear wheels:1.28

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 ends and speeds:	Manually by exchanging p.t.0 shafts	

Power take-off proportional to engine speed 540 rev/min

—Location:	At rear of the tractor	
—Diameter of power take－off shaft end:	Φ34.79	mm
—Number of splines:	6, in conformity with ISO 500/1991	
—Height above ground:	710	mm
—Distance from he median plane of the tractor:	0	mm

－Distance behind rear wheel axis:	224		mm
－PTO speed at rated engine speed:	634		rev/min
－Engine speed at standard power take－off speed:	1874		rev/min
－Ratio of rotation speeds (engine speed/p.t.o.speed):	3.47		
－Power restriction and maximum torque: (Manufacturers recommendation)	43kW	900N·m	
－Direction of rotation(viewed from behind tractor):	Clockwise		

1000 rev/min

－Location:	At rear of the tractor		
－Diameter of power take-off shaft end:	34.79		mm
－Number of splines:	6, in conformity with ISO 500/1991		
－Height above ground:	710		mm
－Distance from the median plane of the tractor:	.0		mm
－Distance behind rear wheel axis:	224		mm
－PTO speed at rated engine speed:	1150		rev/min
－Engine speed at standard power take－off speed:	1913		rev/min
－Ratio of rotation speeds (engine speed/p.t.o.speed):	1.91		
－Power restriction and maximun torque:	43kW	500N·m	
－Direction of rotation (viewed from behind tractor):	Clockwise		

Optional Power Take-off:

－Location:	At rear of the tractor		
－Diameter of power take-off shaft end:	38		mm
－Number of splines:	6, not in conformity with ISO 500/1991		
－Height above ground:	710		mm
－Distance from the median plane of the tractor:	0		mm
－Distance behind rear wheel axis:	224		mm
－PTO speed at rated engine speed:	808(L)	1075(H)	rev/min
－Engine speed at standard power take－off speed:	1470(L)	2045(H)	rev/min
－Ratio of rotation speeds			

(engine speed/p.t.o.speed):	2.72(L)	2.05(H)
– Power restriction and maximum torque:		
(Manufacturers recommendation)	43kW	750N·m
– Direction of rotation(viewed from behind tractor):	Clockwise	

Power take-off proportional to ground speed: None

HYDRAULIC POWER LIFT

– Make:	Own make	
– Type of hydraulic system:	Partial separated units, Open center	
– Type and number of cylinders:	Single acting, 1	
– Opening pressure of cylinder safety valve:	18	MPa
– Type of linkage lock for transport:	Hydraulic lock	
– Relief valve pressure setting:	17 ± 0.5	MPa
– Lift pump type:	CBN－E314, gear pump	
– Transmission between pump and engine:	Gear, driven from engine	
– Type and number of filter(s):	Screen fileter, 1	
– Site of oil reservoir:	In the hydraulic power lift housing	
– Tapping point(s)		
·Type:	Thread	
·Number:	1	
·Location:	Front side of hydraulic power lift housing	
– Maximum volume of oil available to external cylinders:	15	dm^3

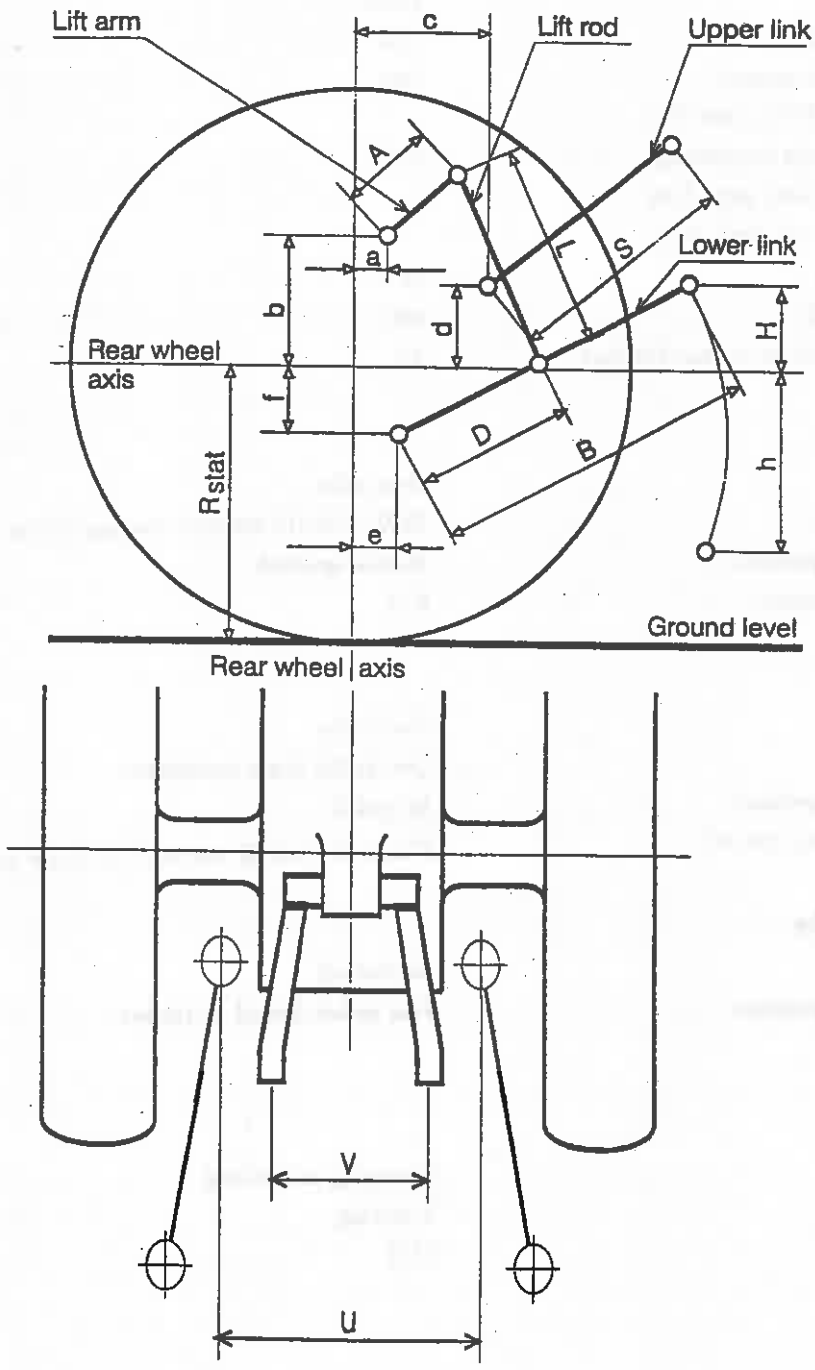
Three point linkage

– Category:	Ⅱ to ISO standard 730/Ⅰ－1994	
– Category adapter:	None	
– Linkage geometry:	See next page and following table	

		Dimension or range(＊) mm	Setting 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	66
pivot from rear wheel axis:	Vertically(b)	429	429
Horizontal distance between the 2 lower link points:	(u)	490	490
Horizontal distance between the 2 lift arm end points	(v)	508	508
Length of upper link	(S)	from 474 to 660	595
Distance of upper link pivot	Horizontally(c)	273	273
point from rear wheel axis:	Vertically(d)	from 271 to 345	308
Distance of lower link pivot	Horizontally(e)	－17	－17
point from rear wheel axis:	Vertically(f)	140	140
Distance of lower link pivot points to lift rod pivot points on lower links	(D)	450	450
Length of lift rods	(L)	from 590 to 760	710
Height of lower hitch points relative to the rear wheel axis:			
in low position	(h)	from 205 to 615	470
in high position	(H)	from 105 to 360	200
Height above ground of lower hitch points when locked in transport position		from 1025 to 770	

(＊) Assuming(r) with a type dynamic radius index of 665mm(ISO4251/1－1992)

Lift test – Linkage geometry:



TRAILER HITCH

– Type:	Fixed	
– Hole diameter:	Φ34	mm
– Height above ground:	580	mm
– Distance of hitch point from rear wheel axis, horizontally:	704	mm
– Distance of hitch point from power take – off shaft end:		
· Vertically:	411	mm
· Horizontally:	490	mm
– Maximum vertical permissible load:	15	kN

STEERING

– Make:	Own make	
– Model/Type:	BZZI – 100, Hydrostatic steering system	
– Method of operation:	Manual operated	
– Working pressure:	6.5	MPa

BRAKES

– Make:	Own make	
– Model/Type	Dry double plates mechanical	
– Method of operation:	By pedals	
– Traiter braking take-off:	Pneumatic braking, operated by tractor pedals	

Parking brake

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

WHEELS

– Number		
· Front:	2, steering and driving	
· Rear:	2, driving	
– Wheelbase:	2115	mm

－Track width adjustment:

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

PROTECTIVE STRUCTURE

—Make/Model/Type: not applicable
—Manufacture's name andaddress: not applicable
—Protective device: not applicable

DRIVER'S SEAT

－Make: Own make
－Model/Type: C1M3 Adjustable suspension
－Seat and streering wheel reversible: No
－Type of suspension: Spring with damper
－Type of damping Hydraulic damper
－Range of adjustment:
・Longitudinal: 70 mm
・Vertical: 0 mm
－Safety belt: No

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	1435	140 × 90	210
Sidelight	1515	135 × 65	670
Rearlight	1520	Φ150	700
Brakelight	1505	Φ100	700

Specifications:

	Used during test	Recommended
Engine oil		
Type:	SAE 10W/30	CA－30
Viscosity:	11.4mm²/s at 100℃	10 mm²/s at 100℃
Classification:	API CC	GB 5353－85
Transmission oil		
Type:	SAE 80W/90	80W/90
Viscosity:	9.3mm²/s at 100 ℃	15～19mm²/s at 100℃
Classification:	API GL－4	SH0350－92
Hydraulic fluid		(China standard)
Type:	Same as trans.oil	
Viscosity:		Same as trans.oil
Classification:		
Steering oil		
Type:	Same as trans.oil	Same as trans.oil
Viscosity:		
Classification:		

Grease

- Type: ZFD－12 complex calcium base grease ZBE 36003－88(China standard)
- Number of lubrication points: 21

Fuel

- Type: Standard diesel fuel in conformity with GB 10327－89
- Density at 15℃ 0.852 g/cm³

JS – 654 COTTEC Test No.9902 OECD No.1/1 873

TEST RESULTS

COMPULSORY TESTS RESULTS

1. MAIN POWER TAKE-OFF

– Date and location of tests: Jul.,15,1999. COTTEC

– Type of dynamometer: LPA-Bedienpult 250 Elec. dynamometer

Power kW	Speed		Fuel consumption			Specific energy kW·h/l
	Engine rev/min	P.T.O. rev/min	Hourly kg/h	Hourly l/h	Specific g/kW·h	
1.1 MAXIMUM POWER – TWO HOURS TEST						
44.68	2200	634	11.17	13.11	250	3.41
1.2 POWER AT RATED ENGING SPEED						
44.68	2200	634	11.17	13.11	250	3.41
1.3 STANDARD POWER TAKE – OFF SPEED (540 ± rev/min)						
41.96	1874	540	10.17	11.94	242	3.51
1.4 PART LOADS						
1.4.1 The torque corresponding to max. power at rated engine speed						
44.68	2200	634	11.17	13.11	250	3.41
1.4.2 85% of the torque obtained in 1.4.1						
38.75	2245	647	9.98	11.71	258	3.31
1.4.3 75% of the torque defined in 1.4.2						
29.42	2273	655	8.32	9.77	283	3.01
1.4.4 50% of the torque defined in 1.4.2						
19.85	2300	663	6.62	7.77	334	2.55
1.4.5 25% of the torque defined in 1.4.2						
10.05	2328	671	5.04	5.92	502	1.70
1.4.6 Unloaded						
1.07	2356	679	3.68	4.32	—	—

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 PART LOADS AT STANDARD POWER TAKE－OFF SPEED 540 rev/min						
1.5.1 The torque corresponding to maximum power						
41.96	1874	540	10.17	11.94	242	3.51
1.5.2 85% of the torque obtained in 1.5.1						
37.73	1985	572	9.36	10.99	248	3.43
1.5.3 75% of the torque defined in 1.5.2						
28.88	2023	583	7.67	9.00	267	3.21
1.5.4 50% of the torque defined in 1.5.2						
19.49	2051	591	6.02	7.07	309	2.76
1.5.5 25% of the torque defined in 1.5.2						
9.91	2079	599	4.44	5.21	448	1.90
1.5.6 Unloaded						
0.83	2106	607	3.03	3.56	—	—

– No load maximum engine speed:	2356	rev/min
– Equivalent crankshaft torque at maximum power at rated engine speed	193.9	N·m
– Maximum Equivalent crankshaft torque: (Engine speed: 1374 rev/min)	246.4	N·m
– Mean atmospheric conditions		
·Temperature:	28	℃
·Pressure:	98.8	kPa
·Relative humidity:	68	%
– Maximum temperatures		
·Coolant:	78	℃
·Fuel:	30	℃
·Engine air intake:	28	℃
·Engine oil:	87	℃

JS－654　　COTTEC　Test No.9902　　OECD No.1/1 873

2. HYDRAULIC POWER AND LIFTING FORCE

－Date and location of tests:　19th Jul.,1999

2.1 HYDRAULIC POWER TEST

－Sustained pressure with relief valve open:　17.6　MPa

－Pump delivery rate at minimum pressure:　31.61　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	23.75	15.8	6.25
Flow rate and hydyaulic pressure corresponding to max.hydraulic power	25.51	15.3	6.49

－Tapping point used for test:　At rear part of the tractor

－Temperature of hydraulic fluid:　65.5　℃

－Opening pressure of the unloading valve:　None

－Closing pressure of the unlading valve:　None

2.2 POWER LIFT TEST

	At the hitch point	On the frame at the 610 mm point
Height of lower hitch points above ground in down position(with lifting force) mm	195	115
Vertical movement(with Lifting force) mm	670	840
Maximum corrected force exerted throught full range kN	19.55	11.42
Corresponding pressure of hydraulic fluid MPa	15.3	15.3
Moment about rear wheel axle kN·m	16.87	16.82
Maximum tilt angle of mast from vertical degrees	—	10.2

—Linkage setting for test: see above table table and figures on page 11

Lifting heights relative to the horizontal plane inculding the lower link pivot points											
mm	－410	－330	－300	－200	－100	0	100	200	300	320	430
Lifting forces (the values of force 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	—	24.07	24.19	24.38	24.21	23.70	23.00	22.25	21.06	19.55	—
Corresponding pressure: 15.3 MPa											
At the frame kN	21.08	21.01	20.40	19.74	18.53	17.48	16.30	14.94	13.70	12.34	11.42
Corresponding pressure: 15.3 MPa											

3. DRAWBAR PERFORMANCE

—Date of tests: 24th ~ 25th Jul. 1999

—Type of track: Concrete

	Height of drawber above ground mm	Tyre inflation pressure kPa	
		Front	Rear
Unballasted	490	100	100
Ballasted	485	100	100

Gear and range	Power kW	Drawber pull kN	Speed km/h	Engine speed rev/min	Slip of wheels %	Specific fuel Consumption g/kW·h	Sencific energy kW·h/l	Temperature			Atmospheric conditions		
								Fuel ℃	Coolant ℃	Engine oil ℃	Temperature ℃	Relative humidity %	Pressure kPa
3.1 MAXIMUM POWER IN TESTED GEARS(unballasted tractor, 4WD)													
2	20.30	22.70	3.22	2277	14.95	382	2.23	29	77	77	28	68	98.8
3	32.67	22.84	5.15	2224	14.95	324	2.63	29	77	78	28	68	98.8
4	35.87	17.81	7.25	2200	9.51	314	2.71	29	77	78	28	68	98.8
5	37.77	15:40	8.83	2200	8.00	298	2.86	29	78	81	28	68	98.8
3.2 MAXIMUM POWER IN TESTED GEARS(ballasted tractor, 4WD)													
1	15.54	25.54	2.19	2302	15.12	436	1.95	30	77	78	29	68	98.8
2	23.28	25.63	3.27	2272	14.86	360	2.37	30	77	80	29	68	98.8
3	34.97	24.07	5.23	2201	13.11	321	2.65	30	78	81	29	68	98.8
4	35.47	17.42	7.33	2200	8.64	320	2.66	30	78	81	29	68	98.8
5	37.20	14.88	9.00	2198	7.10	305	2.79	30	78	82	33	68	98.5
3.3 TEN – HOUR TEST(ballasted tractor, 4WD)													
3.3.1 FIVE – HOUR TEST at 75% of pull at maximum power													
4	28.13	13.15	7.70	2248	6.30	338	2.52	30	78	80	30	69	98.5
3.3.2 FIVE – HOUR TEST at pull corresponding to 15% wheelslip without additional ballast													
2	23.11	25.68	3.24	2272	14.9	359	2.37	30	77	80	29	69	99.0

Oil consumption during ten hours duration of tests 3.3.1 and 3.3.2: 70 g/h

JS – 654 COTEC Test No. 9902 OECD No. 1/1 873

REPAIRS AND ADJUSTMENTS DURING TESTS:

None

REMARKS:

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

Director of the COTTEC
Senior engineer

Lu Zhenzhou

Responsible engineer for these tests:
Senior engineer

Fan Jianhua

Vice-director of the COTTEC
Senior engineer

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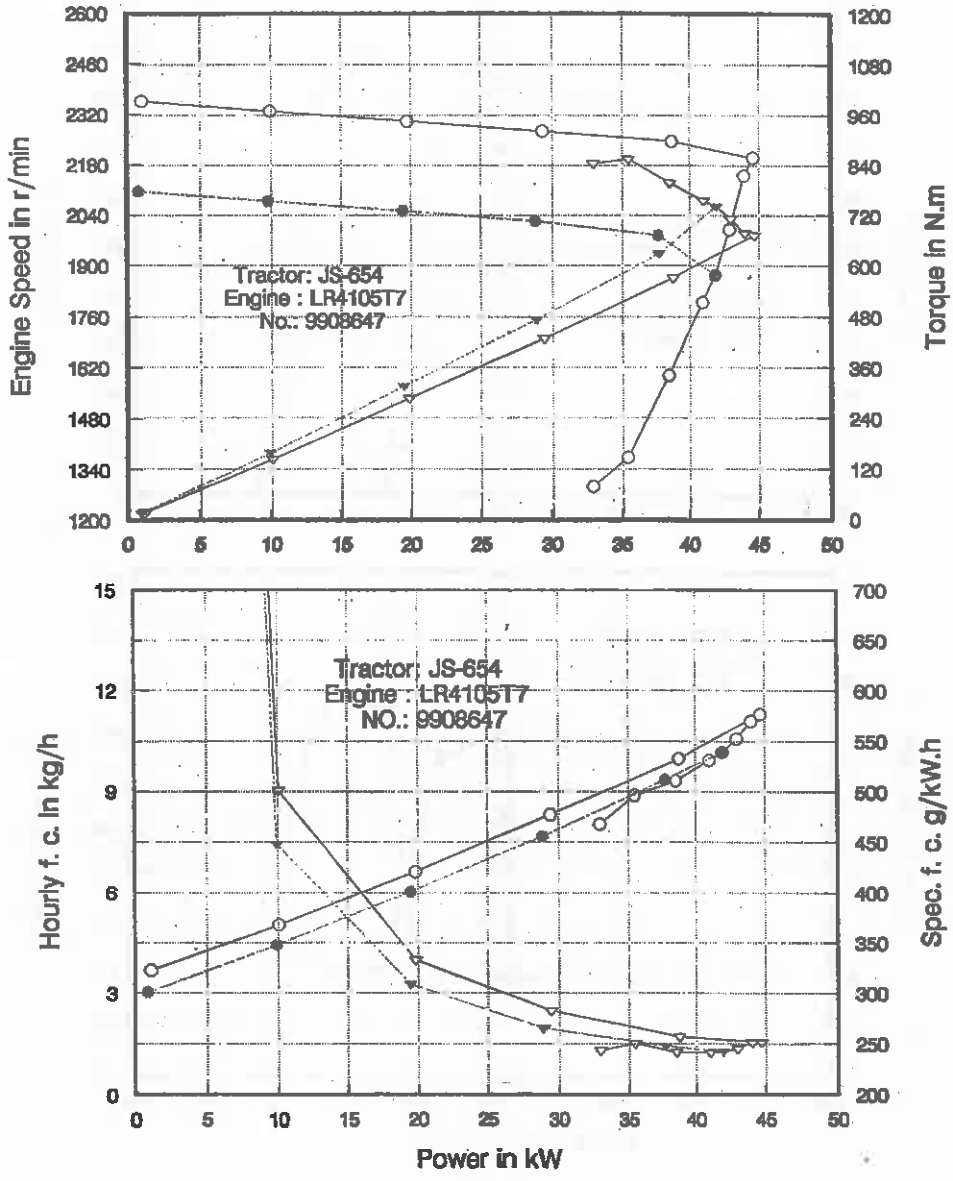
Vice-director of the COTTEC
Senior engineer

Guo Qingchen

Editor for the test roport publish:
Senior Engineer　Fan Jianhua
Engineer　Chen Zhiqiang

Date: Oct.30, 1999

ANNEX I
MAIN POWER TAKE-OFF TEST CURVES



MAIN POWER TAKE-OFF TEST CURVES

