COTTEC

CHINA
OFFICIAL TRACTOR
TEST AND
EVALUATION CENTRE

Address:
Luoyang tractor
research institute
Luoyang, Henan, China
Tel:86 379 4921001
Fax:86 379 4912417

OECD TEST REPORT OF JM—204 (4WD) AGRICULTURAL TRACTOR (CODE Ⅰ)

Report on test in accordance with the OECD standard code I (FULL CODE)
for the Official Testing of Agricultural and Forestry Tractor



OECD Approval

No.1657 Full Code

Date Apr.17, 1997

Tested Tractor
Make: JIN MA
Model: 204
Type:4WD－30km/h Version

Submitted for test by
Name: Yancheng Tractor Works
Address: Yancheng, Jiangsu, China
Tel:86 515 8313688
Fax:86 515 8321710

This report includes 25 pages and may only be duplicated as a whole

JM－204　　COTTEC Test No. 961686　　OECD No. 1657

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This report has been approved by the OECD Co-ordinating Centre (CEMAGREF) in Antony (France) on Apr. 17, 1997. Approved No. 1657 Full code

JM－204　　COTTEC Test No. 961686　　OECD No. 1657

Tractor manufacturer's name and address:	Yancheng Tractor Works Yancheng, 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:	40 hours
Location of test:	COTTEC, Luoyang, Henan, China

SPECIFICATIONS OF TRACTOR

IDENTIFICATION

—Make:	JIN MA
—Model:	204
—Type:	4WD
—Number of driving wheels:	4
—Serial No.:	3244
—1st Serial No.:	3244

ENGINE

—Make:	Jianxiang Diesel Engine Works
—Model:	TY290TA2
—Type:	4 stroke, directer injection, water cooling, naturally aspirated
—Serial No.:	384

Cylinders

—Number:	2	
—Disposition:	Vertical	
—Bore/Stroke:	90/100	mm
—Capacity:	1272	cm^3
—Compression ratio:	18/1	
—Arrangement of valves:	Overhead	
—Cylinder liners:	Wet type	

Fuel system

—Fuel feed system:	Plunger transfer Pump
—Fuel filter:	

. Make:	Henan Yanjin Engine Accessory Works	
. Model /type:	C0506B, paper catridge,	
—Capacity of fuel tank:	19	dm^3
—Injection pump		
. Make:	Wuxi Pump and Injector Works	
. Model/type:	2-cylinder plunger, Series 1	
. Serial No. :	28757	
—Manufacturer's production setting of injection pump:		
. Flow rate (at rated engine speed and full load):	4.6	dm^3/h
. Timing:	22°～28° before T.D.C.	
—Injectors:		
. Make:	Shaoguan Pump and Injector Works	
: Model/Type:	TS4100, multihole	
. Injection pressure:	18.13＋0.49	MPa

Governor

—Make:	Wuxi Pump and Injector Works	
—Model/type:	Mechanical, incorporated into fule injection pump	
—Governed range of engine speed:	650～2530	rev/min
—Rated engine speed:	2300	rev/min

Air cleaner

—Make:	Zhoukou No. 8 Engine Accessory Works	
—Model/Type:	Kllll2 oil bath with mesh screen	
—Location of air intake:	Left of the engine	
—Maintenance indicator:	None	

Lubrication system

—Type of feed pump:	Rotor	
—Type & Number of filter(s):	JX0701C, 1	

Cooling system

—Type of coolant:	Water	
—Type of pump:	Centrifugal, belt driven	
—Specification of fan or blower:	Axial flow type, belt driven	
—Number of fan blades:	4	
—Fan diameter:	255	mm

—Coolant capacity:	8	dm^3
—Type of temperature control:	Thermostat	
—Superpressure system	None	
Starting system		
—Make:	Weihai Automobile Starting Motor Works	
—Model/Type:	QD1257A Electrical, solenoid pre-engaged	
—Starter motor power rating:	1.8	kW
—Cold starting aid:	Preheater	
—Safety device:	Main shift lever in neutral position	
Electrical system		
—Voltage:	12 (Negative earth)	V
—Generator:		
. Make:	Wuxi Dongfang Engine Electrical Machinery	
. Model/Type:	2JF200 alternator, belt driven	
. Power:	0.2	kW
—Battery(number of accumulators):		
. Model/Type:	6－QA－60, Lead acid	
. Number:	1	
. Rating:	60	Ah at 20 hours rating
Exhaust system		
—Make:	Jianxiang Diesel Engine Works	
—Model/Type:	Expension type silencer	
—Location:	Right-hand side of the engine, vertical	

TRANSMISSION TO WHEELS

—Clutch		
—Make:	Own make	
—Model/Type:	Dry, Single disk, Travel and Power Take-off	
—Number of plate(s):	2	
—Diameter of plate(s):	200	mm
—Method of operation:	Mechanically by pedal	
Gear box		
—Make:	Own make	
—Model/Type:	JM-204, Spur gear, $2 \times (3+1) \times 2$ compound	

—Arrangment:	type Gear box with 3 forward and 1 reverse gears, and with 2 ranges(L and H) in the rear, and with CREEP and FAST speed group in the front.
—Number of gears:	12 forward and 4 reverse gears
—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:	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 drives

Total ratios and travelling speeds

No	Group	Gear No	Rang	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	Creep	Ⅰ	L	1345.781	0.30
2		Ⅱ		681.328	0.60
3		Ⅲ		392.657	1.00
4		Ⅰ	H	291.137	1.40
5		Ⅱ		147.394	2.77
6		Ⅲ		84.945	4.62
7	Fast	Ⅰ	L	250.944	1.62
8		Ⅱ		127.045	3.21
9		Ⅲ		73.218	5.35
10		Ⅰ	H	54.287	7.51
11		Ⅱ		27.484	14.83
12		Ⅲ		15.839	24.75
R1	Creep	R	L	1696.855	0.24
R2		R	H	367.086	1.11
R3	Fast	R	L	316.407	1.29
R4		R	H	68.449	5.96

* Calculated with a tyre dynamic radius index of 470 mm (ISO 4251/1-1992).

Number of revolutions of front wheels for one revolution of rear wheels: 1.575

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:	None	

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 500/1991	
—Height above ground:	470	mm
—Distance from the median plane of the tractor:	0	mm
—Distance behind rear wheel axis:	281	mm
—PTO speed at rated engine speed:	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:	14.8kW　236N·m	
—Direction of rotation(viewed from behind tractor):	Clockwise	

POWER LIFT

—Make:	Own make	
—Type of hydraulic system:	Partial separated units, Open center system	
—Type and number of cylinders:	Single acting, 1	
—Type of linkage lock for transport:	Hydraulic lock	
—Opening pressure of cylinder safety valve:	None	
—Relief valve pressure setting:	16＋0.5	MPa
—Lift pump type:	CBN－E306L－X_1, gear pump	
—Transmission between pump and engine:	Gear, driven from engine	
—Type and number of filter(s):	Screen fileter, 1	
—Site of oil reservior:	In the hydraulic power lift housing	
—Tapping point(s) ·Type:	Thread	

・Number: 1

・Location: Right side of hydraulic power lift housing

—Maximum volume of oil available to external cylinders: 5.0 dm^3

Three point linkage

—Category: O to ISO standard 730/I－1990

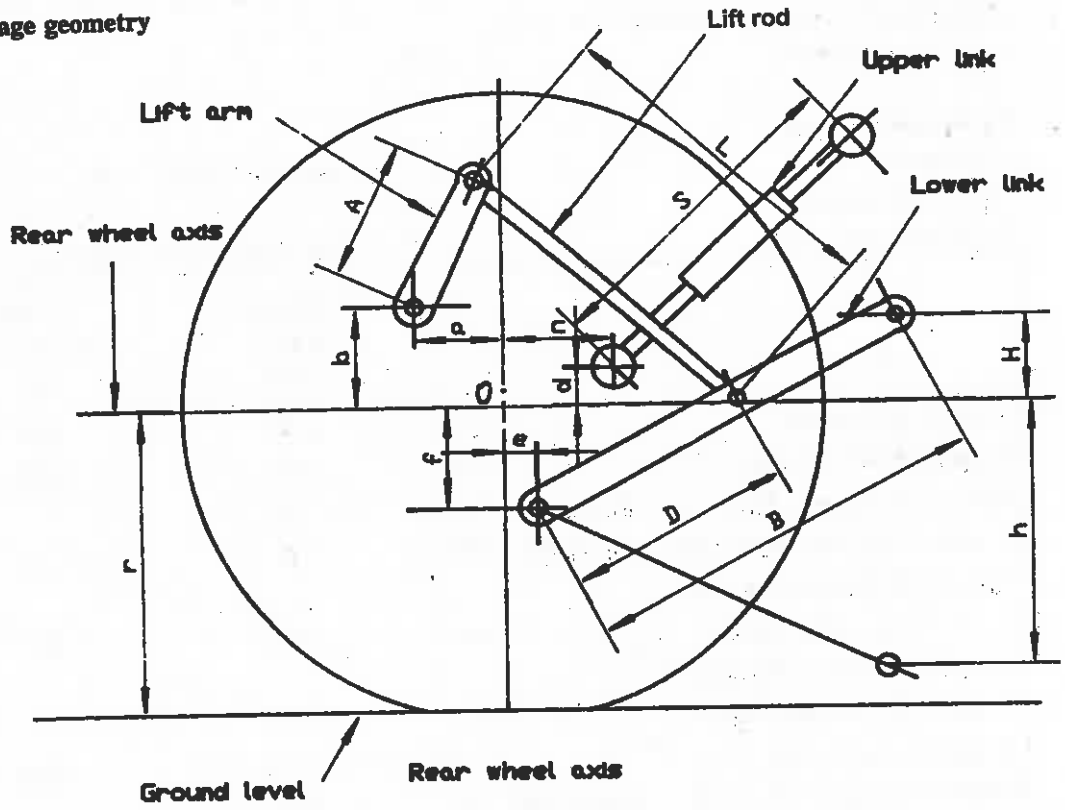
—Category adapter: None

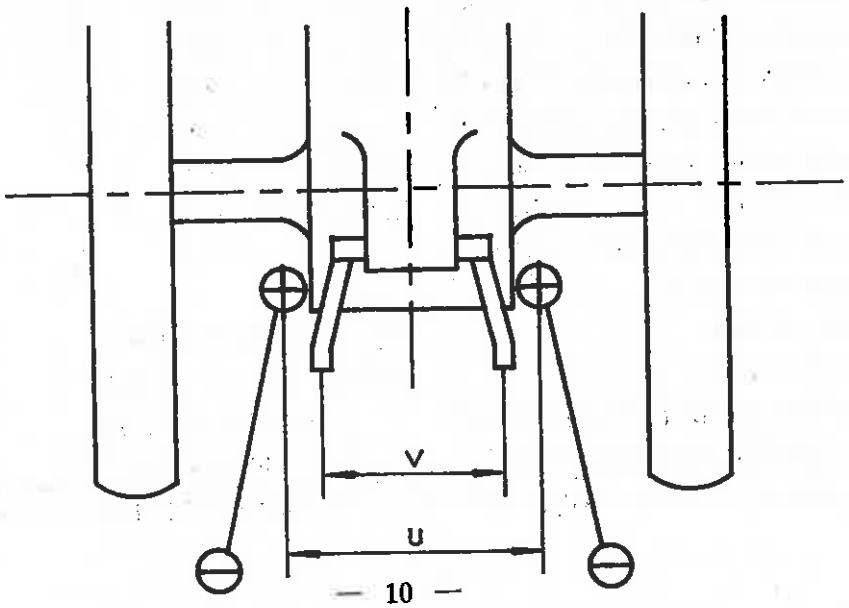
—Linkage geometry: See following table and next page

		Dimension or range * mm	Setting used in test mm
Length of lift arms	(A)	190	190
Length of lower links	(B)	600	600
Distance of lift arm pivot point from rear wheel axis: Horizontally	(a)	－30	
Vertically	(b)	299	
Horizontal distance between the 2 lower link points:	(u)	304	304
Horizontal distance between the 2 lift arm end points	(v)	332	332
Length of upper link	(S)	from 460 to 554	500
Distance of upper link pivot point from rear wheel axis: Horizontally	(c)	230	
Vertically	(d)	215	
Distance of lower link pivot point from rear wheel axis: Horizontally	(e)	155	
Vertically	(f)	109	
Distance of lower link pivot points to lift rod pivot points on lower links	(D)	268.5	268.5
Length of lift rods	(L)	from 380 to 520	425
Height of lower hitch points relative to the rear wheel axis:			
in low position	(h)	from 40 to 440	220
in high position	(H)	from 375 to 125	330
Height above ground of lower hitch points when locked in transport position		Any height within lift range	

* Assuming (r) with a tyre dynamic radius index of 470mm(ISO4251/1－1992)

Linkage geometry





TRAILER HITCH

—Type:	Fixed	
—Hole diameter:	20	mm
—Height above ground:	335	mm
—Distance of hitch point from rear wheel axis, horizontally:	380	mm
—Distance of hitch point from power take-off shaft end:		
. Vertically:	115	mm
. Horizontally:	219	mm
—Maximum vertical permissible load:	5	kN

HOLED DRAWBAR　None

STEERING

—Make:	Ninbo Steering Machinery Works
—Model/Type:	Screw and recirculating ball
—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
—Method of operation:	Foot pedals, locked by ratchet

WHEELS

—Number		
. Front:	2, steering and driving	
. Rear:	2, driving	
—Wheelbase:	1510	mm
—Track width adjustment:		

	Minimum mm	Maximum mm	Adjustment method
Front	950	950	None
Rear	950	1150	Reversing wheels and off-set lug rims

DRIVER'S SEAT

—Make: Anbu Automobile Accessory Works
—Model/Type: Operator's sofa
—Type of suspension: None
—Type of damping None
—Range of adjustment:
. Longitudinal: 60 mm
. Vertical: 0 mm
—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	1080	140×105	89
Sidelight	——	——	——
Rearlight	1170	160×95	400
Reflectors	——	——	——

TEST CONDITIONS

OVERALL DIMENSIONS

	Length	Width		Height at top of	
		Minimum	Maximum	protective structure	exhaust silencer
	mm	mm	mm	mm	mm
Ballasted	2655	1220	1525	2085	1940
Unballasted	2655	1220	1370	2085	1940

GROUND CLEARANCE(unballasted tractor) 297 mm

—Clearance limiting part: Under the front axle

TRACTOR MASS

Without protective structure:

	Ballasted		Unballasted	
	Without driver kg	With driver kg	Without driver kg	With driver kg
Front	516	525	510	514
Rear	817	883	613	684
Total	1333	1408	1123	1198

BALLAST

	Weights		Water
	Number	Total mass kg	kg
Front	—	—	—
Rear	6	210	—
Optional	—	—	—

TYRE SPECIFICATIONS

	Front	Rear
Tyres:		
Dimensions	6.00—12	8.3—24
Ply rating	4	4
Type	Cross ply	Cross ply
Maximum load (tyre manufacturer's)	3.35 kN	5.70 kN
Inflation pressure (tyre manufacturer's)	160—180 kPa	100—120 kPa
Dynamic radius index	307 mm	470 mm
Chosen track width:	950 mm	1000 mm

OILS AND LUBRICATION

Capacity and change interval:

	Capacity	Oil change	Filter change
	dm^3	h	h
Engine	5	250	500
Gear box	11	500	—
Rear axle	Common with gear box		—
Final drive (rear)	Common with gear box		—
Front axle	7	500	—
Final drive (front)	Common with front axle		—
Hydraulic system	7	1000	500
Steering	0.3	1000	—

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Specifications:

	Recommended	Used during test
Engine oil		
Type:	SAE 10W/30	CA—30
Viscosity:	11.4 cSt at 100℃	11 cSt at 100℃
Classification:	API CC	GB 5323－85
Transmission oil		
Type:	SAE 80	HQB－10
Viscosity:	9.3 cSt at 100℃	11 cSt at 100℃
Classification:	API GL－4	GB 485－84 (China standard)
Hydraulic fluid		
Type:	Same as trans. oil	Same as engine oil
Viscosity:		
Classification:		
Steering oil		
Type:	Same as trans. oil	Same as trans. oil
Viscosity:		
Classification:		

Grease

—Type: Multi－purpose grease

—Number of lubrication points: 13

Fuel

—Type: Standard diesel fuel in conformity with GB 10327－89 (China standard)

—Density at 15℃: 0.852 g/cm^3

TEST RESULTS

COMPULSORY TESTS RESULTS

1. MAIN POWER TAKE-OFF

—Date and location of tests: June 15, 1996, COTTEC

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

Power	Speed		Fuel consumption			Specific
	Engine	P.T.O.	Hourly		Specific	energy
kW	rev/min	rev/min	kg/h	1/h	g/kW·h	kW·h/l
1.1 MAXIMUM POWER － TWO HOURS TEST						
15.03	2200	572	4.34	5.09	289	2.95
1.2 POWER AT RATED ENGINE SPEED						
14.21	2300	598	3.99	4.68	281	3.03
1.3 STANDARD POWER TAKE-OFF SPEED (540 ± 10 rev/min)						
14.93	2077	540	4.38	5.14	293	2.91
1.4 PART LOADS						
1.4.1 The torque corresponding to max. power at rated engine speed						
14.21	2300	598	3.99	4.68	281	3.03
1.4.2 85% of the torque obtained in 1.4.1						
12.17	2315	602	3.39	3.98	281	3.06
1.4.3 75% of the torque defined in 1.4.2						
9.06	2327	605	2.81	3.30	310	2.75
1.4.4 50% of the torque defined in 1.4.2						
6.01	2350	611	2.16	2.54	359	2.37
1.4.5 25% of the torque defined in 1.4.2						
3.09	2365	615	1.61	1.89	521	1.64
1.4.6 Unloaded						
0.91	2388	621	1.29	1.51	—	—

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Power	Speed		Fuel consumption			Specific
	Engine	P.T.O.	Hourly		Specific	energy
kW	rev/min	rev/min	kg/h	1/h	g/kW·h	kW·h/l
1.5 PART LOADS AT STANDARD POWER TAKE-OFF SPEED						
1.5.1 The torque corresponding to maximum power						
14.93	2077	540	4.38	5.14	293	2.91
1.5.2 85% of the torque obtained in 1.5.1						
12.71	2085	542	3.47	4.07	273	3.12
1.5.3 75% of the torque defined in 1.5.2						
9.71	2123	552	2.64	3.10	272	3.13
1.5.4 50% of the torque defined in 1.5.2						
6.54	2146	558	2.01	2.36	307	2.78
1.5.5 25% of the torque defined in 1.5.2						
3.30	2165	563	1.79	2.10	542	1.57
1.5.6 Unloaded						
0.84	2192	570	1.10	1.29	—	—

—No load maximum engine speed:	2388	rev/min
—Equivalent crankshaft torque at maximum power at rated engine speed:	59.02	N·m
—Equivalent crankshaft torque at maximum power:	65.26	N·m
—Maximum Equivalent crankshaft torque: (Engine speed: 1777 rev/min)	72.28	N·m
—Mean atmospheric conditions		
.Temperature:	32	℃
.Pressure:	99.4	kPa
.Relative humidity:	70	%
—Maximum temperatures		
.Coolant:	98	℃
.Fuel:	31	℃
.Engine air intake:	38	℃
.Engine oil:	115	℃

2. HYDRAULIC POWER AND LIFTING FORCE

—Date of tests: June 14, 1996

2.1 HYDRAULIC POWER TEST

—Sustained pressure with relief valve open: 16.0 MPa
—Pump delivery rate at minimum pressure: 14.24 1/min

	Flow rate 1/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	9.63	14.4	2.31
Flow rate and hydyaulic pressure corresponding to max. hydraulic power	11.4	13.1	2.49

—Tapping point used for test: Right side of hydraulic power lift housing
—Temperature of hydraulic fluid: 65 ℃
—Opening pressure of the unloading valve: None
—Closing pressure of the unloading valve: None

2.2 POWER LIFT TEST

—Sustained pressure with relief valve open: 16.0 MPa
—Temperature of hydraulic fluid: 65 ℃

		At the hitch point	On the frame
Height of lower hitch points above ground in down position	mm	258	230
Vertical movement	mm	542	682
Maximum corrected force exerted throught full range	kN	8.10	4.23
Corresponding pressure of hydraulic fluid	MPa	14.4	14.4
Moment about rear wheel axle	kN·m	6.11	5.77
Maximum tilt angle of mast from vertical	degrees	—	14.7

—Linkage setting for test: see above table and figures

Lifting heights relative to the horizontal plane inculding the lower link pivot points								
mm	－130	－110	0	＋100	＋200	＋300	＋390	＋500
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)								
At the hitch point kN		9.27	8.82	8.55	8.37	8.19	8.10	
Corresponding pressure: 14.4 MPa								
At the frame kN	8.01	7.92	7.47	7.02	6.39	5.76	5.13	4.23
Corresponding pressure: 14.4 MPa								

3. DRAWBAR PERFORMANCE

—Date of tests: June 16～17, 1996

—Type of track: Concrete

	Height of drawbar above ground mm	Tyre inflation pressure kPa	
		Front	Rear
Unballasted	315	160	110
Ballasted	310	160	110

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)													
FⅠL	3.67	9.11	1.45	2362	15.1	537	1.59	30	79	93	30	70	99.4
FⅡL	7.15	9.20	2.80	2324	14.9	408	2.09	31	81	98	30	70	99.4
FⅢL	11.35	9.10	4.50	2200	14.0	381	2.24	31	82	99	30	70	99.4
FⅠH	12.47	6.74	6.66	2199	7.9	350	2.43	31	82	100	30	70	99.4
3.2 MAXIMUM POWER IN TESTED GEARS (ballasted tractor)													
CⅠL	0.80	10.65	0.27	2370	15.0	1925	0.44	30	80	94	30	70	99.5
CⅡL	1.66	10.68	0.56	2367	15.0	1024	0.83	31	80	95	30	70	99.5
CⅢL	2.65	10.71	0.89	2363	15.1	732	1.16	31	81	95	30	70	99.5
CⅠH	3.69	10.55	1.26	2351	14.9	572	1.49	31	81	96	30	70	99.5
CⅡH	7.28	10.69	2.45	2322	15.1	415	2.05	31	81	96	31	70	99.5
CⅢH	11.49	10.66	3.88	2200	15.0	380	2.24	31	82	97	31	70	99.5
FⅠL	4.15	10.60	1.41	2351	15.1	513	1.67	30	78	95	30	70	99.4
FⅡL	8.08	10.61	2.74	2316	14.9	402	2.12	31	81	98	30	70	99.4
FⅢL	11.80	9.21	4.61	2201	9.9	373	2.28	31	81	104	31	70	99.4
FⅠH	12.69	6.78	6.74	2198	6.4	348	2.45	31	82	108	31	70	99.4
3.3 TEN-HOUR TEST (ballasted tractor)													
3.3.1 FIVE-HOUR TEST at 75% of pull at maximum power													
FⅠH	10.14	5.08	7.18	2313	4.57	364	2.34	31	81	104	31	70	99.5
3.3.2 FIVE-HOUR TEST at pull corresponding to 15% wheelslip without additional ballast													
FⅡL	8.21	10.78	2.74	2315	—	—	—	31	82	105	31	70	99.5

Oil consumption during ten hours duration of tests 3.3.1 and 3.3.2 : 19.0 g/h

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4. TURNING AREA AND TURNING CIRCLE

Details of wheel equipment:

	Tyre size	Track mm
Front	6.00－12	950
Rear	8.3－24	1000

	With brakes		Without brakes	
	Right hand m	Left hand m	Right hand m	Left hand m
Radius of turning area	2.45	2.46	2.76	2.65
Radius of turning circle	2.32	2.35	2.63	2.54

5. LOCATION OF CENTRE OF GRAVITY

—Height above ground: 635 mm

—Distance forward from the vertical plane containing the axle of the rear wheels: 648 mm

—Distance from the median plane of the tractor: R4 mm

6. BRAKING

—Date of tests: June 18, 1996

—Type of track: Concrete

—Speed before application of brakes: 26.3 km/h

6.1 COLD SERVICE BRAKING DEVICE TEST

Ballasted tractor	Braking device control force N	190	240	295	355	420	490
	Mean deceleration m/s^2	0.62	1.46	2.57	2.99	3.29	3.51
Unballasted tractor	Braking device control force N	220	236	281	390	460	480
	Mean deceleration m/s^2	0.77	1.30	2.31	2.97	3.17	3.34

6.2 FADE TEST

Ballasted tractor	Braking device control force N	235	269	302	410	480	520
	Mean deceleration m/s^2	0.79	1.31	2.27	2.86	3.12	3.24

—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	320	320

7. MEASUREMENT OF EXTERNAL NOISE LEVEL

—Date of tests: June 18, 1996
—Sound level meter, Make/Model/Type: B & K 2209
—Type of track: Concrete
—Gear number: FⅢH
—Travelling speed before acceleration: 19.7 km/h
—Sound level: 84.0 dB(A)

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 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

郭清臣

Senior engineer

Members of the tractor test board:

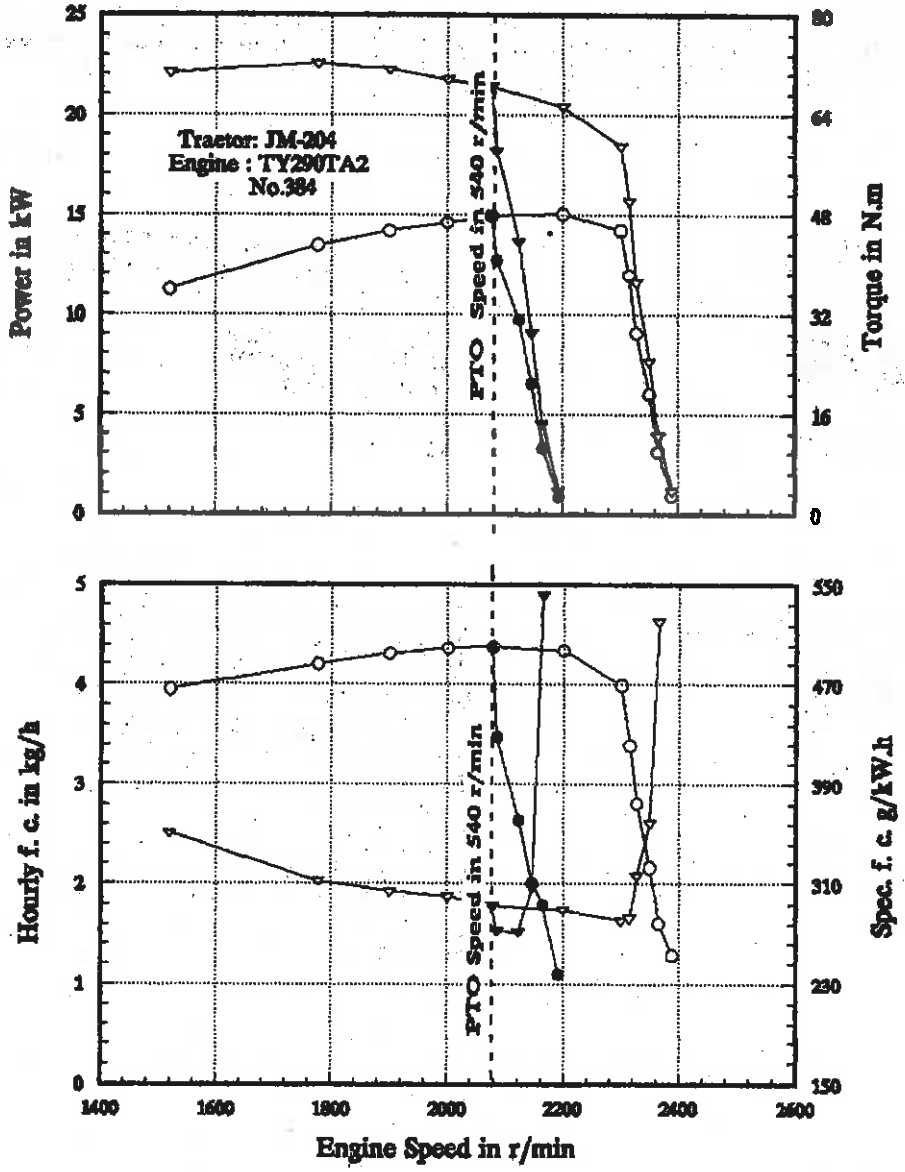
Shi Guoquan	Shen Jilan
Liu Guoquan	Li Lechen
Chen Shusheng	Li Jinzhong
Jin Xiaohan	Xu Yuhui
Li Deshan	

Date: 1996.11.4

Edirot for the test report pablish:
Engineer
Xu Xiao

ANNEX I

MAIN POWER TAKE－OFF TEST CURVES



JM – 204 COTTEC Test No. 961686 OECD No. 1657

MAIN POWER TAKE – OFF TEST CURVES

