OECD APPROVAL # 1195
Date of approval: May 24 1989

CENTER FOR AGRICULTURAL EQUIPMENT
DEPARTMENT OF AGRICULTURAL ENGINEERING
INSTITUTE OF AGRICULTURE AND NATURAL RESOURCES
UNIVERSITY OF NEBRASKA - EAST CAMPUS
LINCOLN, NEBRASKA 68583-0832, USA

REPORT ON TEST IN ACCORDANCE WITH OECD STANDARD CODE FOR THE OFFICIAL TESTING OF AGRICULTURAL TRACTOR PERFORMANCE

CASE INTERNATIONAL 7110 TRACTOR WITH MECHANICAL FRONT WHEEL DRIVE (4 WD)





MANUFACTURED BY: J.I.Case Company
700 State Street
Racine, Wisconsin 53404, USA

NEBRASKA TEST NO.1609

Test date: June-July 1988

This test report provides the results of the tests conducted in accordance with the OECD Standard Test Code for the Official Testing of Agricultural Tractor Performance - C(87)53 Final - Annex I.

This report has been approved by the OECD Coordinating Centre in Paris (CEMAGREF) on May 24 ,1989

Case International 7110 Diesel 4 WD OECD # 1195

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SPECIFICATIONS OF TRACTOR.

Manufacturer's name/address	:	J.I.Case Company 700 State Street Racine, Wisconsin 53404, USA
Submitted for test by	:	The manufacturer.
Selected for test by	:	The manufacturer in agreement with the test station.
Place of running in	:	J.I.Case, Hinsdale, Illinois.
Duration of running in	:	264 hours
Location of Test	:	Center for Agricultural Equipment, Lincoln, Nebraska,USA.

TRACTOR.

Make	Case International
Model	7110
Type	Unit construction, mechanical front wheel drive (4 WD)
Number of driving wheels	4
Serial Number	*JJA0001876*
1st Serial number	9949063, Sequence changed January 1988: JJA 0001505.

ENGINE.

Make	Consolidated Diesel Company
Model	6T-830
Type	Diesel, turbocharged.
Serial Number	*44220549*
Cylinders	
Number & Disposition	6, in-line, vertical
Bore x stroke	114 x 135 mm (4.488 x 5.315 in)
Cubic capacity	8268 cu.cm (504.5 cu.in)
Compression Ratio	17.3 - 1
Arrangement of valves	Overhead
Cylinder liners	Wet, replacable
Super charging	
Make/Model/Type	Holset/H1E/exhaust gas driven
Pressure	42-56 kPa (6.1-8.1 psi) at rated speed and load.
Fuel System	
Feed system	Engine driven transfer pump
Make/Type/Model of filters	Two spin-on cartridges. Fleetguard/FF5038 and FF5052
Fuel Tank capacity	295 liter (78 US gallons)

Make/Model/Type Injection Pump	Robert Bosch/A/in-line
Pump Serial number	84308287
Production setting of pump Flow Rate (Rated Eng.Spd & Full Load)	24.9 +/- 1.2 kg/hr 54.9 +/- 2.7 lb/hr
Make/Model/Type of injectors	Robert Bosch/Pt.# J908507/17 mm
Injection pressure	20.5-21.3 MPa(2975 - 3090 psi)
Timing	22 degrees before TDC

Governor

Make/Model/Type	Robert Bosch/RSV/Variable speed mechanical.
Governed engine speed range	From 825 to 2395 rev/min
Rated engine speed	2200 rev/min
High-idle speed range	2355 +/- 40 rev/min

Air Cleaner.

Pre-cleaner	
Make/Model/Type	Donaldson/6066A1605/aspirated
Air intake location	under hood, ahead of radiator
Main Cleaner	
Make/Model/Type	Donaldson/EGB11-0077/dual element; pleated paper. Or Nelson 71181A; pleated paper
Maintenance indicator	Service light on instrument panel.

Lubrication system.

Type of feed pump	Full pressure, positive displacement.
Type of filters	Full flow, spin on type.
Number	One
Oil cooler	Heat exchanger with engine coolant

Cooling system.

Type of coolant	Liquid
Type of pump & drive	Centrifugal, belt driven
Fan specification	Direct belt drive.
Number of fan blades	6
Fan diameter	600 mm (23.6 in.)
Coolant system capacity	28.6 liter (30 qt)
Type of temperature control	2 Thermostats
Superpressure system	103 kPa (15 psi)

Starting system.

Make/Model/Type of starter	Nippondenso/4 kW/Electric
Power Rating	4.0 kW
Cold starting aid	Ether spray in intake manifold.
Safety device	Electrical lockout on transmission and PTO controls.

Electrical system.	
Voltage & grounding.	12 Volt DC;negative ground
Generator	
Make/Model/Type	Bosch/N1/Belt driven alternator
Power rating	110 Ampere at 2200 engine rpm.
Batteries	
Number & connection	2-12 V batteries in parallel
Rating	180 amp-hours per battery at 20 hour rate.
Exhaust system.	
Make/Model/Type	Nelson(muffler)/21326A /horizontal
Location	Underhood muffler; vertical exhaust pipe, rear of engine right front corner of cab.

TRANSMISSION.

Clutch. (travel)	
Make/Type	Case International: Wet multi-plate, oil cooled.
Number of plates	9
Plate diameter	228.5 mm (9 inch)
Method of operation	Hydraulic, foot pedal.
Gear Box.	
Make/Type	Case International/full powershift.
Arrangement	Countershaft type with 6 forward and 2 reverse gears in speed transmission section and 3 gears in range transmission section (only lowest gear of range section used for reverse).
Number of gears	18 forward, 2 reverse controlled by a single hand lever
Oil cooler	Heat exchanger with air
Available options	Creeper option with 6 forward and 1 reverse additional speeds
Rear axle and final drives.	
Make/Type	Case International/crown wheel and pinion; differential; inboard planetary reduction.
Differential Lock	
Type	Hydraulic
Method of engagement	Electrical switch on console.
Method of disengagement	Electrical switch on console or actuation of either brake pedal

Front Axle and final drives.

Make/Model/Type	Dana/070BP123/crown wheel and pinion; differential and outboard planetary reduction.
Differential lock	
Type	limited slip
Method of engagement	self-locking
Method of disengagement	self-unlocking

Gear ratios and travel speeds.

(Tire dynamic radius of 820 mm (32.3 in) ISO 4251/1-1984)

Gear Number	Number of engine revolutions for one revolution of the driving wheels	Nominal travel speed at rated engine speed of 2200 rev/min [km/h]	[mph]
1 fwd	244.659	2.78	1.73
2 fwd	213.292	3.19	1.98
3 fwd	184.966	3.68	2.28
4 fwd	161.252	4.22	2.62
5 fwd	140.579	4.84	3.01
6 fwd	122.556	5.55	3.45
7 fwd	105.064	6.47	4.02
8 fwd	91.594	7.43	4.61
9 fwd	79.430	8.56	5.32
10 fwd	69.246	9.82	6.10
11 fwd	60.369	11.27	7.00
12 fwd	52.629	12.92	8.03
13 fwd	46.004	14.78	9.19
14 fwd	40.106	16.96	10.54
15 fwd	34.780	19.55	12.15
16 fwd	30.321	22.43	13.94
17 fwd	26.434	25.73	15.99
18 fwd	23.045	29.51	18.34
1 rev	169.968	4.00	2.49
2 rev	148.178	4.59	2.85
Creeper Gear Group (Not fitted on tested tractor)			
1 fwd	840.621	0.81	0.50
2 fwd	653.522	1.07	0.66
3 fwd	483.015	1.41	0.87
4 fwd	360.988	1.88	1.17
5 fwd	272.911	2.49	1.55
6 fwd	207.420	3.28	2.04
1 rev	583.994	1.16	0.72

Number of front wheel revolutions for one rear wheel revolution.	1.3304

POWER - TAKE - OFF.

Main Power-Take-Off.

Type	Independent
Method of engagement	Hydraulic clutch operated by hand lever, independent of main drive clutch. Wet multiplate.
Number of shafts	Two.
Method of changing speeds or shafts	Separate shafts at fixed ratios

Standard PTO. 1000 rev/min.

Location	Rear of tractor in vertical center plane.
Diameter of PTO shaft end	35 mm (1.375 inch)
Number of splines	21; conforms to ISO 500/1979.
Height above ground	730 mm (28.7 in)
Distance from median plane of tractor	0 mm
Distance behind rear axle	745 mm (29.3 in.)
PTO speed @ rated engine speed	1003 rev/min
Engine speed @ Std. PTO Speed	2193
Ratio of Engine rpm to PTO rpm	2.193
Direction of rotation (viewed facing driving end)	Clockwise.

Standard PTO 540 rev/min. (not tested)

Location	Rear of tractor in vertical center plane.
Diameter of PTO shaft end.	35 mm (1.375 in)
Number of splines	6;conforms to ISO 500/1979
Height above ground	607 mm (23.9 in)
Distance from median plane of tractor	0 mm
Distance behind rear axle	796 mm (31.3 in)
PTO speed @ rated engine speed	533 rev/min
Engine speed @ Std.PTO speed	2229 rev/min
Ratio of Eng spd./PTO spd.	4.128
Maximum allowed power	63 kW (85 hp)
Direction of rotation (viewed facing driving end)	Clockwise.

POWER LIFT.

Make	Case International
Type of hydraulic system	Closed center; load sensing
Number/Type of cylinders	1 internal, 1 external; both single acting.
Type of linkage lock for transport	Hydraulic with locking notch for hand lever on console.
Relief valve setting	18.27 +/- 0.35 MPa (2650 +/- 50 psi)
Opening pressure of cylinder safety valve	19.65-20.34 MPa (2850-2950 psi)
Lift pump type	Axial piston, pressure and flow compensated.
Power transmission to pump	Gear drive from transmission.
Type/Number of filters	1 spin-on replacable cartridge; 1 cleanable suction screen in the reservoir.
Location of oil reservoir	Transmission housing
Number/Type/Location of tapping points.	3 pairs of ISO standard coup - lings at rear of tractor.
Max. oil volume available for external cylinders	8.5 l (9 qt)

THREE POINT LINKAGE

Category 3 in conformity with ISO 730/1-1977
Category adapter - none

THREE POINT LINKAGE.

Figure 1.1

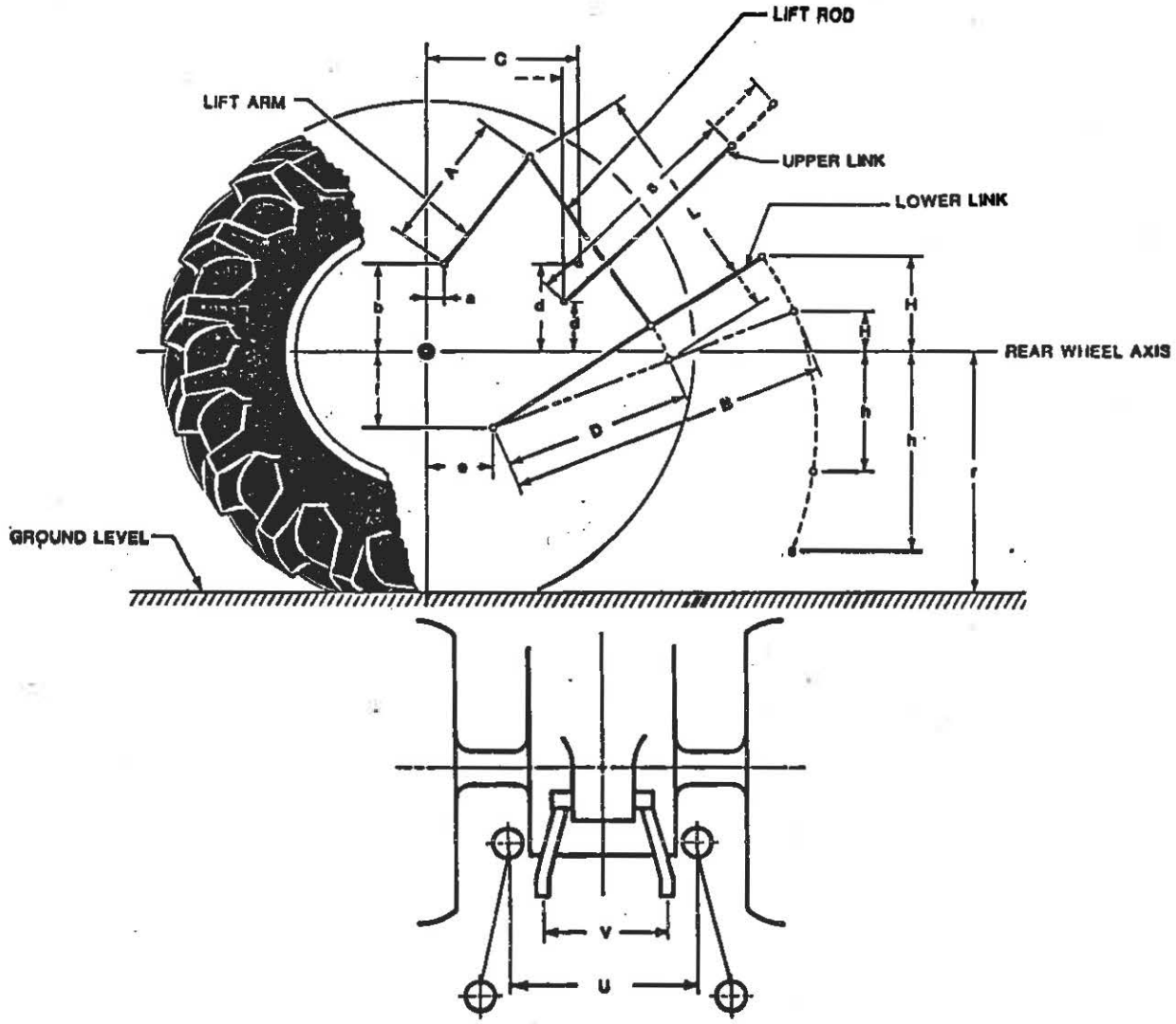


Figure 1.2

Table 1.1 - Linkage geometry dimensions.

		Dimension or range		Settings used on test	
		[mm]	[in]	[mm]	[in]
Lift category		III			
Rear Tire - Radius Index	(r)	820	32.3		
Front Tire - Radius Index	(r')	610	24.0		
Length of lift arms	(A)	381	15.0	same	
Length of lower links	(B)	861	33.9	same	
Distance of lift arm pivot from rear wheel axis: horizontal	(a)	364	14.3	to rear	same
vertical	(b)	422	16.6	same	
Horizontal distance between the 2 lower link points	(u)	604	23.8	same	
Horizontal distance between the 2 lift arm end points	(v)	737	29.0	same	
Length of upper link	(S)	634 to 853	25.0 to 33.6	655	25.8
Distance of upper link pivot from rear wheel axis: horizontal	(c)	627	24.7	same	
vertical-upper	(d)	250	9.8	169	6.7
-lower		169	6.7		
Distance of lower link pivot from rear wheel axis: horizontal	(e)	445	17.5	same	
vertical	(f)	332	13.1	same	
Distance of lower link pivot points to lift rod pivot pts on lower links.	(D)	579	22.8	same	
Length of lift rods	(L)	660 to 866	26.0 to 34.1	768	30.2
Height of lower hitch points relative to rear wheel axis In low position	(h)	378 to 699	14.9 to 27.5	576	22.7
In high position	(H)	3 to 269	0.1 to 10.6	117	4.6
Height above ground of lower hitch points when locked in transport position.		823 to 1089	32.4 to 42.9	937	36.9

SWINGING DRAWBAR.

Type	Oscillating
Height above ground	477 mm. (18.8 in) fixed.
Adjustments	Laterally adjustable plus 3 longitudinal positions.
Distance of hitch point from rear wheel axis,horizontal	1152/1254/1356 mm (45.4/49.4/53.4 inch)
Distance of hitch point from PTO shaft end.....1000 rpm	
Vertical	253 mm (10 in)
Horizontal	406/508/610 mm (16/20/24 in.)
.....540 rpm	
Vertical	131 mm (5.2 in)
Horizontal	356/458/559 mm (14/18/22 in)
Lateral adjustment;Right side	210/228/246 mm (8.3/9.0/9.7 in)
Left side	210/228/246 mm (8.3/9.0/9.7 in)
Distance of pivot point from rear wheel axis; horizontal	50 mm (2.0 in) forward.
Diamater of drawbar pin hole	42 mm (1.65 in)
Maximum vertical static permissible load	Two forward positions 14.2 kN (3200 lb)
	Rearmost position 12.0 kN (2700 lb)

STEERING

Make/Model/Type	TRW/HGE 20/hydrostatic steering control unit.
Method of operation	
Pump(s)	Main-axial piston pump through steering priority valve.
Ram(s)	Two double acting cylinders
Working pressure	16.2 to 16.9 MPa, (2350 to 2450 psi)

BRAKE SYSTEM.

Service brake.

Make/Model/Type	Case International/oil immersed disc
Method of operation	Hydraulically actuated from main system; operated by two pedals which can be locked together.

Parking brake.

Type	Transmission lock
Method of operation	Gear selector lever.

WHEELS.

Number.	
Front	Two; Driving and steering
Rear	Two or four; Driving
Wheelbase	3006 mm (118.3 inch)

Track width adjustment

	Minimum [mm]	Minimum [in]	Maximum [mm]	Maximum [in]	Adjustment method
Front	1526	(60.1)	2407	(94.8)	Reverseing wheels,off-set lug rims.
Rear	1524	(60.0)	2518	(99.1)	Adjustable clamping wedges on bar axle and offset lug rims

PROTECTIVE STRUCTURE.

Make/Model/Type	Case International/CX-96/Cab
Manufacturer's name/address	J.I.Case Company 700 State street Racine, Wisconsin 53404,USA
Protective device	Cab, not tiltable.
OECD approval number	4 WD version CSS 096/1

DRIVER'S SEAT.

Make/Model/Type	Sears/SA7633-000ED/air-oil suspension.
Type of suspension	Air ride;fore-aft isolator; weight adjustment
Type of Damping	Hydraulic
Range of adjustment	
Longitudinal	152.4 mm (6.0 in.)
Vertical	76.2 mm (3.0 in.)

LIGHTING.

	Height above ground of center [mm]	Height above ground of center [in]	Size [mm]	Distance from out - side edge to median plane of tractor. [mm]	Distance from out - side edge to median plane of tractor. [in]
Headlights	1576	62.0	260.5x130.8	390	15.4
Rearlights	2019	79.5	100 x 45.2	654	25.7
Rear reflectors	2019	79.5	50 x 45.2	554 and 704	21.8 and 27.7

TEST CONDITIONS.

Overall dimensions.

Length		5019 mm (197.6 in)
Width	Minimum	2845 mm (112.0 in)
	Maximum	3069 mm (120.8 in)
Height	- Top of cab	2982 mm (117.4 in)
	- Top of exhaust	2980 mm (117.3 in)
Ground clearance (unballasted)		404 mm (15.9 in)
Clearance-limiting part		Drawbar anchor point

Tractor Mass (with Cab, with full tanks)

		Without driver [kg]	Without driver [lb]	With driver [kg]	With driver [lb]
Unballasted (with singles)	Front	2424	5345	2424	5345
	Rear	5101	11245	5176	11410
	Total	7525	16590	7600	16755
Ballasted (with duals)	Front	2724	6005	2724	6005
	Rear	5901	13010	5976	13175
	Total	8625	19015	8700	19180

Ballast.

	Number of weights	Mass(total) [kg]	Mass(total) [lb]	Water [kg]	Water [lb]
Front	none			none	
Rear	none			none	
Duals (rear)		653	1440	none	
Additional front frame		59	130		
+ weights	2	91	200		
Test equipment		297	655		

Tire Specifications	Front wheels	Rear wheels
Make	Goodyear	Goodyear
Dimensions	13.6R28	18.4R38
Tire rating	Three star (10 ply)	One star (8 ply)
Type	Radial	Radial
Max.load (tire manufacturer)	1851 kg/tire (4080 lb/tire)	2722 kg/tire (6000 lb/tire)
Max.load(tractor manufacturer)	same	same
Inflation pressure (tire mfgr)	207 kPa(30 psi)	124 kPa (18 psi)
Dynamic Radius Index	610 mm(24.0 in)	820 mm (32.3 in)
Chosen track width - singles	1875 mm(73.8 in)	1790 mm (70.5 in)
- duals		2920 mm(115.0 in)

Oils and Lubrication.

Capacity and change interval:

	Capacity liter	Capacity quart	Oil change hrs	Filter change hrs
Engine (w/o filter)	19	20	250	250
Gear Box + rear axle + rear final drive + hydraulic system	191	202	1000	1000
Front axle	11.4	12	1000	----
Final drive, front	0.9	1	1000(each side)	----

Oil and Lubricant specifications:

	Recommended	Used during test
Engine oil		
Type	Case IH No. 1 SAE 15W40	same
Viscosity	14.9 cSt @ 100 'C	
Classification	API SF/CD/CE	
Transmission		
Type	Case IH Hy-Tran Plus	same
Viscosity	6.3 cSt @ 100 'C	
Classification	None	
Hydraulic fluid	Same as transmission	same
Front axle diff. + final drive		
Type	Case IH 135 HEP Gear Lube	same
Viscosity	27 cSt @ 100 'C	
Classification	API GL-5 or MIL-L-2105D	
Grease		
No. of lubrication points	24	

Fuel

Type/grade	Diesel fuel "Premier"¦grade 2-D
Density (Pto test)	0.827 g/cu.cm (6.905 lbs/gallon) at 15 'C (59 'F)
(Drawbar test)	Same as Pto test.
Cetane number	51.2
Viscosity	2.33 cSt at 37.8 'C(100 'F)

COMPULSORY TESTS.

(1) MAIN POWER TAKE-OFF PERFORMANCE (1000 rev/min).

Date of tests : June 24, 1988
Location of tests : Center for Agricultural Equipment, University of Nebraska, Lincoln, Nebraska.
Type of Dynamometer: Eaton Dynamatic 2025 D.G.

Power kW (hp)	Speeds engine rev/min	Speeds PTO rev/min	Fuel Consumption hourly l/h (gal/h)	Fuel Consumption hourly kg/h (lb/h)	Fuel Consumption specific kg/kW.h (lb/hp.h)	Specific energy kW.h/l (hp.h/gal)
1.1 Maximum Power- 2 hour test.						
98.66 (132.31)	2050	935	29.03 (7.67)	24.02 (52.95)	0.243 (0.400)	3.40 (17.25)
1.2 Power at rated engine speed.(1 hour)						
98.41 (131.97)	2200	1004	30.21 (7.98)	24.99 (55.10)	0.254 (0.418)	3.26 (16.54)
1.3 Maximum power at standard PTO speed. (1000 rev/min)						
98.41 (131.97)	2200	1004	30.21 (7.98)	24.99 (55.10)	0.254 (0.418)	3.26 (16.54)

1.4 PART LOADS - governor hand lever set for maximum power at rated engine speed

Power kW (hp)	Speeds engine rev/min	Speeds PTO rev/min	Fuel Consumption hourly l/h (gal/h)	Fuel Consumption hourly kg/h (lb/h)	Fuel Consumption specific kg/kW.h (lb/hp.h)	Specific energy kW.h/l (hp.h/gal)
(i) Torque obtained at maximum power at rated engine speed.						
98.41 (131.97)	2200	1004	30.21 (7.98)	24.99 (55.10)	0.254 (0.418)	3.26 (16.54)
(ii) 85% of the torque obtained in (i)						
85.59 (114.77)	2249	1026	27.63 (7.30)	22.86 (50.40)	0.267 (0.439)	3.10 (15.72)
(iii) 75% of the torque defined in (ii)						
64.91 (87.04)	2278	1039	23.19 (6.13)	19.19 (42.30)	0.296 (0.486	2.80 (14.21)
(iv) 50% of the torque defined in (ii)						
43.88 (58.84)	2305	1052	18.91 (5.00)	15.65 (34.50)	0.357 (0.586)	2.32 (11.78)
(v) 25% of the torque defined in (ii)						
22.14 (29.68)	2335	1066	15.30 (4.04)	12.66 (27.90)	0.572 (0.940)	1.45 (7.35)
(vi) Unloaded						
0.76 (1.02)	2354	1074	11.02 (2.91)	9.12 (20.10)	11.958 (19.659)	0.07 (0.35)

1.5 PART LOADS - governor hand lever set for maximum power at standard pto speed.

Power kW (hp)	Speeds engine rev/min	Speeds PTO rev/min	Fuel Consumption hourly l/h (gal/h)	Fuel Consumption hourly kg/h (lb/h)	Fuel Consumption specific kg/kW.h (lb/hp.h)	Specific energy kW.h/l (hp.h/gal)
(i) Torque obtained at standard pto speed.						
98.41 (131.97)	2200	1004	30.21 (7.98)	24.99 (55.10)	0.254 (0.418)	3.26 (16.54)
(ii) 85% of the torque obtained in (i)						
85.59 (114.77)	2249	1026	27.63 (7.30)	22.86 (50.40)	0.267 (0.439)	3.10 (15.72)
(iii) 75% of the torque defined in (ii)						
64.91 (87.04)	2278	1039	23.19 (6.13)	19.19 (42.30)	0.296 (0.486)	2.80 (14.21)
(iv) 50% of the torque defined in (ii)						
43.88 (58.84)	2305	1052	18.91 (5.00)	15.65 (34.50)	0.357 (0.586)	2.32 (11.78)
(v) 25% of the torque defined in (ii)						
22.14 (29.68)	2335	1066	15.30 (4.04)	12.66 (27.90)	0.572 (0.940)	1.45 (7.35)
(vi) Unloaded						
0.76 (1.02)	2354	1074	11.02 (2.91)	9.12 (20.10)	11.958 (19.659)	0.07 (0.35)

No-load maximum engine speed		2354 rev/min
Equivalent engine torque:		
	at rated engine speed	427.2 Nm(2200 rev/min)
	at maximum power	459.6 Nm(2050 rev/min)
	at maximum torque	571.2 Nm(1500 rev/min)
Mean atmospheric conditions:		
	Temperature-dry bulb	28 °C (82 °F)
	Relative humidity	48 %
	Barometer	97.75 kPa(28.87 in Hg)

Maximum Temperatures :		
Thermostat housing	86 °C	(186 °F)
Engine oil pan	108 °C	(227 °F)
Fuel at injection pump	66 °C	(151 °F)
Engine air intake	33 °C	(91 °F)
Trans./Hydr. Oil	57 °C	(134 °F)
Turbocharger boost pressure		
at rated engine speed	52 kPa	(7.5 psi)
at maximum power	48 kPa	(7.0 psi)

2. POWER LIFT AND HYDRAULIC PUMP PERFORMANCE TEST.

Date of test: July 6, 1988
Location: CAE/UNL, Lincoln, Nebr.

2.1 HYDRAULIC POWER TEST - Hydraulic pump performance

i. Sustained pressure at compensator cutoff : 18.2 MPa (2640 psi)

ii. Pump delivery rate @ minimum pressure & rated engine speed : 107.6 l/m (28.4 gpm)

iii.

	Flow Rate l/min (gal/min)	Pressure MPa (psi)	Power kW (hp)
At 90% of relief valve setting.	39.1 (10.3)	16.6 (2403)	10.8 (14.5)
At maximum hydraulic power.	99.9 (26.4)	15.2 (2200)	25.3 (33.9)

Tapping point(s)	Two hydraulic outlets combined
Hydraulic fluid temperature	
in oil reservoir	59 °C (138 °F)
at flow meter	62 °C (144 °F)

2.2 POWER LIFT TEST. (Upper link in bottom hole on tractor)

	Hitch Points	Frame
Lower hitch points above ground - down position. [mm/inch]	244/9.6	231/9.1
Vertical movement [mm/inch]	658/25.9	773/30.4
Maximum corrected force through full range [kN/lbf]	32.6/7327	31.3/7036
Corresponding pressure [kPa/psi]	15168/2200	
Moment about rear axle [kN.m/lb-ft]	42.5/31382	59.9/44209
Maximum mast tilt angle [degrees]	--	9.4

Lifting height relative to the horizontal position of lower links

[mm]		-251	-239	-201	-99	0
[in]		-9.9	-9.4	-7.9	-3.9	0
Corrected lift forces						
hitch	[kN]	--	32.6	33.7	38.2	41.3
points	[lb]	--	7327	7569	8586	9276
at	[kN]	31.3	--	32.7	35.7	37.1
frame	[lb]	7036	--	7350	8026	8340

Lifting height relative to the horizontal position of lower links

[mm]		99	201	302	401	419	521
[in]		3.9	7.9	11.9	15.8	16.5	20.5
Corrected lift forces.							
hitch	[kN]	43.2	44.9	45.8	46.9	47.5	--
points	[lb]	9720	10096	10294	10536	10670	--
at	[kN]	37.4	37.0	34.9	33.5	--	32.7
frame	[lb]	8417	8311	7855	7524	--	7359

3. DRAWBAR PERFORMANCE.

Date of tests: June 27-30,1989
Location: CAE/UNL,Lincoln, Ne
Type of Track: Concrete Oval

Date of tests: 27-Jun-88 05-Jul-88 Fuel density: 0.827 kg/l
Type of track: Concrete Case IH 7110 MFWD

Gear	Speed	Power	Pull	Engine Speed	Slip	SFC		Temperature, deg C					Rel hum	Pressure
	km/h	kW	kN	rev/min	%	kg/kW.h	kW.h/l	Fuel	Coolant	Oil	Dry	Wet	%	kPa
I. Maximum Power (unballasted, single wheels, fwa) Drawbar height: 381 mm								Tire pressure: 124 kPa, rear 124 kPa, front						
3rd	3.29	63.03	69.06	2254	14.25%	0.355	2.33	63	83	103	22	16	54	98.27
4th	3.72	72.28	69.86	2225	14.06%	0.340	2.44	65	83	103	22	16	54	98.27
5th	4.49	79.48	63.74	2183	8.10%	0.311	2.66	65	83	103	23	17	55	98.27
6th	4.92	80.80	59.08	2047	6.33%	0.297	2.78	64	83	103	23	17	55	98.27
7th	5.84	85.51	52.74	2048	4.80%	0.281	2.94	65	83	103	24	17	49	98.27
8th	6.79	85.17	45.19	2054	3.77%	0.280	2.96	66	84	104	24	17	49	98.27
9th	7.86	85.60	39.19	2050	3.05%	0.279	2.97	65	84	104	25	17	44	98.27
10th	9.05	84.69	33.68	2047	2.57%	0.282	2.94	65	84	104	26	17	40	98.24
11th	10.45	83.87	28.88	2052	2.24%	0.286	2.90	65	84	105	26	18	46	98.24
12th	12.02	82.07	24.59	2050	1.91%	0.292	2.83	65	84	105	27	18	41	98.24
13th	13.78	82.60	21.58	2050	1.75%	0.290	2.85	65	84	104	27	18	41	98.24
II. Maximum Power (ballasted, dual wheels, fwa) Drawbar height: 406 mm								Tire pressure: 124 kPa, rear (inner) 97 kPa, rear (outer) 124 kPa, front						
1st*	2.54	57.49	81.43	2261	12.49%	0.362	2.29	65	84	102	30	19	35	97.66
2nd*	2.94	67.06	82.11	2245	11.09%	0.339	2.44	67	84	104	28	18	37	97.66
3rd*	3.35	77.76	83.48	2193	9.92%	0.317	2.61	66	84	103	27	17	36	97.66
4th	3.98	81.00	73.35	2190	6.75%	0.308	2.68	68	85	105	31	21	40	97.66
5th	4.38	82.53	67.90	2050	4.38%	0.290	2.85	65	84	104	24	22	84	97.36
6th	5.07	82.65	58.73	2049	3.51%	0.289	2.86	66	84	104	24	22	84	97.39
7th	5.93	86.31	52.38	2046	3.03%	0.278	2.97	65	84	104	24	22	84	97.39
8th	6.84	86.87	45.74	2048	2.46%	0.278	2.98	66	84	106	25	22	77	97.43
9th	7.92	87.13	39.61	2048	2.30%	0.280	2.96	66	84	106	26	23	78	97.46
10th	9.13	86.25	34.01	2051	1.89%	0.282	2.93	65	84	105	26	23	78	97.46
11th	10.49	85.01	29.17	2049	1.64%	0.286	2.89	65	84	106	27	23	71	97.49
12th	12.06	83.32	24.88	2048	1.39%	0.293	2.83	65	84	106	27	23	71	97.53
13th	13.83	81.86	21.31	2050	1.14%	0.294	2.81	66	84	105	28	24	72	97.53
III. Five Hour Test at 75% of Pull at Maximum Power														
8th	7.60	72.42	34.30	2259	2.01%	0.315	2.63	61	84	103	18	17	91	97.52
IV. Five Hour Test at Pull Corresponding to 15% Slip in Test II.														
2nd	3.13	72.69	83.50	2243	NA	0.318	2.60	65	84	105	31	25	61	98.07

Total oil consumption during ten hours of tests III and IV - 0.027 kg/h. * Pull limited to prevent tractor bounce.

Date of tests: 27-Jun-88 05-Jul-88 Fuel density: 6.905 lb/gal
Type of track: Concrete Case IH 7110 MFWD

Gear	Speed	Power	Pull	Engine Speed	Slip	SFC		Temperature, deg F					Rel hum	Pressure
	mph	hp	lb	rpm	%	lb/hp-hr	hp-hr/gal	Fuel	Coolant	Oil	Dry	Wet	%	in Hg
I. Maximum Power (unballasted, single wheels, fwa) Tire pressure: 18 psi, rear Drawbar height: 15 in 18 psi, front														
3rd	2.04	84.53	15526	2254	14.25%	0.583	11.85	146	181	217	72	61	54	29.02
4th	2.31	96.92	15705	2225	14.06%	0.559	12.36	149	182	217	71	61	54	29.02
5th	2.79	106.59	14330	2183	8.10%	0.511	13.51	150	182	218	73	62	55	29.02
6th	3.06	108.35	13283	2047	6.33%	0.489	14.12	148	182	218	74	62	55	29.02
7th	3.63	114.67	11857	2048	4.80%	0.463	14.93	149	182	218	75	62	49	29.02
8th	4.22	114.22	10159	2054	3.77%	0.460	15.01	150	183	220	76	63	49	29.02
9th	4.89	114.79	8810	2050	3.05%	0.458	15.06	150	183	220	77	63	44	29.02
10th	5.63	113.57	7571	2047	2.57%	0.463	14.92	149	183	220	78	63	40	29.01
11th	6.50	112.47	6494	2052	2.24%	0.470	14.70	149	183	221	79	64	46	29.01
12th	7.47	110.06	5528	2050	1.91%	0.480	14.39	149	183	222	80	64	41	29.01
13th	8.56	110.77	4851	2050	1.75%	0.478	14.46	149	183	220	80	65	41	29.01
II. Maximum Power (ballasted, dual wheels, fwa) Tire pressure: 18 psi, rear (inner) Drawbar height: 16 in 14 psi, rear (outer) 18 psi, front														
1st*	1.58	77.10	18307	2261	12.49%	0.595	11.61	149	183	216	86	67	35	28.84
2nd*	1.83	89.93	18460	2245	11.09%	0.558	12.38	153	183	219	83	65	37	28.84
3rd*	2.08	104.27	18766	2193	9.92%	0.521	13.25	151	183	218	80	63	36	28.84
4th	2.47	108.62	16490	2190	6.75%	0.507	13.63	154	185	221	88	70	40	28.84
5th	2.72	110.67	15265	2050	4.38%	0.477	14.47	150	183	219	75	71	84	28.75
6th	3.15	110.84	13203	2049	3.51%	0.475	14.52	151	183	220	75	71	84	28.76
7th	3.69	115.74	11775	2046	3.03%	0.457	15.10	149	183	220	76	72	84	28.76
8th	4.25	116.50	10282	2048	2.46%	0.456	15.13	150	184	222	77	72	77	28.77
9th	4.92	116.84	8905	2048	2.30%	0.460	15.00	150	184	223	79	73	78	28.78
10th	5.67	115.67	7646	2051	1.89%	0.464	14.90	148	184	221	79	73	78	28.78
11th	6.52	114.00	6559	2049	1.64%	0.471	14.66	150	184	223	81	74	71	28.79
12th	7.49	111.73	5593	2048	1.39%	0.481	14.34	148	184	222	81	74	71	28.80
13th	8.59	109.77	4791	2050	1.14%	0.484	14.28	150	184	221	82	75	72	28.80
III. Five Hour Test at 75% of Pull at Maximum Power														
8th	4.72	97.12	7712	2259	2.01%	0.517	13.35	142	183	218	64	62	91	28.80
IV. Five Hour Test at Pull Corresponding to 15% Slip in Test II.														
2nd	1.95	97.48	18772	2243	NA	0.522	13.22	149	183	221	89	77	61	28.96

Total oil consumption during ten hours of tests III and IV - 0.06 lb/hr. * Pull limited to prevent tractor bounce.

4. TURNING AREA AND TURNING CIRCLE.

4.1 Front wheel drive disengaged. Single rear wheels.

	With Brakes		Without Brakes	
	Right Turn	Left Turn	Right Turn	Left Turn
Turning area radius	4.75 m 187 in	4.83 m 190 in	5.41 m 213 in	5.36 m 211 in
Turning circle radius	4.57 m 180 in	4.65 m 183 in	5.23 m 206 in	5.18 m 204 in

4.2 Front wheel drive engaged. Single rear wheels.

	With Brakes		Without Brakes	
	Right Turn	Left Turn	Right Turn	Left Turn
Turning area radius	4.52 m 178 in	4.72 m 186 in	6.22 m 245 in	6.25 m 246 in
Turning circle radius	4.33 m 171 in	4.55 m 179 in	6.05 m 238 in	6.06 m 239 in

4.3 Front wheel drive disengaged. Dual rear wheels.

	With Brakes		Without Brakes	
	Right Turn	Left Turn	Right Turn	Left Turn
Turning area radius	4.93 m 194 in	4.75 m 187 in	5.72 m 225 in	5.69 m 224 in
Turning circle radius	4.75 m 187 in	4.57 m 180 in	5.54 m 218 in	5.51 m 217 in

4.4 Front wheel drive engaged. Dual rear wheels.

	With Brakes		Without Brakes	
	Right Turn	Left Turn	Right Turn	Left Turn
Turning area radius	4.76 m 188 in	4.67 m 184 in	6.91 m 272 in	6.83 m 269 in
Turning circle radius	4.60 m 181 in	4.50 m 177 in	6.73 m 265 in	6.65 m 262 in

5. LOCATION OF CENTER OF GRAVITY.

Height above ground	1056 mm	(41.6 in)
Distance forward of rear axle	968 mm	(38.1 in)
Distance from median plane of tractor	0 mm	(0.0 in) to left

6. BRAKING TESTS.

Date of tests: July 25-26,1988
Location : CAE/UNL,Lincoln,Nebr.

Tractor mass with operators

	Without ballast (Single tires) [kg]	[lb]	With ballast (Dual tires) [kg]	[lb]
Front	2388	5265	3016	6650
Rear	5253	11580	5829	12850
Total	7641	16845	8845	19500

Speed before application of brakes: 31.3 km/h (19.4 mph)

6.1 COLD SERVICE BRAKING DEVICE TEST. (Type 0 test)

Unballasted

Braking device control force	[N]	80	165	214	267	311
	[lb]	18	37	48	60	70
Mean deceleration	[m/s.s.]	1.33	1.90	2.37	2.67	2.98
	[ft/s.s.]	4.36	6.23	7.78	8.76	9.78

Ballasted

Braking device control force	[N]	111	200	289	378	445
	[lb]	25	45	65	85	100
Mean deceleration	[m/s.s.]	1.35	2.03	2.46	2.77	2.94
	[ft/s.s.]	4.43	6.66	8.07	9.09	9.65

6.2 FADE TEST (Type 1 test)

Braking device control force	[N]	120	178	311	374	458
	[lb]	27	40	70	84	103
Mean deceleration	[m/s.s.]	1.36	1.77	2.52	2.77	3.09
	[ft/s.s.]	4.46	5.81	8.27	9.09	10.14

Maximum deviation of tractor from its original course: Not significant.
Abnormal vibration : None
Brake heating method : Driven with brakes applied for 1 km (0.62 mi) at 80% of maximum speed with a pedal force corresponding to a deceleration rate of 1 m/s.s. (3.3 ft/s.s)

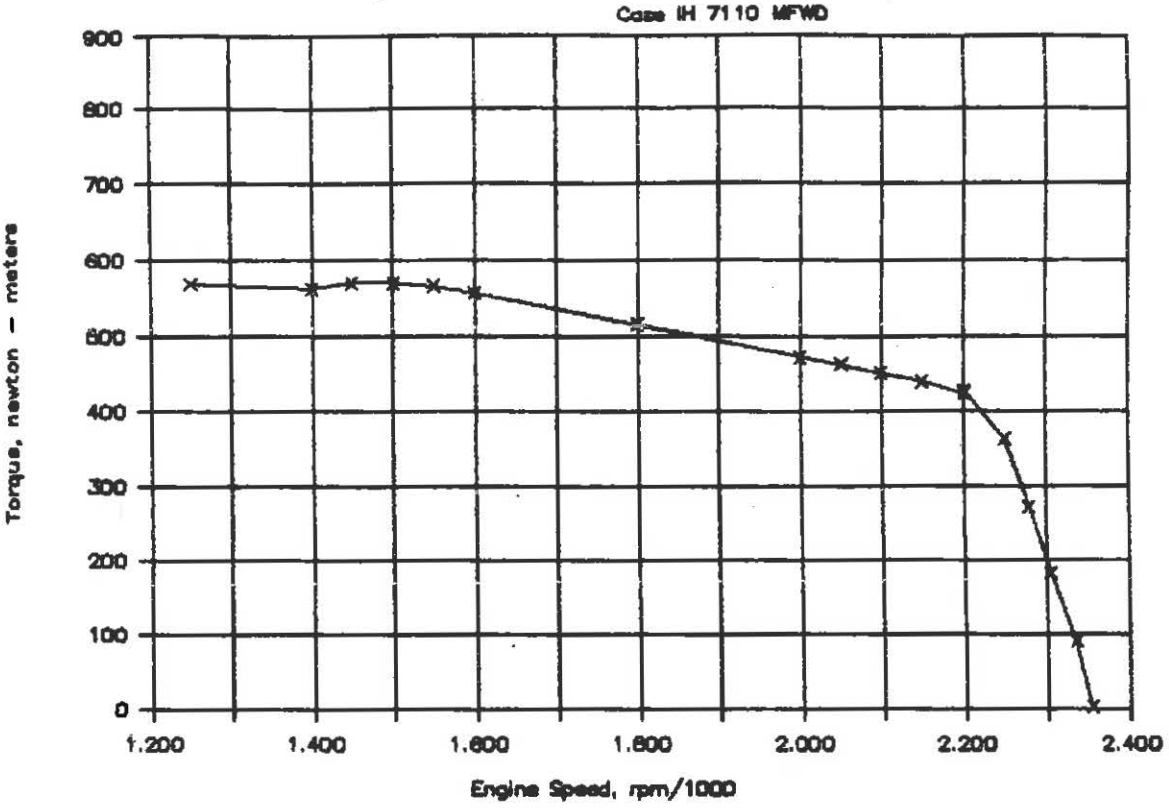
6.3 PARKING BRAKE DEVICE TEST.

Transmission lock engaged by gear selector lever.

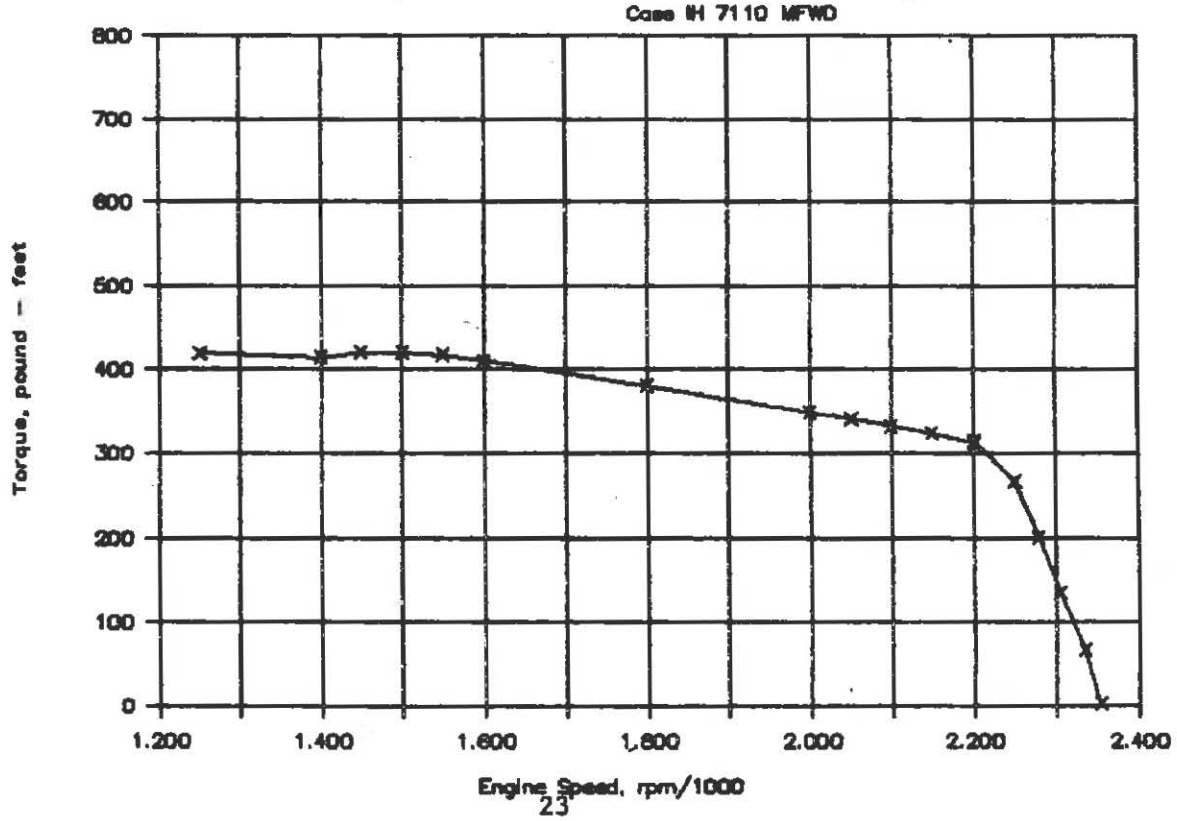
7. MEASUREMENT OF EXTERNAL NOISE LEVEL.

Date of test	: June 24, 1988
Location of test	: CAE/UNL, Lincoln, Nebr.
Sound level meter	: B & K 2203
Type of track	: Concrete oval
Gear number	: 18
Speed prior to acceleration	: 24.3 km/h (15.1 mph)
Sound level	: 84.0 dB(A)

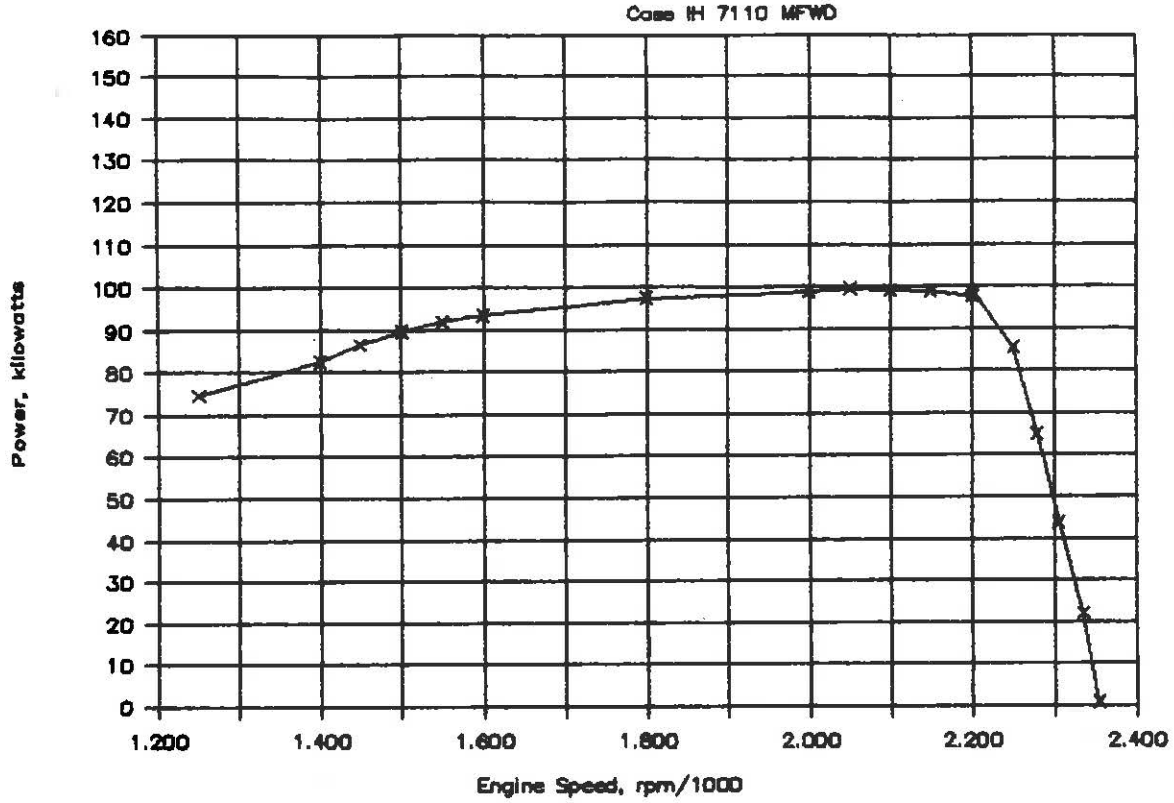
S.I. Equivalent Crankshaft Torque



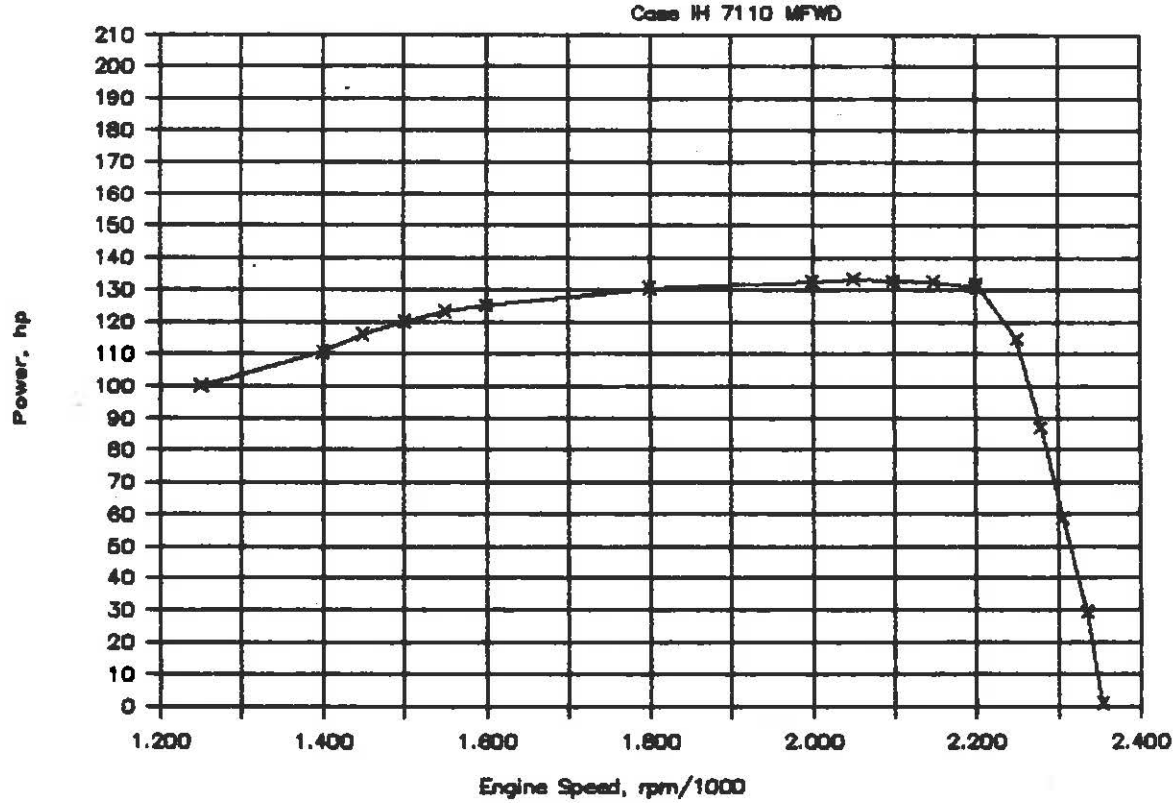
U.S. Equivalent Crankshaft Torque

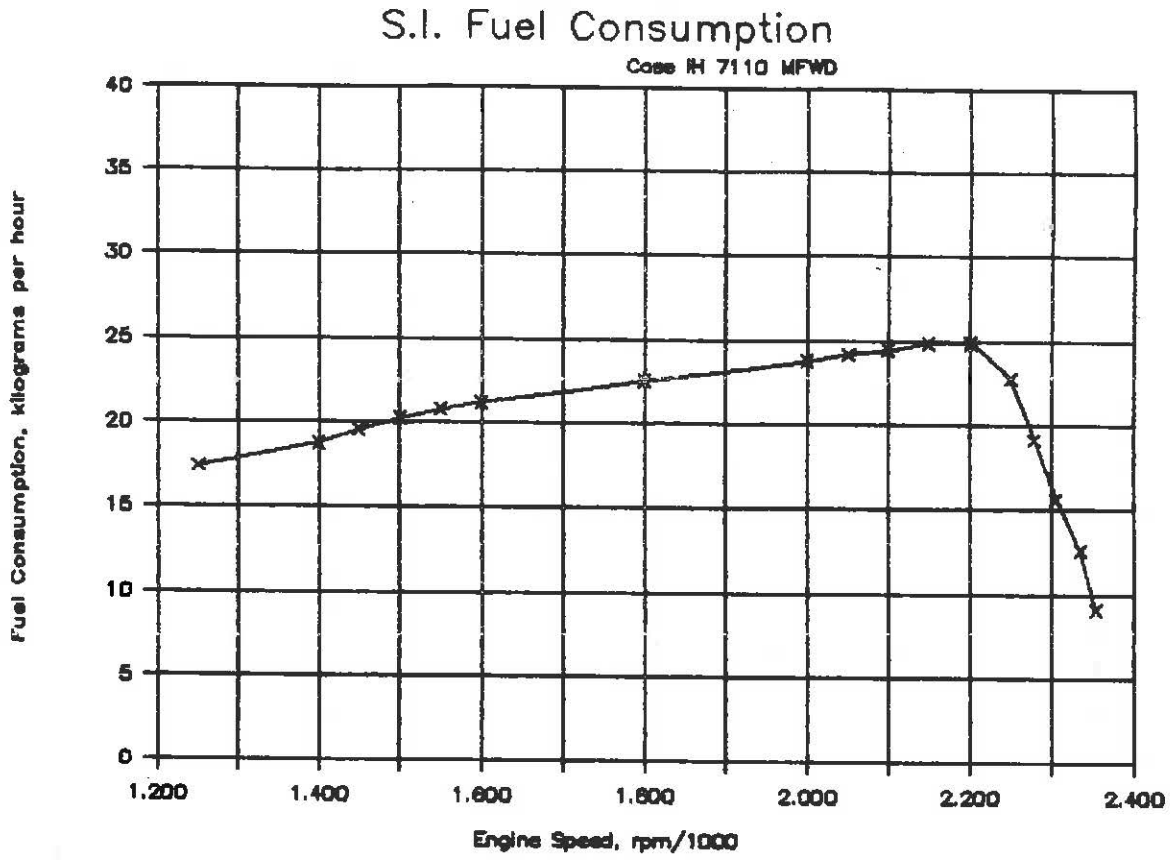


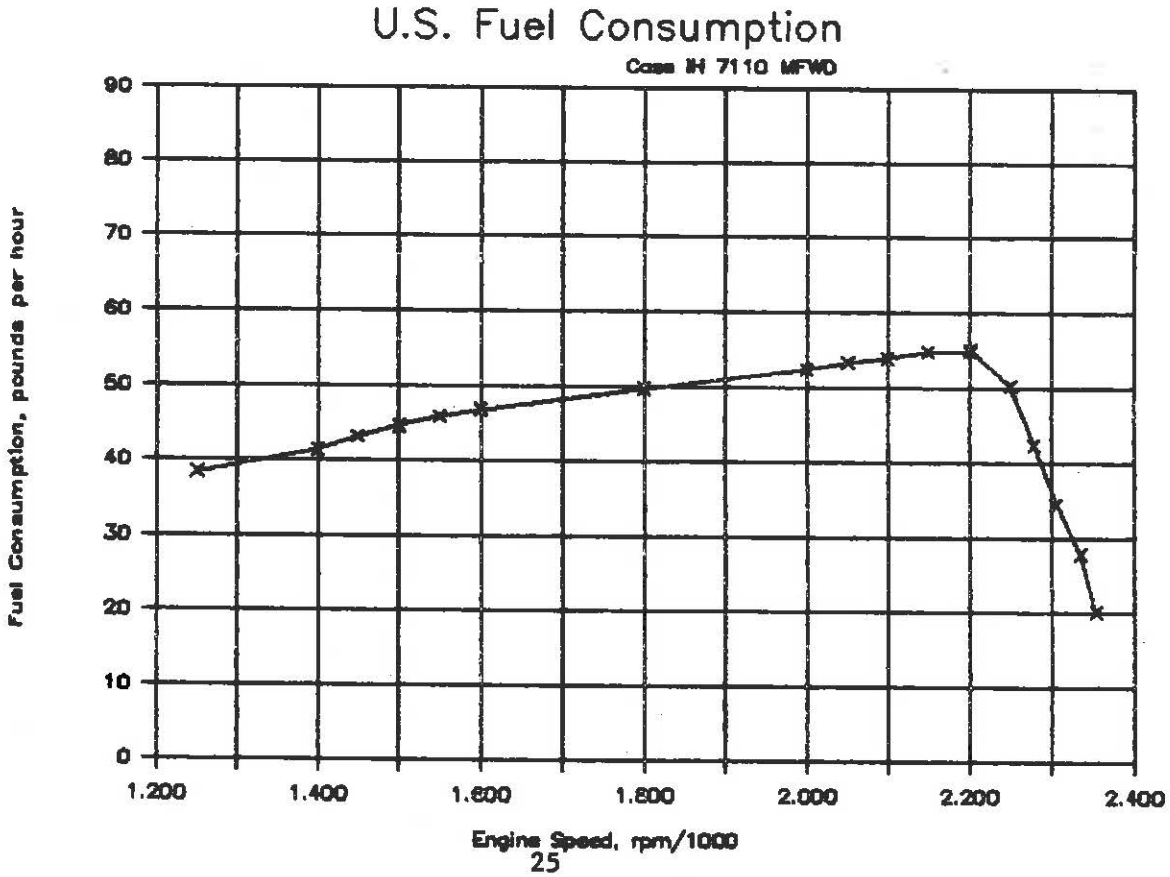
S.I. PTO Power

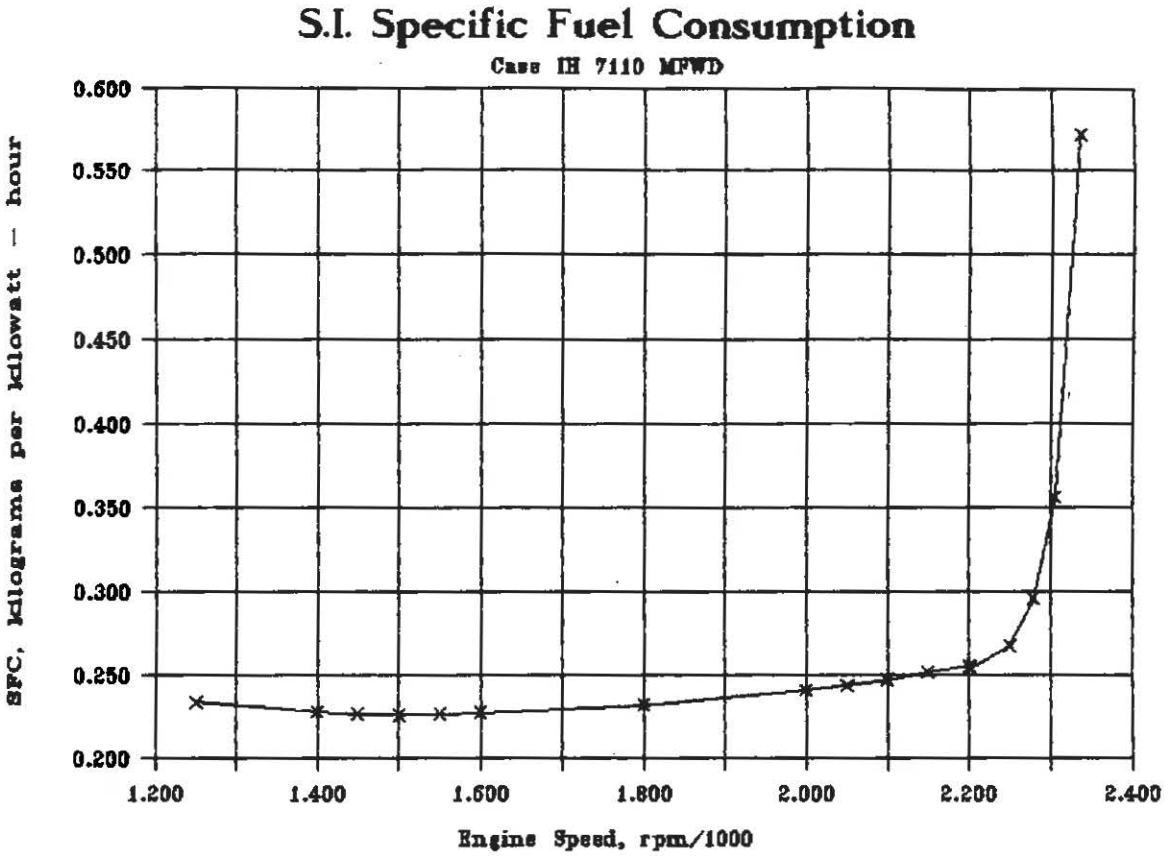


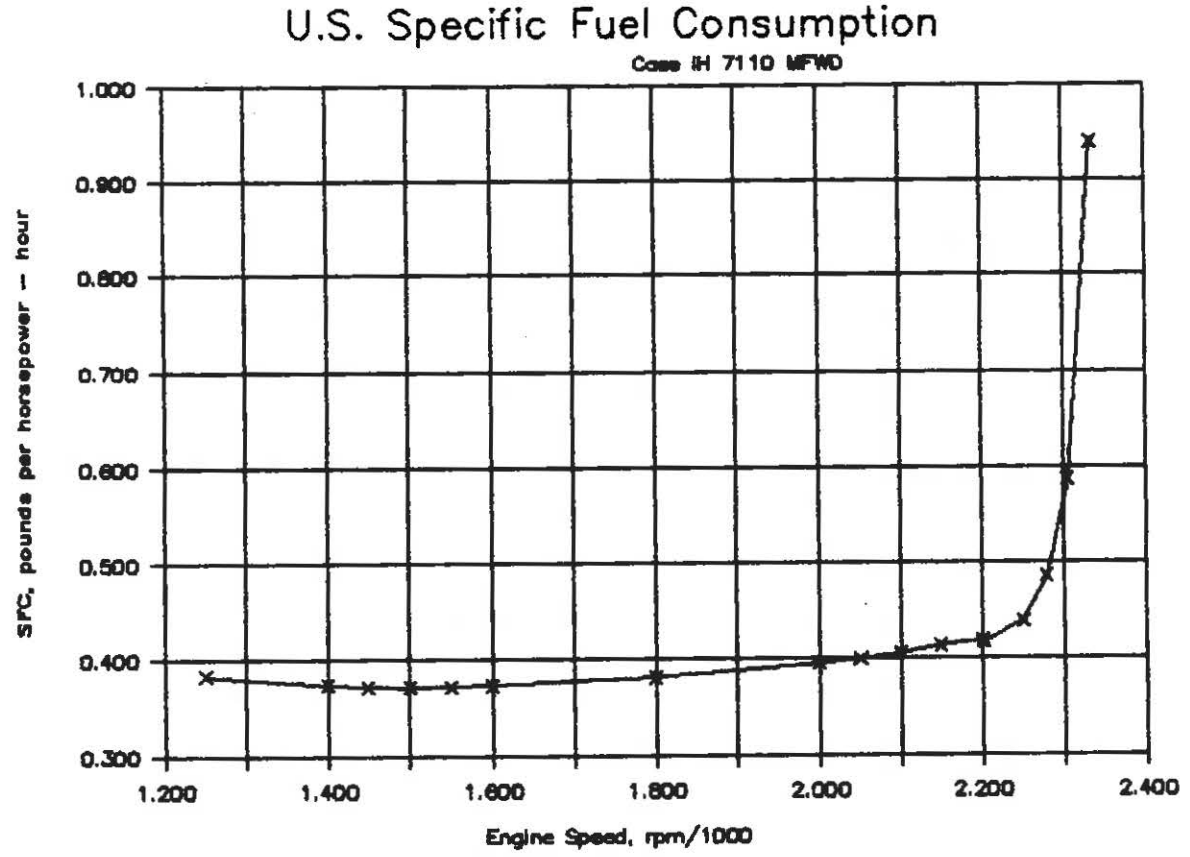
U.S. PTO Power

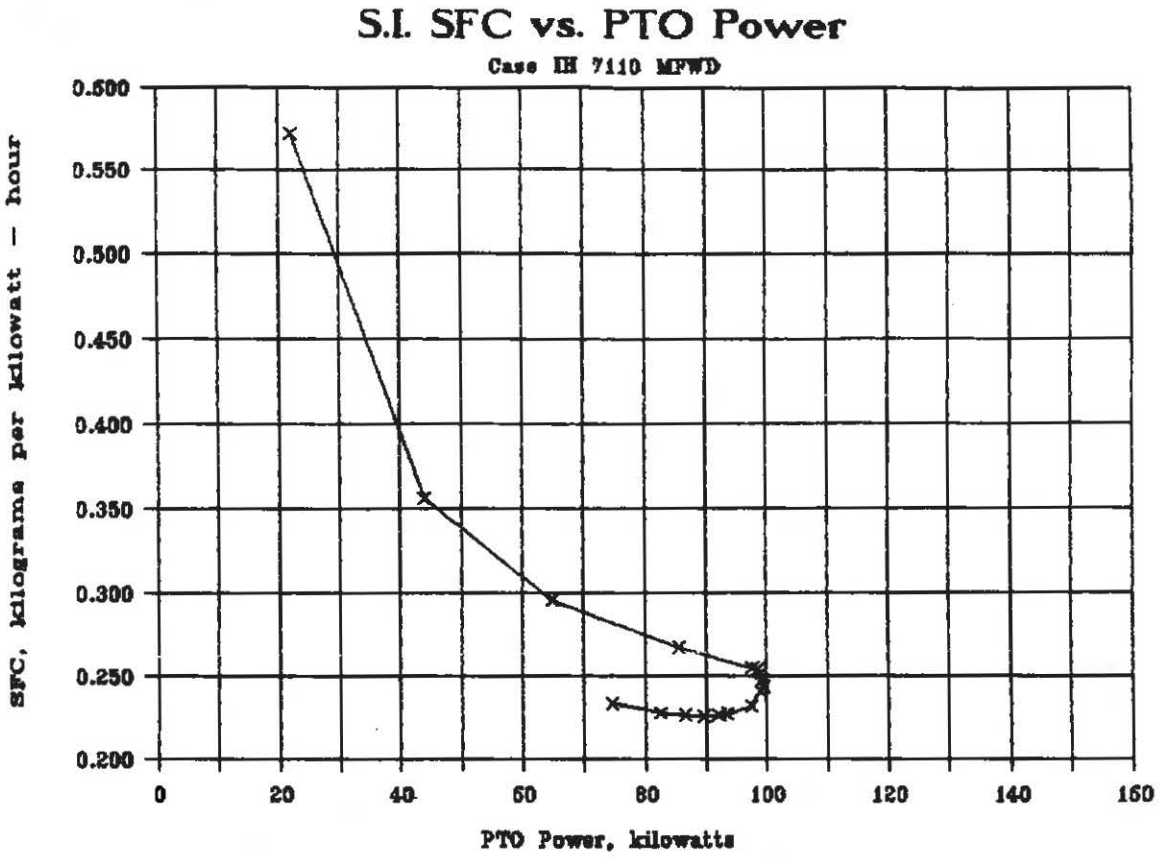


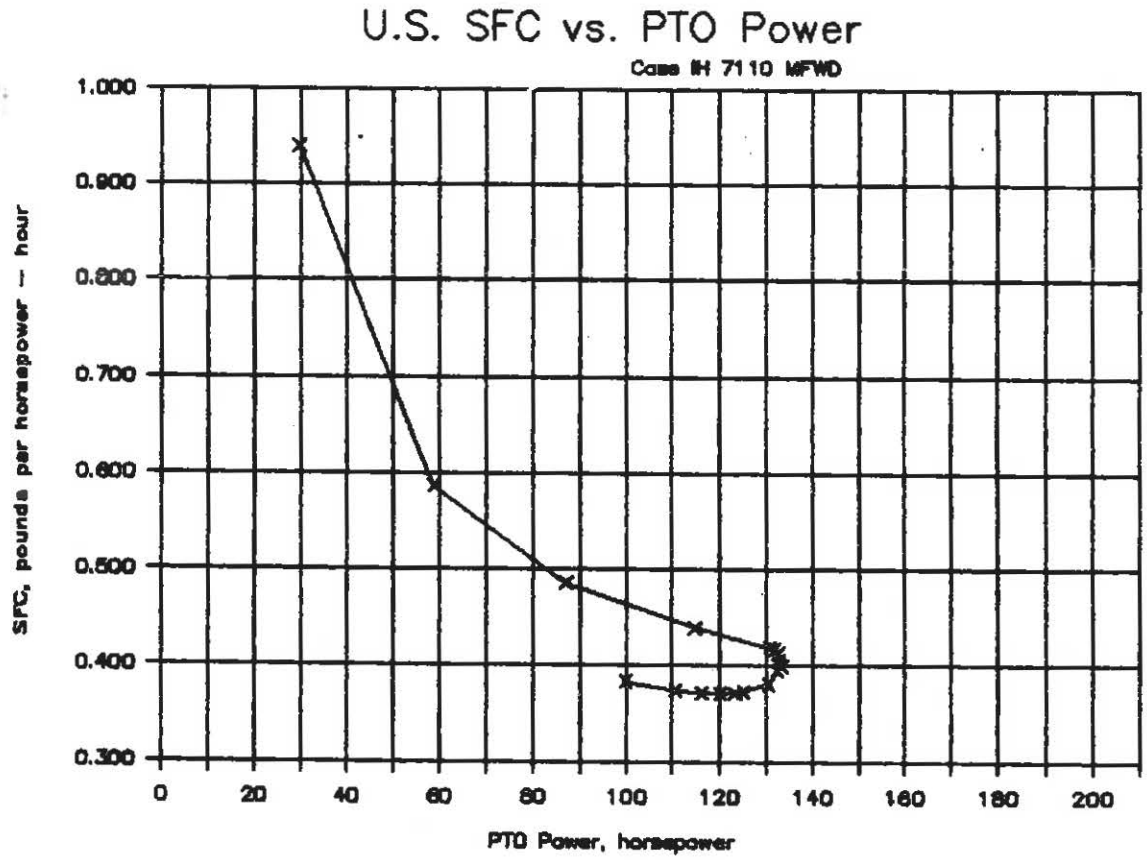

S.I. Fuel Consumption
Case IH 7110 MFWD
Fuel Consumption, kilograms per hour
40
35
30
25
20
15
10
5
0
1.200
1.400
1.600
1.800
2.000
2.200
2.400
Engine Speed, rpm/1000


U.S. Fuel Consumption
Case IH 7110 MFWD
Fuel Consumption, pounds per hour
90
80
70
60
50
40
30
20
10
0
1.200
1.400
1.600
1.800
2.000
2.200
2.400
Engine Speed, rpm/1000


S.I. Specific Fuel Consumption
Case IH 7110 MFWD
SFC, kilograms per kilowatt - hour
0.600
0.550
0.500
0.450
0.400
0.350
0.300
0.250
0.200
1.200
1.400
1.600
1.800
2.000
2.200
2.400
Engine Speed, rpm/1000


U.S. Specific Fuel Consumption
Case IH 7110 MFWD
SFC, pounds per horsepower - hour
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
1.200
1.400
1.600
1.800
2.000
2.200
2.400
Engine Speed, rpm/1000


S.I. SFC vs. PTO Power
Case IH 7110 MFWD
SFC, kilograms per kilowatt - hour
0.600
0.550
0.500
0.450
0.400
0.350
0.300
0.250
0.200
0
20
40
60
80
100
120
140
160
PTO Power, kilowatts


U.S. SFC vs. PTO Power
Case IH 7110 MFWD
SFC, pounds per horsepower - hour
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0
20
40
60
80
100
120
140
160
180
200
PTO Power, horsepower

8. OPTIONAL TEST RESULTS.

8.1 DRAWBAR PERFORMANCE.

Condition of test: Dual rear wheels, ballasted
Front wheel drive disengaged.

Date of tests: 27-Jun-88 05-Jul-88 Fuel density: 0.827 kg/l
Type of track: Concrete Case IH 7110 MFWD

Gear	Speed	Power	Pull	Engine Speed	Slip	SFC		Temperature, deg C					Rel hum	Pressure
	km/h	kW	kN	rev/min	%	kg/kW.h	kW.h/l	Fuel	Coolant	Oil	Dry	Wet	%	kPa
IIa. Maximum Power (ballasted, dual wheels, 2wd) Tire pressure: 124 kPa, rear (inner)														
Drawbar height: 406 mm 97 kPa, rear (outer)														
124 kPa, front														
4th	3.88	74.22	68.94	2224	10.92%	0.330	2.51	65	83	103	23	22	92	97.36
5th	4.50	79.60	63.65	2148	6.48%	0.306	2.71	66	84	104	23	22	92	97.36
6th	4.99	81.49	58.82	2049	5.34%	0.293	2.82	66	84	105	24	22	84	97.39
7th	5.88	85.11	52.12	2049	4.40%	0.282	2.94	66	84	106	25	22	77	97.43
8th	6.79	86.42	45.80	2048	3.69%	0.281	2.95	65	84	106	26	23	78	97.43
9th	7.88	86.46	39.49	2049	3.05%	0.281	2.95	65	84	106	26	23	78	97.46
10th	9.09	85.49	33.84	2050	2.64%	0.285	2.90	65	84	106	27	23	71	97.49
11th	10.46	84.38	29.04	2048	2.23%	0.288	2.88	65	84	106	27	23	71	97.49
12th	12.04	82.56	24.69	2047	1.82%	0.295	2.80	65	84	106	28	24	72	97.53
13th	13.81	81.53	21.25	2048	1.49%	0.297	2.78	66	84	106	28	24	72	97.56

Date of tests: 27-Jun-88 05-Jul-88 Fuel density: 6.905 lb/gal
Type of track: Concrete Case IH 7110 MFWD

Gear	Speed	Power	Pull	Engine Speed	Slip	SFC		Temperature, deg F					Rel hum	Pressure
	mph	hp	lb	rpm	%	lb/hp-hr	hp-hr/gal	Fuel	Coolant	Oil	Dry	Wet	%	in Hg
IIa. Maximum Power (ballasted, dual wheels, 2wd) Tire pressure: 18 psi, rear (inner)														
Drawbar height: 16 in 14 psi, rear (outer)														
18 psi, front														
4th	2.41	99.53	15498	2224	10.92%	0.542	12.75	150	182	218	74	71	92	28.75
5th	2.80	106.75	14310	2148	6.48%	0.502	13.75	150	183	219	74	71	92	28.75
6th	3.10	109.28	13223	2049	5.34%	0.482	14.32	151	183	221	76	72	84	28.76
7th	3.65	114.13	11718	2049	4.40%	0.463	14.91	151	184	222	77	72	77	28.77
8th	4.22	115.90	10297	2048	3.69%	0.461	14.96	150	184	222	78	73	78	28.77
9th	4.90	115.94	8879	2049	3.05%	0.462	14.96	149	184	223	78	73	78	28.78
10th	5.65	114.65	7608	2050	2.64%	0.468	14.74	149	184	223	80	74	71	28.79
11th	6.50	113.15	6529	2048	2.23%	0.473	14.59	150	184	222	80	74	71	28.79
12th	7.48	110.71	5550	2047	1.82%	0.485	14.23	149	184	222	82	75	72	28.80
13th	8.58	109.33	4778	2048	1.49%	0.489	14.12	151	184	222	83	75	72	28.81

8.2 POWER LIFT TEST (Upper link in top hole on tractor)

Linkage geometry dimensions.

		Dimension or range [mm]	Dimension or range [in]	Settings used on test [mm]	Settings used on test [in]
Lift category		III			
Rear Tire - Radius Index	(r)	820	32.3		
Front Tire - Radius Index	(r')	610	24.0		
Length of lift arms	(A)	381	15.0	same	
Length of lower links	(B)	861	33.9	same	
Distance of lift arm pivot from rear wheel axis: horizontal	(a)	364	14.3	to rear	same
Distance of lift arm pivot from rear wheel axis: vertical	(b)	422	16.6	same	
Horizontal distance between the 2 lower link points	(u)	604	23.8	same	
Horizontal distance between the 2 lift arm end points	(v)	737	29.0	same	
Length of upper link	(S)	634 to 853	25.0 to 33.6	655	25.8
Distance of upper link pivot from rear wheel axis: horizontal	(c)	627	24.7	same	
Distance of upper link pivot from rear wheel axis: vertical upper	(d)	250	9.8	250	9.8
Distance of upper link pivot from rear wheel axis: vertical lower		169	6.7		
Distance of lower link pivot from rear wheel axis: horizontal	(e)	445	17.5	same	
Distance of lower link pivot from rear wheel axis: vertical	(f)	332	13.1	same	
Distance of lower link pivot points to lift rod pivot pts on lower links.	(D)	579	22.8	same	
Length of lift rods	(L)	660 to 866	26.0 to 34.1	768	30.2
Height of lower hitch points relative to rear wheel axis In low position	(h)	378 to 699	14.9 to 27.5	576	22.7
Height of lower hitch points relative to rear wheel axis In high position	(H)	3 to 269	0.1 to 10.6	117	4.6
Height above ground of lower hitch points when locked in transport position.		823 to 1089	32.4 to 42.9	937	36.9

TEST RESULTS

		Hitch point	Frame
Lower hitch points above ground - down position.	[mm/inch]	244/9.6	252/9.9
Vertical movement	[mm/inch]	658/25.9	668/26.3
Maximum corrected force through full range	[kN/lbf]	32.6/7327	36.9/8294
Corresponding pressure	[kPa/psi]	15168/2200	
Moment about rear axle	[kN.m/ft.lb]	42.5/31382	70.7/52111
Maximum mast tilt angle	[degrees]	---	1.7

Lifting height relative to the horizontal position of lower links

	[mm]	-239	-231	-201	-99	0	99
	[in]	-9.4	-9.1	-7.9	-3.9	0	3.9
Corrected lift forces.							
hitch points	[kN]	32.6	--	33.7	38.2	41.3	43.2
	[lb]	7327	--	7569	8586	9276	9720
at frame	[kN]	--	36.9	38.0	40.4	41.8	42.5
	[lb]	--	8294	8551	9071	9400	9557

Lifting height relative to the horizontal position of lower links

	[mm]	201	302	401	419	437
	[in]	7.9	11.9	15.8	16.5	17.2
Corrected lift forces.						
hitch points	[kN]	44.9	45.8	46.9	47.5	--
	[lb]	10096	10294	10536	10670	--
at frame	[kN]	42.5	40.2	39.6	40.0	39.6
	[lb]	9547	9041	8900	8991	8896