WSM

WORKSHOP MANUAL
KUBOTA EXCAVATOR

KX121-3
KX161-3

Kubota

Code No.97899-60550

MidWestTech | Kubota KX121-3, KX161-3 Tractor Service Manual | Publication 97899-60550

Order the manual at mid-west-tech.com >

Machine Quality Specifications

KX121-3, KX161-3: KE, KDG, KUK Version

Machine specification:Service port, Wrist rest, STD-arm, KBM-cab, KBM-bucket

No		Specifications Items			Unit	KX121-3	KX161-3	Remarks
Q1	Main Spec. JIS A8404							
1	1	Machine size	Total length (Transport)		mm	5055 ± 101	5510 ± 110	
					inch	199.0 ± 4.0	216.9 ± 4.3	
	2		Total width		mm	1700 ± 17	1960 ± 20	
					inch	66.9 ± 0.7	77.2 ± 0.8	
	3		Total height (Canopy)		mm	–	–	
					inch	–	–	
	4		Total height (Cabin)		mm	2490 ± 25	2540 ± 25	
					inch	98.0 ±1.0	100.0 ± 1.0	
2	1	Weight	Machine weight (Canopy)		kg	–	–	Fuel tank
					lbs		–	
	2		Machine weight (Cabin)		kg	4060 ± 81	5070 ± 101	
					lbs	8951 ± 179	11177 ± 223	
3	1	Performance	Swivel speed	L	rpm	9.2 ± 0.9	9.3 ± 0.9	
	2			R	rpm	9.2 ± 0.9	9.3 ± 0.9	
	3		Travel speed	Rubber F1	km/h	3.0 ± 0.3	2.5 ± 0.3	
					mph	1.86 ± 0.19	1.55 ± 0.19	
	4			Rubber F2	km/h	5.0 ± 0.5	4.4 ± 0.4	
					mph	3.11 ± 0.3	2.73 ± 0.25	
	5			Iron F1	km/h	2.9 ± 0.3	2.2 ± 0.12	
					mph	1.80 ± 0.2	1.37 ± 0.12	
	6			Iron F2	km/h	4.7 ± 0.5	3.9 ± 0.4	
					mph	2.9 ± 0.3	2.4 ± 0.25	
	7		Gradeability		deg	30	30	
4	1	Rear end min. turning radius			mm	1300 ± 26	1090 ± 22	
					inch	51.2 ± 1.0	42.9 ± 0.9	
	2	Swivel frame rear ground clearance			mm	570 ± 11	620 ± 12	
					inch	22.4 ± 0.4	24.4 ± 0.5	
	3	Tambler center distance			mm	1710 ± 50	1990 ± 60	
					inch	67.3 ± 2.0	78.3 ± 2.4	
	4	Crawler total length			mm	2175 ± 65	2500 ± 75	
					inch	85.6 ± 2.6	98.4 ± 3.0	
	5	Crawler total width			mm	1700 ± 34	1960 ± 39	
					inch	66.9 ± 1.3	77.2 ± 1.5	
	6	Min. ground clearance			mm	330 ± 10	320 ± 10	
					inch	13.0 ± 0.4	12.6 ± 0.4	
5	1	Front attachment	Bucket heaped capacity	CECE	m^3			
					yd^3			
	2			SAE, JIS	m^3	0.12	0.17	
					yd^3	0.16	0.22	
	3		Bucket width		mm	600 ± 12	650 ± 13	Without side cutter
					inch	23.6 ± 0.5	25.6 ± 0.5	
	4		Swing angle	Canopy L	deg			
	5			Canopy R	deg			
	6			Cabin L	deg	75 ± 2	75 ± 2	
	7			Cabin R	deg	50 ± 2	48 ± 2	

MidWestTech | Kubota KX121-3, KX161-3 Tractor Service Manual | Publication 97899-60550 Order the manual at mid-west-tech.com >

No		Specifications Items			Unit	KX121-3	KX161-3	Remarks
5	8	Front attachment	Max. digging radius		mm	5315 ± 80	6000 ± 90	
					inch	209.3 ± 3.1	236.2 ± 3.5	
	9		Ground level Max. digging radius		mm	5185 ± 76	5865 ± 88	
					inch	204.1 ± 3.1	230.9 ± 3.5	
	10		Ground level Min. finish radius		mm	1785 ± 36	2105 ± 42	Bucket bottom horizontal
					inch	70.3 ± 1.4	82.9 ± 1.65	
	11		Max. digging depth		mm	3205 ± 64	3555 ± 71	
					inch	126.2 ± 2.5	140.0 ± 2.8	
	12		Max. vertical digging depth		mm	2555 ± 77	2815 ± 84	
					inch	100.6 ± 3.0	110.8 ± 3.3	
	13		Max. digging height	Canopy	mm	–	–	
					inch	–	–	
	14			Cabin	mm	5210 ±104	5595 ± 112	
					inch	205.1 ± 4.1	220.3 ± 4.4	
	15		Max. dump height	Canopy	mm	–	–	
					inch	–	–	
	16			Cabin	mm	3690 ± 74	3945 ± 79	
					inch	145.3 ± 2.9	155.3 ± 3.1	
	17		Max. dump height (Arm vertical)	Canopy	mm	–	–	
					inch	–	–	
	18			Cabin	mm	1550 ± 46	1555 ± 47	
					inch	61.0 ± 1.8	61.2 ± 1.9	
	19		Mini. turning radius	Canopy	mm	–	–	
					inch	–	–	
	20			Cabin	mm	2020 ± 61	2385 ± 72	
					inch	79.5 ± 2.4	93.9 ± 2.8	
	21		Mini. turning radius (Left swing)	Canopy	mm	–	–	
					inch	–	–	
	22			Cabin	mm	1650 ± 49	1920 ± 58	
					inch	65.0 ±1.9	75.6 ± 2.3	
6	1	Dozer	Width		mm	1700 ± 5	1960 ± 5	
					inch	66.9 ± 0.2	77.2 ± 0.2	
	2		Height		mm	350 ± 10	360 ± 10	
					inch	13.8 ± 0.4	14.2 ± 0.4	
	3		Max. lift above GL		mm	355 ± 50	455 ± 50	
					inch	14.0 ± 2.0	17.9 ± 2.0	
	4		Max. below GL		mm	410 ± 50	370 ± 50	
					inch	16.1 ± 2.0	14.6 ± 2.0	
Q2	Main Specs JIS A8404							
1	1	Bucket tooth slagging			mm	50	50	F = 30 kgf
					inch	1.97	1.97	
	2	Tilt amount of front attachment			mm	0	0	
					inch	0	0	
	3	Dozer's declination			mm	3	3	
					inch	0.12	0.12	
2	1	Distance from tooth tip to cylinder protector			mm	179	200	
					inch	7.05	7.87	
3	1	Approach angle			deg	29±3	30 ± 3	
4	1	Crawler height			mm	470 ± 9	520 ± 10	Include grouser on the spocket
					inch	18.50 ± 0.35	20.5 ± 0.39	
	2	Max. crawler height			mm	490 ± 10	550 ± 11	
					inch	19.29 ± 0.39	21.7 ± 0.43	

MidWestTech | Kubota KX121-3, KX161-3 Tractor Service Manual | Publication 97899-60550 Order the manual at mid-west-tech.com >

No		Specifications Items			Unit	KX121-3	KX161-3	Remarks
Q3	Engine performance							
1	1	Max. engine rpm	no load		rpm	2450	2450	
	2		1 pump relief		rpm	–	–	
	3		2 pump relief		rpm	–	–	
	4		3 pump relief		rpm	–	–	Boom, arm, swivel
	5		2 pump relief		rpm	2250	2250	
	6		Dozer+2 pump relief		rpm	2250	2250	
2	1	Idleing rpm			rpm	1200 $^{+50}_{-150}$	1200 $^{+50}_{-150}$	
Q4	Travelling performance							
1	1	Travel motor block performance	L		mm(inch)	272	261	20 deg, 10 min Engine stop
					inch	10.7	10.28	
	2	Travel motor block performance	R		mm(inch)	272	261	
					inch	10.7	10.28	
2	1	Max. Traction force	F1		kgf	3081	4083	Slip. 70% of theoretical traction force.
					kN	30.2	40.0	
					lbs	6789	8992	
	2		F2		kgf	1455	1972	Relief. 60% of theoretical traction force.
					kN	14.30	19.3	
					lbs	3215	4339	
3	1	Travel straightness	F1		mm	600	600	10m distance
					inch	23.62	23.62	
	2		F2		mm	600	600	
					inch	23.62	23.62	
	3		Dozer F1		mm	600	600	Dozer up & down 10m distance
					inch	23.62	23.62	
	4		Dozer R1		mm	600	600	
					inch	23.62	23.62	
4	1	Track shoe sag distance	Iron		mm	40 ~ 45	40 ~ 45	Iron. Tread to tread.
					inch	1.57 ~ 1.77	1.57 ~ 1.77	
	2		Rubber		mm	10 ~ 15	10 ~ 15	Rubber. Tread to tread.
					inch	0.39 ~ 0.59	0.39 ~ 0.59	
Q5	Work performance							
1	1	Boom lifting capacity			kgf	827	920	Front end. Arm extend bucket crowd, dozer down.
					kN	8.1	9.0	
					lbw	1823	2023	
	2	Arm digging force			kgf	2095	2495	Bucket tooth root Arm length : KX121-3=1250mm KX161-3=
					kN	20.5	24.5	
					lbw	4618.7	5508	
	3	Bucket digging force			kgf	3210	4075	Machine stance to JIS bucket tooth root
					kN	31.5	40.0	
					lbw	7076.8	8992	
	4	Dozer force		down	kgf	3300	4170	Cutting edge down force at ground level
					kN	32.4	40.9	
					lbw	7275	9194	

MidWestTech | Kubota KX121-3, KX161-3 Tractor Service Manual | Publication 97899-60550 Order the manual at mid-west-tech.com >

A.Specifications & features

a. Technical data : KX121-3, KX161-3

V2203-M-EBH-2

Rated output	Engine speed		rpm	2250	
	Engine output	Net	kW	27.4	
			PS	37.3	JIS B8002-1
			HP	36.7	SAE J1349
		Gross	HP	38.2	SAE J1995
Max. engine torque	Engine speed		rpm	1600	
	Max. torque	Net	Nm	141	
			kgfm	14.4	JIS B8002-1
			lb-ft	104.2	SAE J1349
		Gross	lb-ft	106.9	SAE J1995
	Torque rise		%	21.5	
Engine speed	Idling speed		rpm	950 ~ 1150 (1050 ~ 1250)	( ) Cab-version
	Max. speed, no load		rpm	< 2450	No load
	Max. speed with system relief		rpm	< 2150	Arm & bucket relief
General specification	Bore × Stroke		mm (in)	ϕ83 × 92.4 (3.43 × 3.64)	
	Total displacement		CC (cu..in)	2197 (134.07)	
	No of cylinder			4	
	Injection timing before TDC		degree	18° , 0.314 rad	
	Injection pressure			13.73 MPa (140 kgf/cm^2, 1991 psi)	
	Compression ratio			22.6	
	Starter motor			12 V, 1.4 kW	
	Battery				
	Alternator			12 V, 480 W	
	Fuel comsumption ratio, be		g/ps-h		
	Dimension ; L × W × H		mm (in)	667.1 × 507.1 × 635 (26.3 × 20.0 × 25.0)	
	Weight		kg (lbs)	180 (397)	

Engine model:V2203-M-EBH-2
No of cylinder, bore × stroke:4 - ϕ87 × 92.4mm(3.43" × 3.64")
Total displacement:2197cc(134.07cu.in.)
Output power/RPM:37.3PS(JIS B8002-1), 36.7HP(SAE J1349)/2250rpm

MidWestTech | Kubota KX121-3, KX161-3 Tractor Service Manual | Publication 97899-60550 Order the manual at mid-west-tech.com >

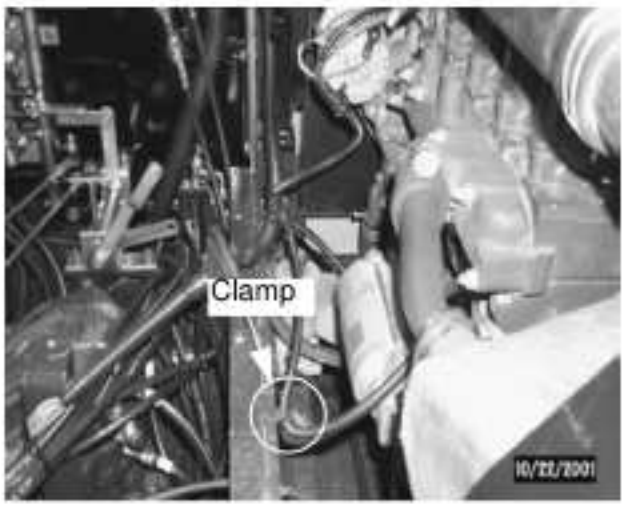
(3) Anti-cavitation valve function

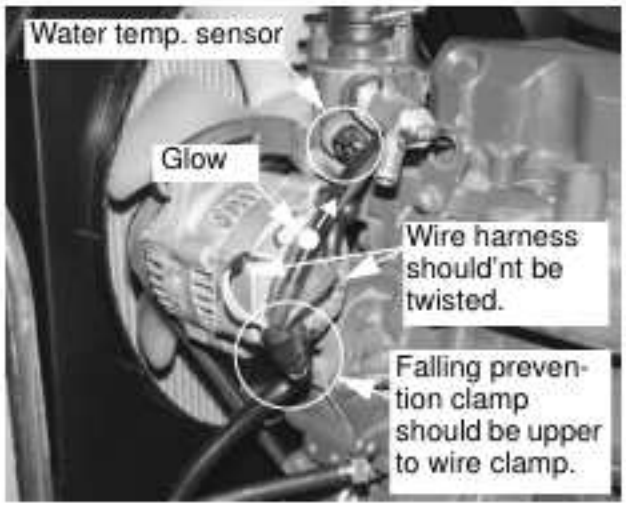
Trouble	Possible Cause	Remedy
Motor will not rotate or rotates but slow.	Defective check valve seat	
	1) Foreign matter exists inside.	Remove foreign matter completely. Repair damaged part and re-assemble it after cleaning. If the damage and leakage are severe, replace the part.
	2) Spring is damaged or broken.	Replace the spring. Remove foreign matter completely. Repair damaged part and re-assemble it after cleaning.
Cavitation sound is heard loud during traveling.	Check valve is seized.	
	Foreign matter exists between the check valve and the valve body.	Remove foreign matter completely. Repair damaged part and re-assemble it after cleaning. If the damage and leakage are severe, replace the part.

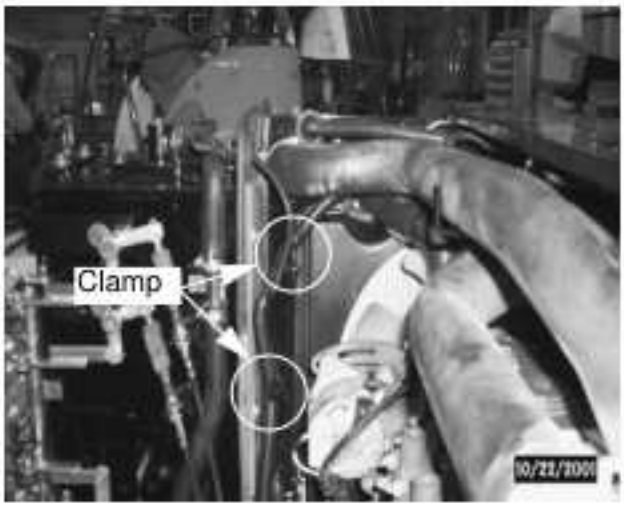
MidWestTech | Kubota KX121-3, KX161-3 Tractor Service Manual | Publication 97899-60550 Order the manual at mid-west-tech.com >

e. Engine harness

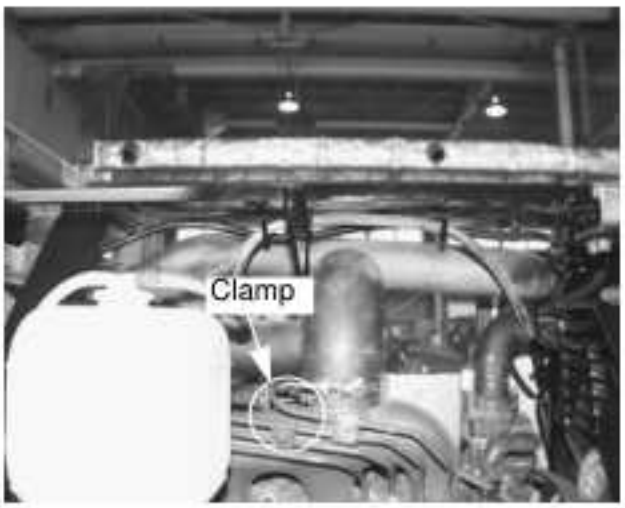






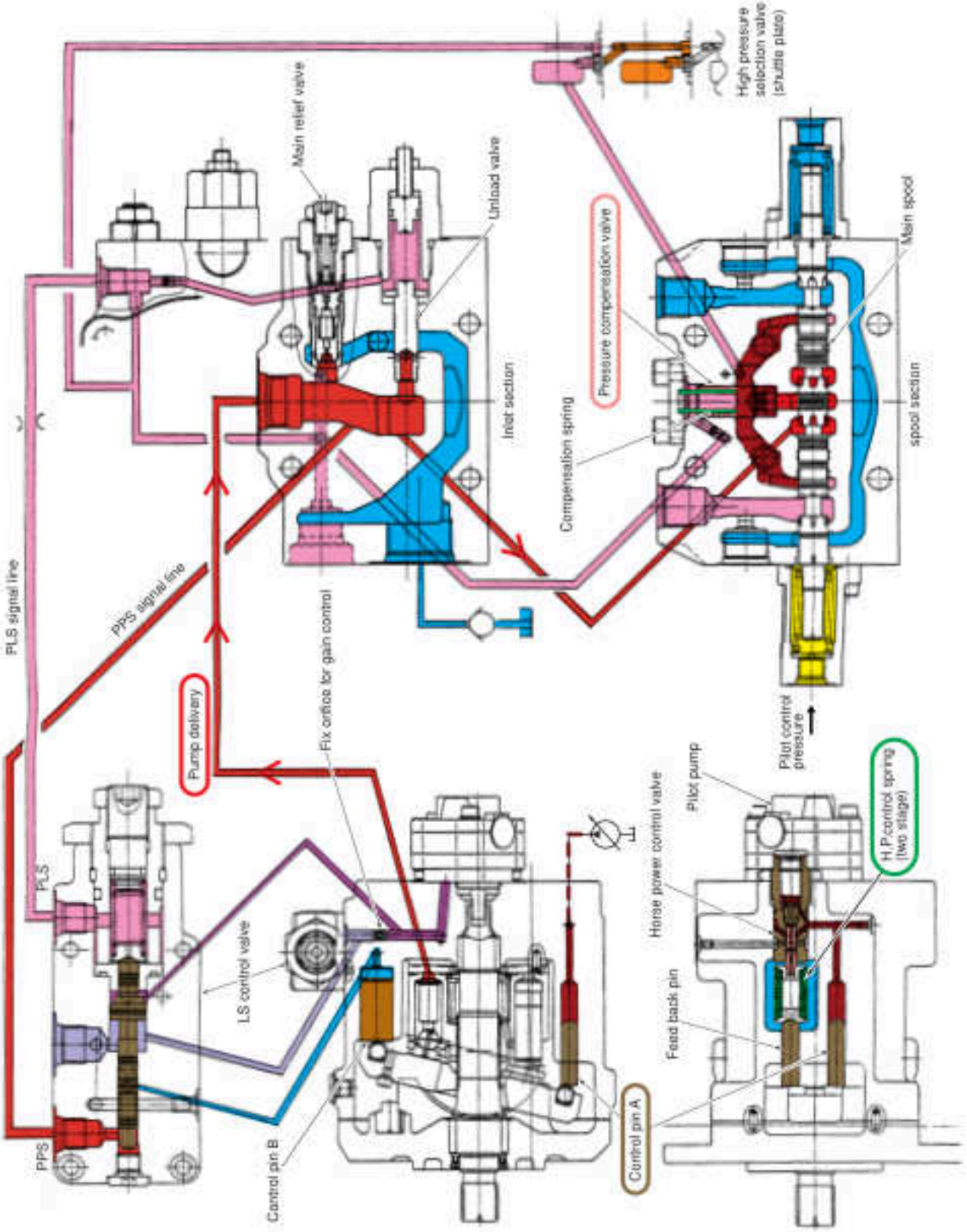






MidWestTech | Kubota KX121-3, KX161-3 Tractor Service Manual | Publication 97899-60550 Order the manual at mid-west-tech.com >

Load Sensing hydraulic system



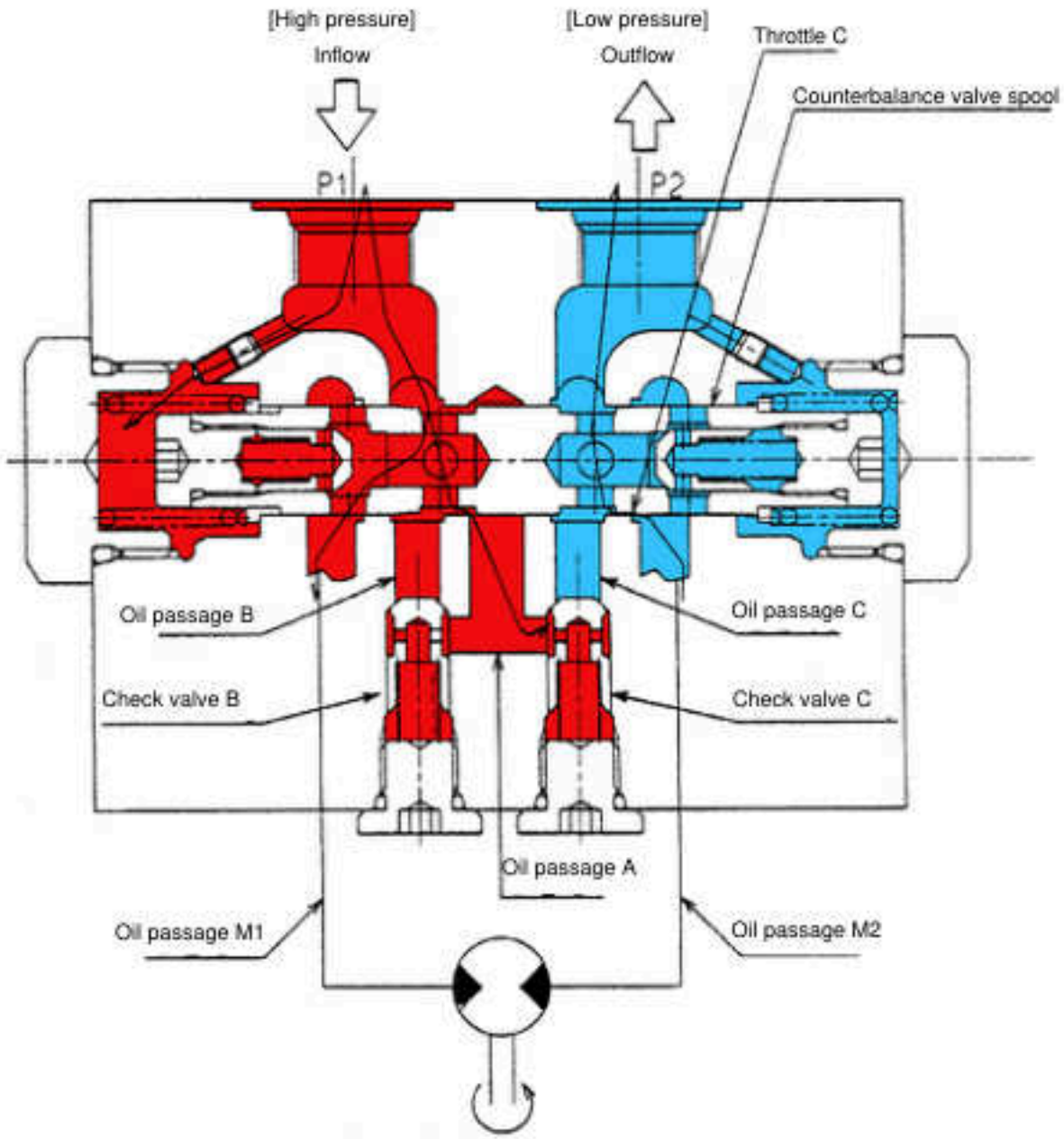
MidWestTech | Kubota KX121-3, KX161-3 Tractor Service Manual | Publication 97899-60550 Order the manual at mid-west-tech.com >

(2) Circuit behavior

1) Motor start-up

When the hydraulic pressure is applied to P1, the counterbalance valve spool overcomes the spring's counter-force and shifts to the right as shown in the figure below. In the meanwhile, the valve switches from M2 to P2, which gets the motor started. (Usual counterbalance action)

At the same time, the oil passage A goes under high pressure. Thanks to the action of the check valve C, however, the pressure oil is kept from leaking out toward the low-pressure side (oil passage C).



MidWestTech | Kubota KX121-3, KX161-3 Tractor Service Manual | Publication 97899-60550 Order the manual at mid-west-tech.com >

c. Case - Study : Poor Manipulation and Abnormal Operation

	Problems	Probable causes	Remedies	Ref.Fig.
1	The engine stalls at the rated rpm when a load (traveling filter, etc.) is imposed.	1) The feedback control pin has got stuck.	1) Eliminate the cause of the stick completely or replace the pin assembly.	Fig.13
		2) There is a control pressure leak due to wear in the control pin B (large diameter pin).	2) If the control pressure leak is caused by wear, replace the pump assembly.	
		3) The control spool of the horsepower control valve has got stuck.	3) If the horsepower control valve is set improperly, reset it.	
		4) The horsepower control valve is set improperly.	For the resetting of the horsepower control valve, refer to the P-Q characteristic diagram.	Fig.14
2	The response of the work machine is abnormally slow. (Especially, at low temperatures)	1) The orifice in the pump is clogged with dirt.	1) Disassemble and clean.	
		2) The unload valve orifice is clogged with dirt.	1) Disassemble and clean.	
		3) The PLS line orifice is clogged with dirt.	1) Disassemble and clean.	
3	An abnormal sound is heard from the pump.	1) Air bleeding hose is kept open.	1) Bleed the air from the pump and plug the hose.	
		2) The quantity of working fluid is smaller than the required quantity.	1) Check the quantity of working fluid and replenish.	
		3) The working fluid viscosity is improper.	1) Use the recommended working fluid.	
		4) Air is sucked through the suction hose or pipes.	1) Check and retighten the hose and pipe. Bleed them.	
		5) There are contaminants or pieces of metal.	1) Overhaul and clean the pump. Replace the pump assembly if necessary.	
4	Loud noise is heard from around the control unit.	1) The delivery hose touches something and rattles.	1) Reinstall the hose. Prevent the hose from touching.	
		2) The relief valve makes squeaking noises.	1) Check the relief pressure. Disassemble and clean the relief valve. Replace the relief valve assembly if necessary.	
5	The boom is not raised when horizontal work is done through simultaneous manipulation of the boom and the arm at idle or low rpm.	There is a possibility that the arm compensation spool has got stuck on the open side. (Principle) When the boom is manipulated, the arm compensation spool works in the direction where it is closed, since the operating pressure for raising the boom is high. However, the pressure compensation is not made due to a stick and the pump flow is directed to the arm crowd side under light load. As a result, the pressure for raising the boom is not built up.	1) Eliminate the cause of a compensation spool stick completely. 2) Replace the arm section assembly of the control valve.	Fig.11
6	The spontaneous boom fall amount is large.	1) Failure of the seal in the cylinder	1) Replace the seal.	
		2) Failure of the boom overload relief valve	1) Disassemble and clean the relief valve.	
		3) Failure of the load check valve	1) Check the load check valve.	
		4) Failure of the fall prevention valve seat	1) Disassemble and clean the fall prevention valve.	
7	The swivel does not stop.	The makeup poppet has got stuck. It is clogged with dirt.	Disassemble and clean the poppet.	
		The swivel main spool has got stuck.	Disassemble and clean the control valve swivel portion.	
		The relief valve of the swivel motor is clogged with dirt.	Disassemble and clean the relief valve.	

Fig. 14 Horse power control setting(KX121-3)

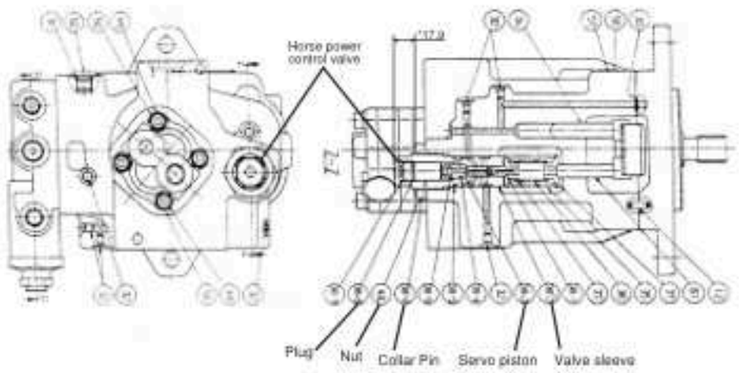


Fig. 15 LS regulation

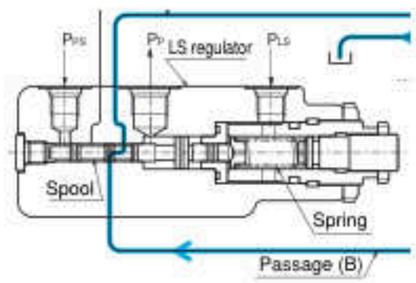
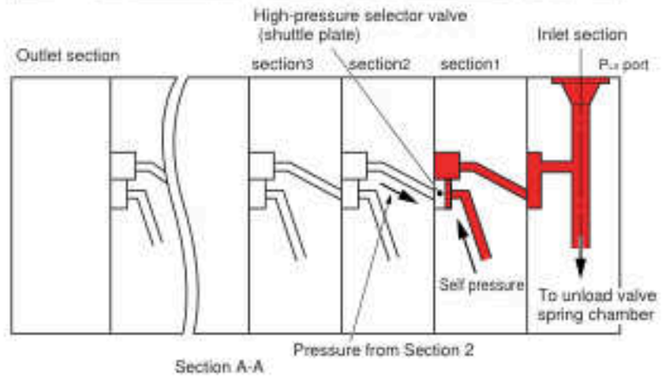
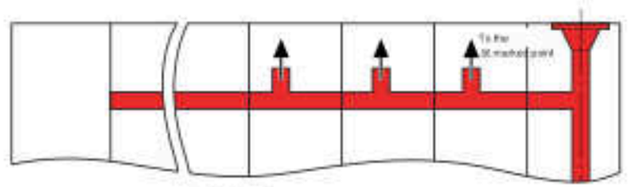


Fig. 12 High pressure selection valve(Shuttle plate)
Model : KX161-3







MidWestTech | Kubota KX121-3, KX161-3 Tractor Service Manual | Publication 97899-60550
Order the manual at mid-west-tech.com >