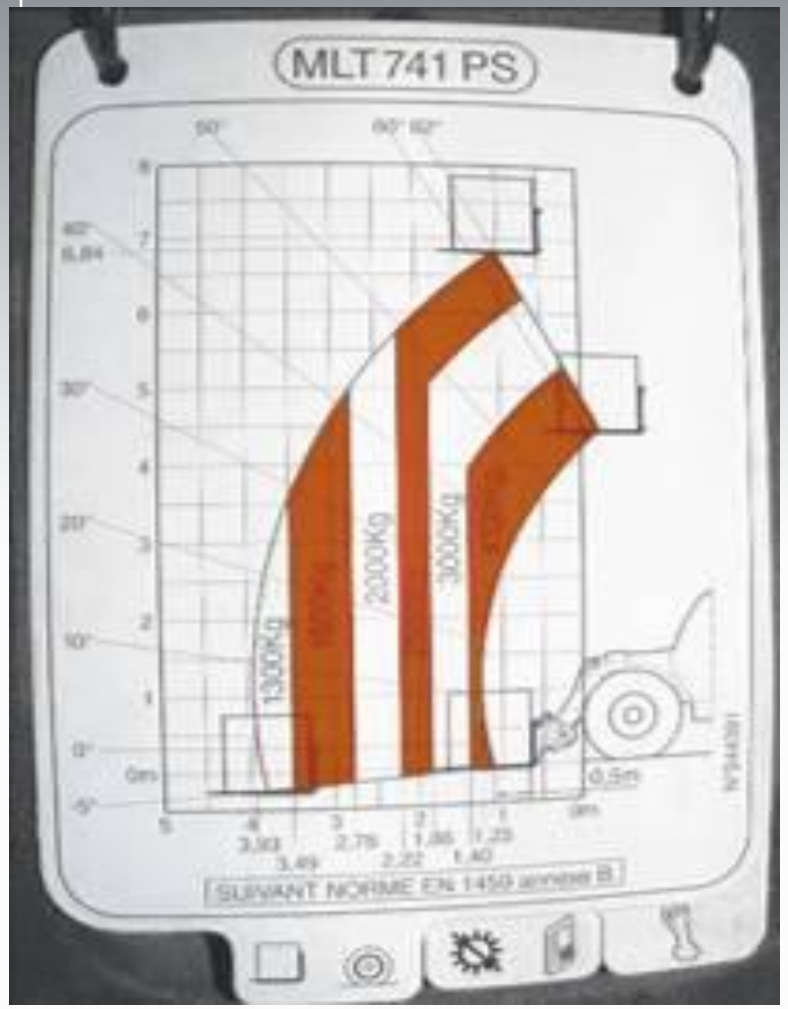
JCB 541-70 Agri Super v Manitou 741- 120 LSU

JCB AGRICULTURE - PRODUCT TRAINING

JCB 541-70 v Manitou 741 - Capacity

Lift Performance	units	JCB 541-70 Super	Manitou 741-120 LSU
Maximum lift capacity	kg	4100	4100
Maximum lift height	m	7.00	6.90
Lift capacity to full height	kg	2500	2500
Maximum forward reach	m	3.70	3.93
Lift capacity to full reach	kg	1500	1300
Machine weight	kg	7800	7365

JCB 541 v Manitou 741 - Lift



- Capacity drops off quickly from 4100kg to 3000kg. (1.25m to JCB's 1.75m)
- Maximum load at full reach is 1300kg, compared to 1500kg on 541-70
- At 2.0m extension Manitou lifts 2500kg – JCB 541-70 lifts 2750kg

JCB Loadall v Manitou 741 - Dimensions

Machine Dimensions and Engine performance			
	Units	JCB 541-70 Agri Super	Manitou 741-120 LSU
Overall height	m	2.49	2.30
Width over tyres	m	2.29	2.32
Length to front of carriage	m	4.99	4.91
Turning radius over tyres	m	3.70	3.85
Gross engine power	hp	130	123
Max. engine torque	Nm	527@1300rpm	434@1400rpm
Fuel tank capacity	ltr	148	120

JCB Loadall v Manitou 741 - Hydraulics

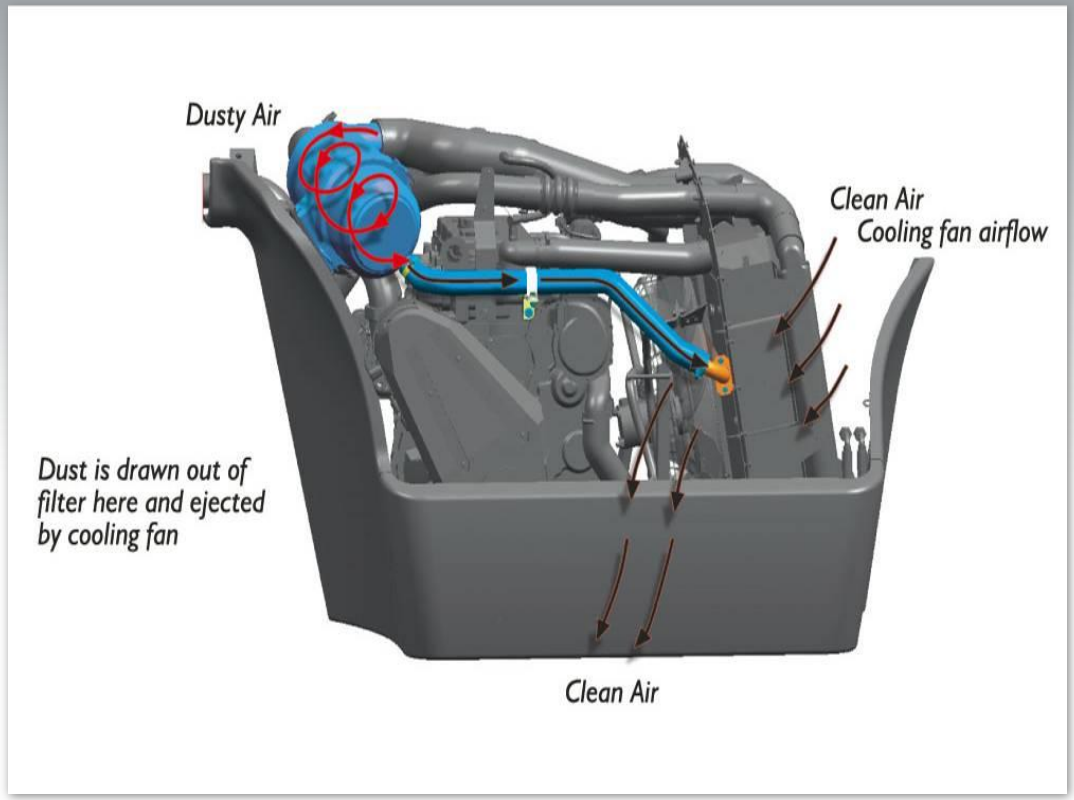
Hydraulic Performance			
	Units	JCB 541-70 Agri Super	Manitou 741-120 LSU
Max. hydraulic flow	l/min	140	150
Max. hydraulic pressure	bar	270	270
Cycle times: Lift	Sec	6.7	7.0
Lower	Sec	5.3	5.3
Extend	Sec	6.1	8.2
Retract	Sec	5.5	6.0
Crowd	Sec	2.5	3.5
Dump	Sec	3.2	3.0
Total cycle	Sec	29.30	33.00

JCB Loadall v Manitou – Engine

- Fitted with the 4.4-litre Perkins engine. 101/123hp
- Engine mounted onto bodywork, driving bevel box via a prop shaft.
- Any damage to bodywork can cause miss-alignment of drive train and potential failure.

- Agri and Agri Plus/ Super models fitted with JCB 444 engine. 100/130hp
- Engine/Transmission/Hydraulic pumps in one resiliently mounted unit, with bodywork separate.
- Benefits service access and potential drive train miss-alignment from bodywork damage.

JCB Loadall v Manitou – Engine



Optional vacuum hose to improve the service life of the air filter

JCB Loadall v Manitou – Engine

Engine mounted to the chassis not carried on the protection frame

JCB Loadall v Manitou – Engine

- Charge-air-cooler pipes made of mild steel, with jubilee clip connections and ‘standard’ black hosing.

- Dense core radiator easily blocked with chaff / fine debris causing over-heating. 11fins/inch

- JCB use stainless steel charge cooler pipes to prevent internal rust being drawn into engine with high temperature silicon hoses and constant torque clips to eliminate pipe ‘blow-off’.
- Large, open core radiator eliminates blockage with debris passing through radiator. 6 fins/inch

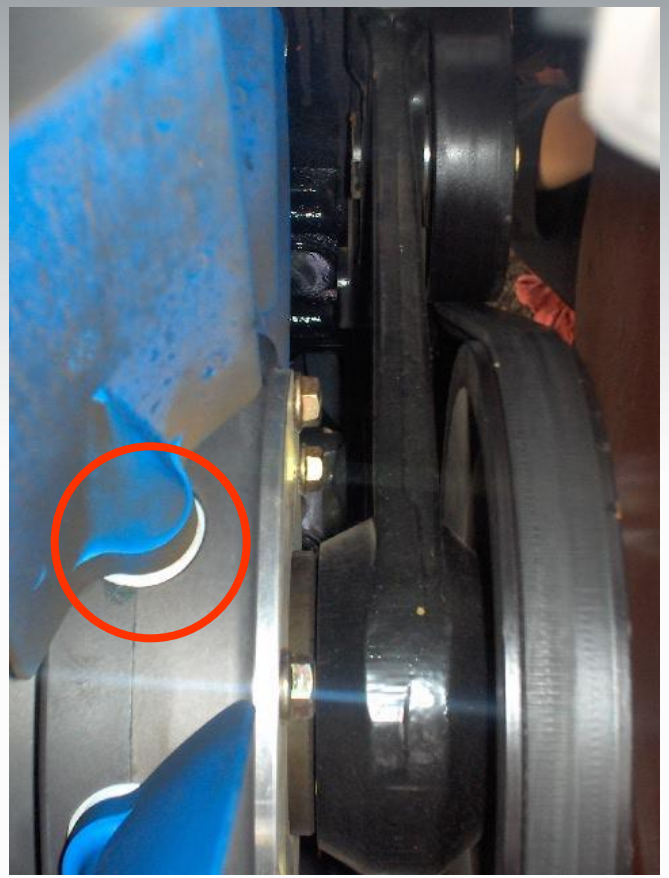
JCB Loadall v Manitou – Engine

- Fan is belt driven from the engine, ‘Clean fix’ type fan used to reverse fan direction – expensive solution.
- Replacement of the fan belt also requires removal of the engine to bevel box prop shaft, which is difficult to reach next to the chassis side plate.
- Hydraulic oil cooler is fitted to the ‘hot’ exit side of pack, although air throughput is minimal.

- Hydraulically driven fan has dedicated pump supply.
- Fan direction can be reversed to disperse debris from radiator and air intake, maintaining maximum air flow.
- Full cooling pack mounted in a sealed compartment for maximum air throughput.

JCB Loadall v Manitou – Engine

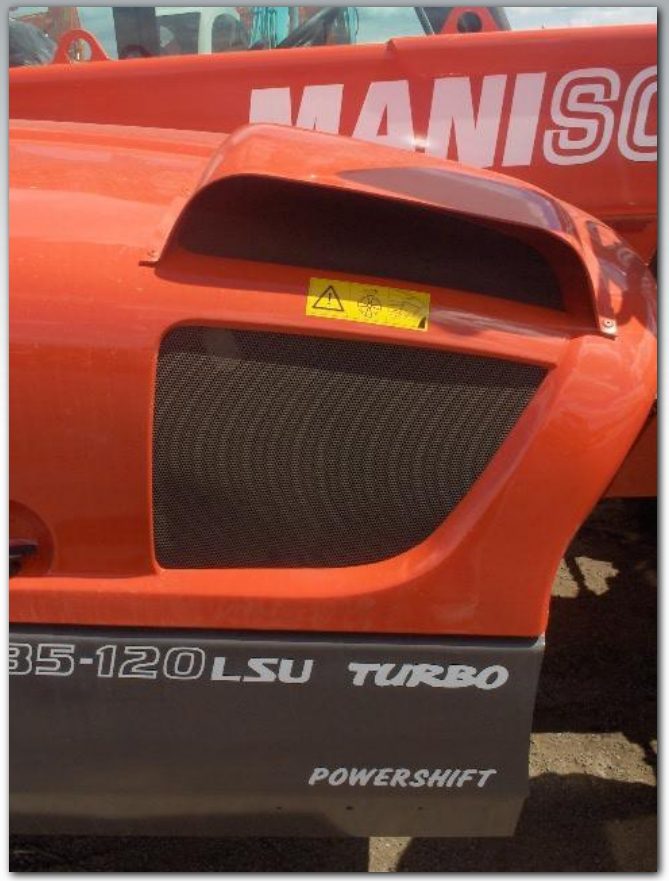
Engine to transmission drive shaft which provides a belt drive to the cooling fan



Fan blades change there angle to reverse the air flow direction

JCB Loadall v Manitou – Engine

Larger meshed air panel to increase air flow to the cooling pack



JCB Loadall v Manitou – Engine

- Additional engine driven pump is required to push oil through the oil cooler. 123hp models

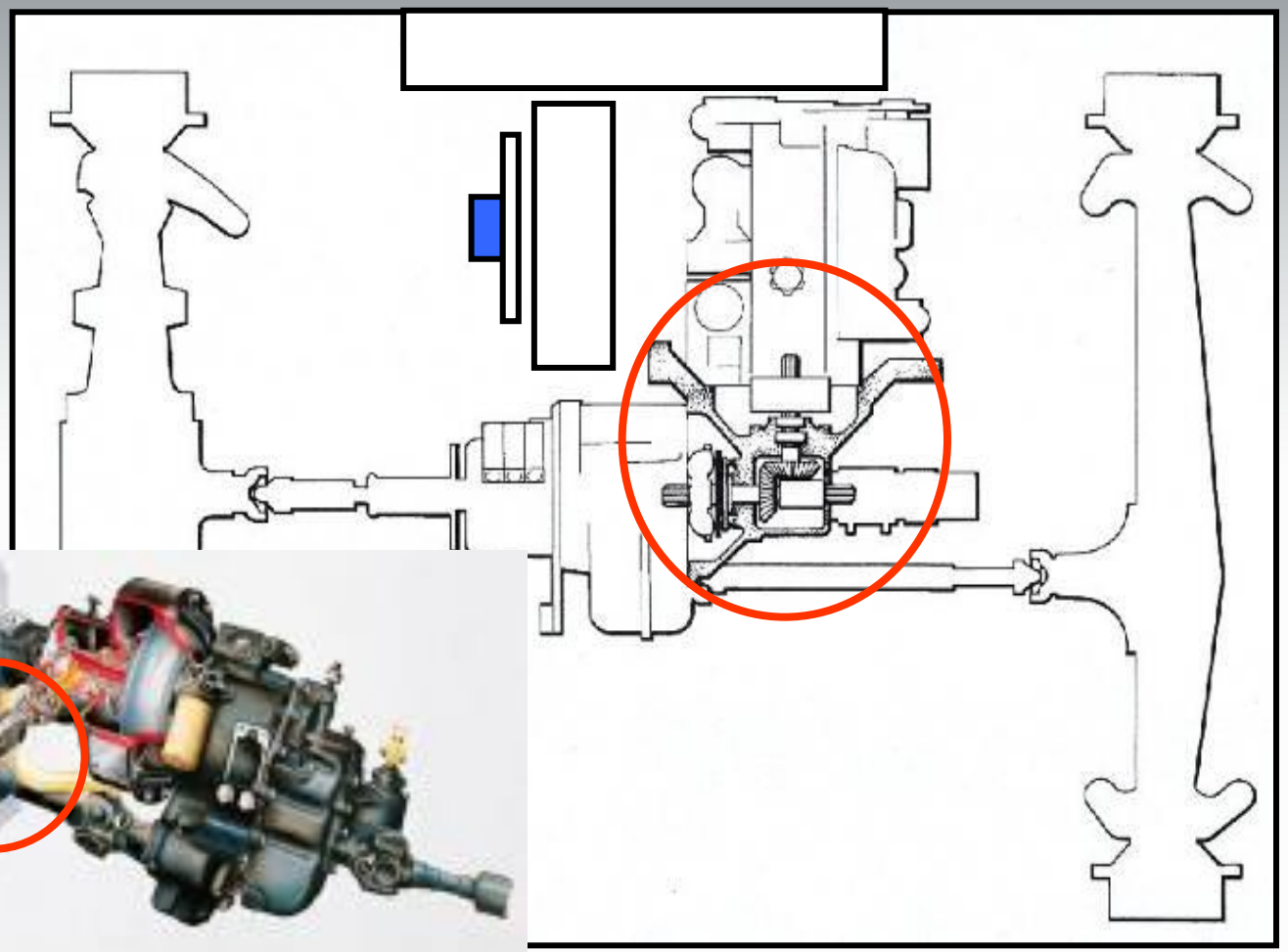
JCB Loadall v Manitou – Driveline

Dampener required to reduce vibration from the engine to the transmission

- Transversely mounted engine drives into 90-degree bevel box.
- Drive shaft with rubber damper prior to transmission.
- Requires maintenance

- Similar engine mounting position but no drive shaft, the engine is directly mounted to the bevel box.
- Tortional damper prior to transmission
- Prevents damage to the transmission.

JCB Loadall v Manitou – Driveline



JCB Loadall v Manitou – Driveline

- 741 has turner 6-speed power shift or 4-speed manual transmission (Power shuttle).
- Power shift capable of 38kph (not 42kph as claimed) and manual capable of 34kph.
- Auto-engaging 6th gear still operates through the torque converter.
- Less efficient at high speeds and trailer towing due to lack of Torque lock.
- All 531-70 and 541-70 models are fitted with power shift as standard. Agri and Agri Plus 4 speed, Agri Super 6 speed.
- Agri Super has genuine 40kph maximum travel speed.
- Torque Lock in 5th & 6th gears gives direct drive, locking the torque converter for greater efficiency in transport.
- 6 speed box has auto select between 4-6 plus 3 operating modes, Eco, Power & Field.

JCB Loadall v Manitou – Driveline

Std hydraulic controller

Manitou standard 4 speed manual gear box and power shuttle

JCB Loadall v Manitou – Driveline

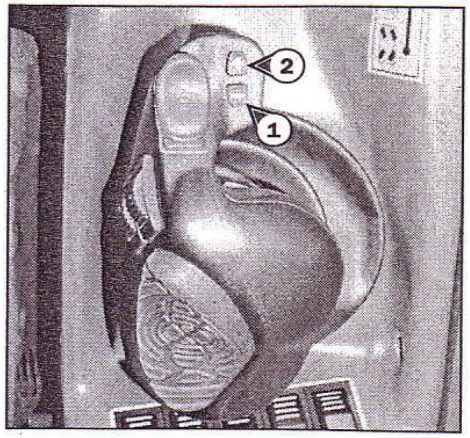
- Manitou has a 6 speed power shift transmission with a small external cooling pack. (limited duty)
- Top speed is limited when towing due to only 5 gears being available.
- 6th gear deactivation switch fitted
- Transmission limited for different applications. (see operators manual)

- Torque Lock 6 speed transmission and large cooling pack are designed specifically for roading and towing. (unlimited duty)
- 40kph towing speed, 60% faster.
- No torque converter related slow down when hill climbing, utilising the engines full torque curve.

MANITOU OPERATORS MANUAL

16B - GEAR SELECTOR

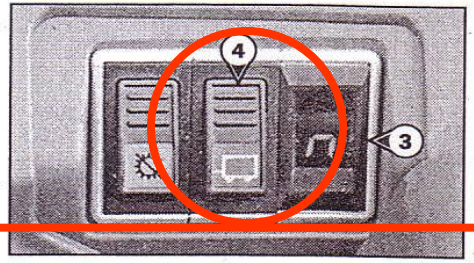
MLT 634 -120 LSU POWERSHIFT Série C-E2
MLT 735 -120 LSU POWERSHIFT Série 3-E2
MLT 741 -120 LSU POWERSHIFT Série 3-E2



The gear is selected by means of buttons 1 and 2. The selected gear is indicated on the dial 3.
There are 6 forward and 3 reverse gears available.

USING THE GEARS ON THE GEAR BOX
- On these lift trucks with a torque converter, it is not necessary to automatically start up in 1st speed and progress up the gears.

The choice of gear ratio should be made carefully according to the nature of the work being carried out. A poor choice may result in the extremely rapid elevation of the transmission oil temperature through excessive slipping of the converter, which could lead to serious damage to the transmission (it is essential to stop and change the working conditions if the transmission oil temperature indicator light comes on). This poor choice may also result in a reduction in the lift truck's performance in forward speed. When the forward force increases, the forward speed in the g gear (for example 3rd gear) may be lower than the forward speed that could be obtained with the g-1 gear (in 2nd instead of the 3rd).



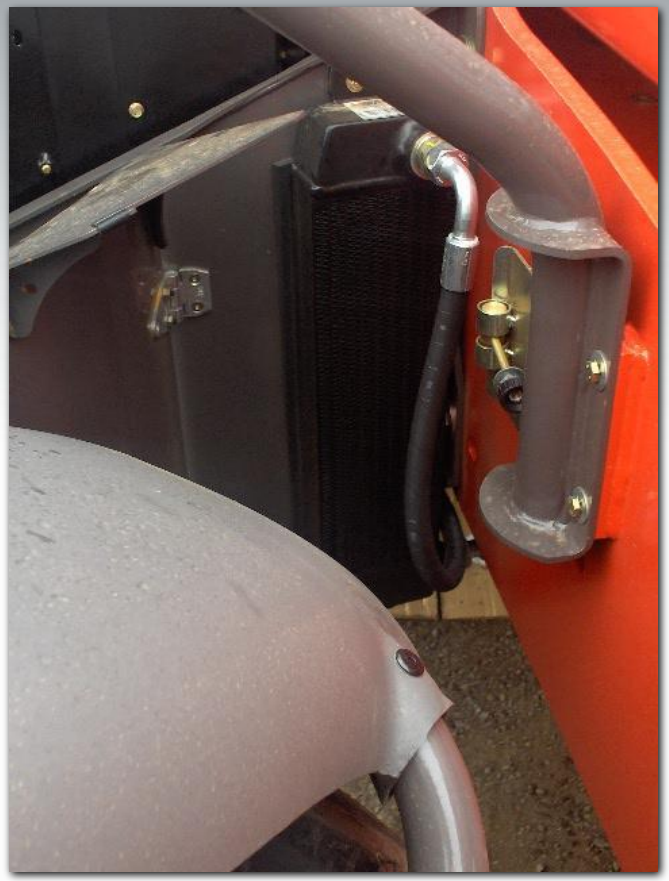
In general, we would advise you to use the following gears according to the nature of the work being carried out.
- On the road: Set off in 4th gear and go up to 5th and 6th if the conditions and state of the road permit it. In hilly areas, set off in 3rd gear and go up to 4th and 5th (the use of 6th gear is prohibited) if the conditions and state of the road permit it.
- With a trailer on the road: Set off in 2nd gear and go up through the gears to 5th if the conditions and state of the road permit it.
- Handling: 3rd, 4th or 5th gear (the use of the 6th gear is prohibited).
  2nd gear in restricted spaces.
- Loading (reclaiming with bucket, manure fork, etc.): 2nd gear.
- Earth moving: 1st gear.

Switch for disabling 6th gear
Switch 4 serves to enable or disable 6th gear and must be used when required for the task to be performed. When the lamp is lit, 6th gear is disabled.

This device must be used during handling, when towing a trailer and in hilly areas, to reduce the risk of transmission overheating. Disabling 6th gear also guarantees that the speed limit will not be exceeded when towing a trailer.

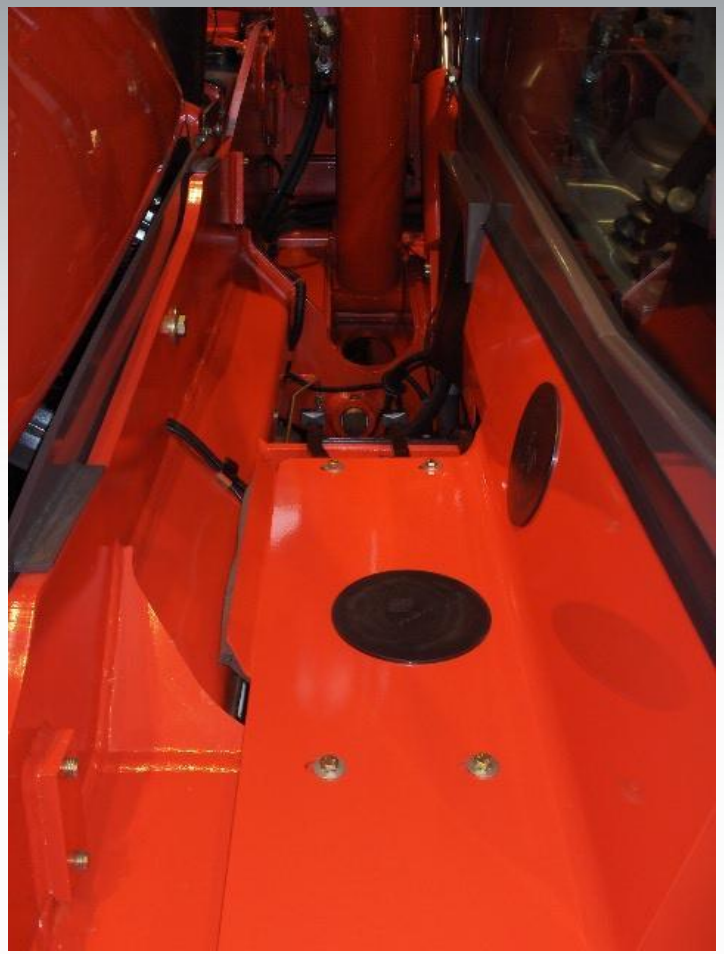
Manitou – Driveline

- Small external transmission cooler with limited air flow
- Cooler is mounted behind the front RHS wheel and is protected by a steel guard, further reducing the air flow



Manitou - Transmission

Transmission oil dip stick and filler cap located under the boom



JCB Loadall v Manitou – Hyd's

- Hydraulic oil tank mounted directly under the cab.
- Potential source of heat.

- Hydraulic oil tank integrated into the chassis at the rear of the machine.
- Disperses heat, away from the cab and provides internal counterweight.

JCB Loadall v Manitou - Fuel

JCB has a low level fuel tank for easy filling
Manitou's is at chest height making it difficult to fill with a barrel or hose.

JCB Loadall v Manitou – Axles

•Spicer axles fitted.

•Compare size to axles fitted to JCB Loadalls.

•Heavy duty JCB axles fitted.

JCB Loadall v Manitou – Axles

28cm

21.5cm

JCB has larger axle hubs to transmit torque to the ground and improve service life

JCB Loadall v Manitou – Chassis

- MLT741 chassis side plate thickness = 20mm.

- Stronger chassis or counter weight ?

- JCB 531-70 chassis side plate thickness = 20mm.

- JCB 541-70 chassis side plate thickness = 25mm (+25% thicker than Manitou).

- Heavier chassis construction for strength and durability in loader applications with 4-tonne capacity.

JCB Loadall v Manitou – Chassis

- Manitou use large rear counterweight to achieve lift performance.
- Counter weight removed to create 735-120 & 731- 120

- JCB has no counterweight, all of weight required is built into chassis, increasing strength.

JCB Loadall v Manitou – Chassis

- Manitou chassis is offset to centre of machine, potentially creating greater stress in right-hand axle foot.

- Heavy duty minimal weld construction at this high stress area, centrally aligned for optimum stress dissipation.

JCB Loadall v Manitou – Chassis

- Dedicated Heavy duty chassis to each JCB model.

- 531-70 = 6900kg 731 = 6975kg
- 541-70 = 7800kg 741 = 7365kg
- 536-70 = 7800kg 735 = 6640kg

- Strong chassis for grater stability and longer service life.
- JCB had thicker chassis plates to add weight and strength, no need for counter weights.

JCB Loadall v Manitou – Hitches

- Maximum download on rear hitch is 1500kg.

- Maximum hitch download is 2000kg

JCB Loadall v Manitou – Boom

Boom Sections:

- Inner = H 280mm x W 250mm x 10mm thick.
- Outer = H 350mm x W 300mm x 7mm thick.
- Overlap = 865mm.

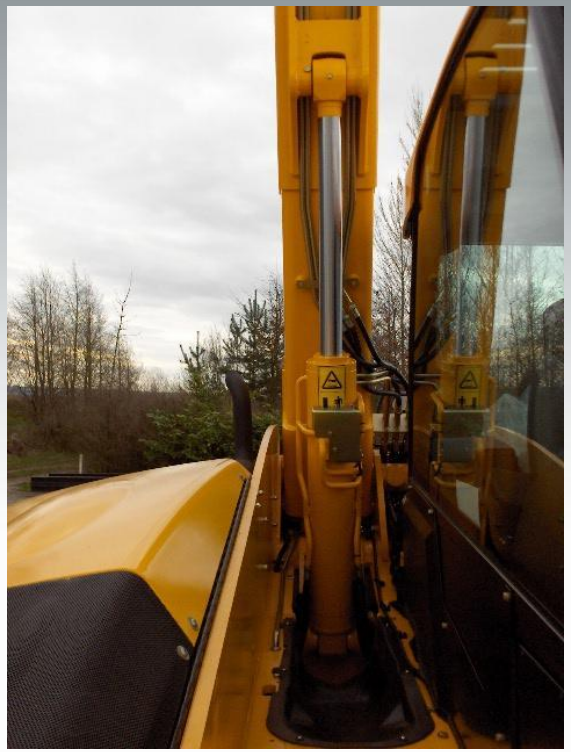
Boom Sections 541-70:

- Inner = H 320mm x W 280mm x 12mm thick.
- Outer = H 420mm x W 320mm x 8mm thick(+20% deeper).
- Overlap = 1043mm (+20%).

Boom Sections 531-70:

- Inner = H 280mm x W 260mm x 12mm thick.
- Outer = H 360mm x W 320mm x 8mm thick.
- Overlap = 1043mm (+20%).

JCB Loadall v Manitou – Boom



- Offset lift and compensation rams.

- Central lift and compensation rams ensure symmetrical boom loadings, reducing twisting forces imposed on the boom and associated wear on pins and bushes.

JCB Loadall v Manitou – Boom

Centrally mounted compensating ram to reduce twisting

JCB Loadall v Manitou – Boom

- Greased boom lubrication requires 250-hour servicing.
- Welded boom nose end – weld at high stress corner area

- Wax-oil lubricated inner boom only requires attention every 500-hours.
- One piece boom & nose end

JCB Loadall v Manitou – Boom

- Vertical crowd ram arrangement giving a maximum carriage rotation of 146º.
- Crowd ram more susceptible to damage when loading trailers / lorries etc.

- Crowd ram mounted inside the boom operating through a linkage, resulting in greater carriage rotation (149º) but still remaining well protected and accessible for servicing.

JCB Loadall v Manitou – Boom

- Manual locking carriage uses a bar and pin.

- Manual carriage with locking lever provides mechanical advantage for easier operation.

JCB Loadall v Manitou - SRS

- SRS is a system proven on thousands of JCB backhoe loaders, Loadalls and wheeled loaders.

- Reliable and the industry standard.

JCB Loadall v Manitou - SRS

- Oil control block mounted on lift ram, connected by hose to gas accumulator mounted on the chassis behind the displacement ram.

- System uses single 1.5 litre accumulator so can only be set-up for one load condition.

- Subjectively less effective than SRS, large variations when digging and pallet handling.

- SRS control block and accumulators are all mounted on the lift ram in one tidy installation.

- JCB use 2 x 1 litre accumulators set at different pressures allowing ‘travel’ and ‘work’ pressure optimisation.

- Larger accumulator capacity also allows greater boom movement softening ride.

JCB Loadall v Manitou - Cab

- Overall cab length (140cm) and width (86cm) are less than the JCB, less available space and reduced operator comfort.
- Interior finish is functional, but drab and uninviting.
- Cab height the same with A/C fitted @ 2.5m

- JCB cab is larger in width (94cm) and length (150cm), offering increased operator comfort.
- Loadall cab has high quality automotive style interior design and finish.
- JCB has a quite cab 78dBa V 81.5dBa

JCB Loadall v Manitou - Cab

JCB has more leg room and floor space

JCB Loadall v Manitou - Cab

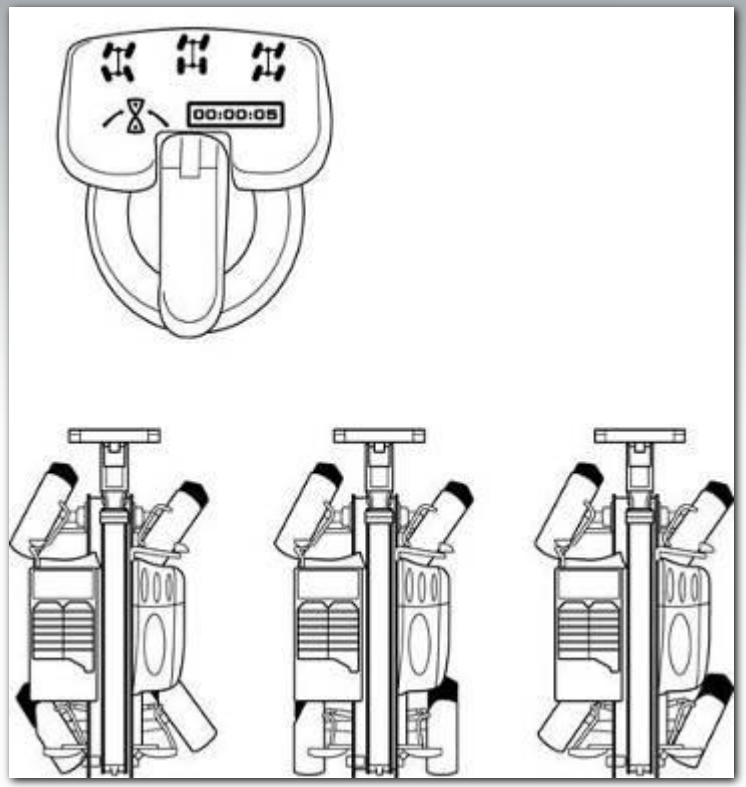
- Steering console is cluttered with information, some switches are hidden making operation difficult.
- Manual steering alignment requires the operator to stop and line up the wheels before changing between modes.

- Clear, separate dials are backlit for easy reading.
- Switches and dials are clustered to the right-hand side to allow maximum forward vision.
- JCB has automatically aligning 3-mode steer.

JCB Loadall v Manitou - Cab

Joy stick controls

JCB Loadall v Manitou - Cab



Manual steering controls v automatic

JCB Loadall vs Manitou - Cab

•Screen wash and brake reservoir mounted in the cab.

•Washer bottle, brake fluid reservoir and storage for grease gun and wheel brace are all in exterior module on front of cab for easy access.

JCB Loadall v Manitou - Cab

- No telescope option on the steering column, tilt only.

- Tilt/telescopic steering column available on all 531-70 and 541-70 Loadalls.

JCB Loadall v Manitou - Cab

- Load Moment Indicator is mounted on the front dash.
- Not easily visible when loading at height.

- LMI mounted high on cab A-post – easily viewed when working at height.

JCB Loadall v Manitou - Service

- Spade connectors still used on electrical system.
- Not IP69 rated.
- Transmission oil dipstick is accessible in the chassis, underneath the boom. Oil check requires raising the boom (starting and stopping the engine) prior to check – then standing underneath an unsupported boom to carry out the check (no boom strut is supplied)
- Michelin 460/70 24 XMCL tyres are fitted to all models.
- Three drive belts fitted, all need manual adjustment

- IP69 rated (pressure washer proof) connecters used throughout electrical system, improving reliability.
- Transmission oil dipstick accessible within engine compartment from the offside of the machine.
- All 4-tonne and high-speed 3-tonne capacity machines, capable of towing are fitted with higher load rated Michelin XM37 or XM47 tyres.
- Possibly another reason for the Manitou's lesser towing capability.
- One self adjusting drive belt fitted.

JCB Loadall v Manitou 741 – Key Points

- 741 appears a shortcut to a 4-tonne capacity machine. Chassis and boom structures are not up rated to match extra capacity (3 machines share the same chassis). JCB difference between 3 ton & 4 ton machines is obvious (3 different chassis).
- Perkins engine, Turner transmission & Spicer axles manufacturer or assembler ??
- Cab is poor compared to JCB. JCB cab is bigger with a more modern design and a easier control layout.
- Limited use 6 speed transmission due to cooling issues
- Less features - no 4WD disconnect, auto-steer alignment, minimal ventilation in cab. (8 air outlets v 5)
- Small & dense cored cooling pack struggles to perform in tough conditions.
- Poor quality wiring harness not IP69
- Engine driven fan means expensive low power reversing option.
- Not true 40kph capability, no Torque Lock, towing not allowed in 6th gear, maximum hitch download of just 1500kg.
- Poor service access.

MANITOU RANGE V JCB

Capacity(kg)	3100	3600		4100	3500
Lift height (m)	7	6	7	7	9
Agri	531-70 (731T)	536-60 (634T LSU)	536-70	541-70	535-95 (1035 LT LSU)
Plus	531-70 (731T LSU)	536-60	536-70	541-70	535-95
Super	531-70	536-60 (634-120LSU PS)	536-70 (735-120 LSU PS)	541-70 (741-120LSU PS)	535-95 (940L-120LSU)
Xtra	531-70	536-60	536-70	541-70	535-95

MANITOU RANGE

Model	Transmission	Engine (kW/hp)	Hydraulic flow (l/min)
MLT 634T LSU	Powershuttle	74,5/101	110
MLT 634-120 LSU	Powershuttle	90,5/123	150
MLT 634-120 LSU PS	Powershift	90,5/123	150
MLT 731T	Powershuttle	74,5/101	105
MLT 731T LSU	Powershuttle	74,5/101	110
MLT 735-120 LSU	Powershuttle	90,5/123	150
MLT 735-120 LSU PS	Powershift	90,5/123	150
MLT 741-120 LSU	Powershuttle	90,5/123	150
MLT 741-120 LSU PS	Powershift	90,5/123	150
MLT 1035 LT LSU	Powershuttle	74,5/101	110
MLT 940L-120LSU	Powershuttle	90,5/123	150

MANITOU RANGE

- MLT = Manitou Loader Telescopic
- T = Turbo engine
- 120 = Horse power
- LSU = Load Sensing Ultra Hydraulics
- PS = Power Shift
- Power Shuttle (Mechanical gear change)
- H = Hydrostatic
- L = Levelling = sway control


JCB