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Revisions are noted in dark blue. Please note these changes as you use this document.

## ServiceMans Service Guide Handbook for Kawasaki Loader Models 65~115ZV

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This is only a quick reference guide. It is not intended to take the place of the Shop Manual, or Operations and Maintenance Manual. See page 3.

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Note: You will see statistical data entered as it applies to a particular model of loader. Comments are to the far right.  
 For more details, refer to the Shop Manual and Operation and Maintenance Manual for each model.



Read and understand Operation and Maintenance Manual.  
 Refer to safety section of Operation and Maintenance Manual.

<b>General:</b>	<b>65TMV</b>	<b>65ZV</b>	<b>70ZV</b>	<b>80ZV</b>	<b>85ZV</b>	<b>90ZV</b>	<b>95ZV</b>	<b>115ZV</b>	<b>Comments</b>
Bucket data (heaped) yd <sup>3</sup> (m <sup>3</sup> ) General Purpose with Bolt On Cutting Edge	2.8 (2.1)	2.8 (2.1)	3.5 (2.7)	4.2 (3.2)	4.6 (3.7)	5.25 (4.0)	7.0 (5.4)	8.5 (6.6)	
Bucket data (heaped) yd <sup>3</sup> (m <sup>3</sup> ) Rock with Teeth and Adapters	2.6 (2.0)	2.6 (2.0)	3.25 (2.5)	4.0 (3.1)	4.4 (3.4)	5.0 (3.8)	6.6 (5.0)	*8.3 (6.4)	* With bolt-on edge segments to protect tooth adapters
Bucket data (heaped) yd <sup>3</sup> (m <sup>3</sup> ) Material Handling With Bolt On Cutting Edge	See comments	See comments	4.0 (3.1)	4.75 (3.6)	5.2 (4.0)	5.9 (4.5)	7.7 (5.9)	See comments	Never exceed twice the standard bucket size when figuring for a light material bucket.
Engine Make	Cummins	Cummins	Cummins	Cummins	Cummins	Cummins	Cummins	Cummins	
Engine Model	<b>6BTAA5.9</b>	<b>6BTAA5.9</b>	<b>QSB5.9</b>	<b>6CTAA8.3</b>	<b>QSL9</b>	<b>QSM11</b>	<b>QSX15</b>	<b>QSK19</b>	
Rated HP@RPM (Min <sup>-1</sup> )	134@2,200	134@2,200	168@2,400	231@2,200	251@2,200	290@2,100	380@2,100	530@2,000	Econ. mode in 95ZV w/ QSX15 reduces HP&torque x 10%.
Rated Torque ft./lbs@ RPM (Min <sup>-1</sup> )	401@1,500	401@1,500	525@1,300	736@1,300	774@1,350	952@1,400	1,160@ 1,400	1,500 @1,300	
Guideline; Fuel consumpt. avg use ↘ gal per hr. /liters hr.	4.5 / 17.03	4.5 / 17.03	5.8 / 22	7.4 / 28.0	7.6 / 28.4	8.3 / 31.4	11.7 / 44.3	16.2 / 61.3 @530 hp	Maximum oil consumption should not exceed 0.15% of fuel consumed.
Guideline; Fuel consumpt. heavy use ↘ gal per hr. /liters hr.	N / A	N / A	6.8 / 25.5	8.6 / 32.5	8.9 / 33.7	9.7 / 36.7	13.6 / 51.5	18.9 / 71.5 @530 hp	MEASURE CAREFULLY; Ex. 10 gph x 0.0015 x 8hrs = 0.12gal
<b>Tires:</b>	<b>65TMV</b>	<b>65ZV</b>	<b>70ZV</b>	<b>80ZV</b>	<b>85ZV</b>	<b>90ZV</b>	<b>95ZV</b>	<b>115ZV</b>	<b>Comments</b>
Standard Tire	17.5-25 L2	17.5-25 L2	20.5-25 L2	23.5-25 L2	26.5 25 L3	26.5 25 L3	29.5 25 L3	35/65 33 L4	
Largest <i>Optional</i> Tire	20.5-25 L2	20.5-25 L2	23.5-25 L2	20.5-25 L3	26-5 25 L5	26-5 25 L5	29-5 25 L5	35/65 33 L5	This shows optional tires
<b>Operating load and machine weight</b>									
Operating load lbs. (kg.) (approximate)	8,120 (3,690)	8,120 (3,690)	10,150 (4,600)	12,180 (5,525)	13,340 (6,050)	15,225 (6,910)	20,300 (9,210)	24,650 (11,182)	
Weight; Minimum (approximate)	26,410 (11,980)	23,610 (10,710)	31,590 (14,330)	38,875 (17,635)	45,060 (20,440)	51,320 (23,280)	64,230 (29,135)	98,190 (44,540)	Canopy, std. tires,
Weight; Maximum (approximate)	29,520 (13,390)	26,720 (12,120)	38,850 (17,625)	44,200 (20,050)	53,760 (24,385)	63,570 (28,840)	78,720 (35,710)	111,890 (50,755)	Std. cab, logging c/w, 3rd spool, hydro-inflation, ride control, etc. (NOT high lift)

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**SAFETY RELATED INFORMATION**

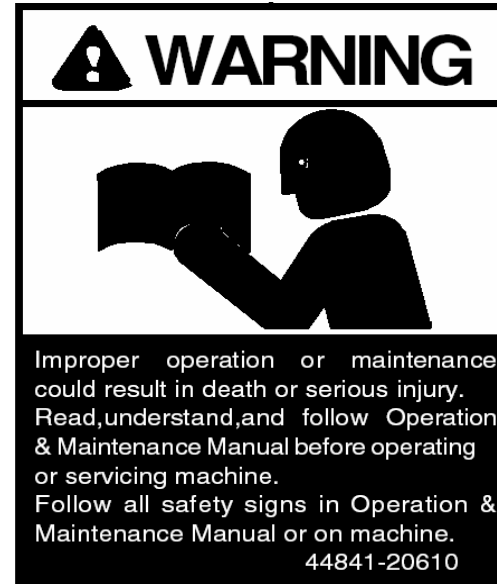
Read and understand Operation and Maintenance Manual.

Refer to safety section of Operation and Maintenance Manual as instructed below.

Decal in cab of every Kawasaki ZV series loader as originally manufactured.

**⚠ WARNING!**

- Read and understand Operation and Maintenance Manual.
- Read and understand Shop Manual.
- Follow instructions in Operations and Maintenance Manual.
- Follow instructions in Shop Manual.
- Replace safety decals when they are worn or no longer legible.



**Miscellaneous Quick Reference for Cab and Machine**

Seat Belt (Replace every three yrs or when worn, whichever is first)	↔	↔	↔	↔	↔	↔	↔	↔	↔	43005-70060-7; Belt & retractor
Seat Belt Tether (See replacement notice above.)	↔	↔	↔	↔	↔	↔	↔	↔	↔	43000-70060-7; Below seat
Armrest, LH ( SEARS SEAT )	↔	↔	↔	↔	↔	↔	↔	↔	↔	SA10760.901
Armrest, RH ( SEARS SEAT )	↔	↔	↔	↔	↔	↔	↔	↔	↔	SA10759.901
KEY, hydraulic cap, cab door, fuel cap, engine housing	↔	↔	↔	↔	↔	↔	↔	↔	↔	32110-70170
KEY, padlock	↔	↔	↔	↔	↔	↔	↔	↔	↔	ZZKEY301
Antenna / 24V DC Radio / Speakers (2 required)	↔	↔	↔	↔	↔	↔	↔	↔	↔	30510-60090-7 / 31102-60040 / 35550-60030
Wiper Blade for front / Wiper Motor for front / Timer relay	↔	↔	↔	↔	↔	↔	↔	↔	↔	41321-60020 / 44487-60100 / 45051-60020
Wiper Blade for rear / Wiper Motor for rear	↔	↔	↔	↔	↔	↔	↔	↔	↔	41321-60040 / 44487-60100
Seal, CAB DOOR	↔	↔	↔	↔	↔	↔	↔	↔	↔	34041-60070
Seal, REAR WINDOW	↔	↔	↔	↔	↔	↔	↔	↔	↔	34041-60250
Seal, WINDSHIELD	↔	↔	↔	↔	↔	↔	↔	↔	↔	34041-60280
HVAC filters (Drain tube p/n 36700-70380-7; NEVER REMOVE!)	↔	↔	↔	↔	↔	↔	↔	↔	↔	Inner; 40332-70100-7; Outer 40330-60270.

Cab HVAC Powered Preclean unit parts for 65~135ZV; Rain cap, SYKG0001; Electric precleaner, SYG030524A03W02; Adapter to filter & elect. precleaner, SYKS825R500; Canister filter, SYKFCFF00 + clamp SYK099049-002

Other items for 65~115ZV cab; Exterior mirror, 44340-60130; Exterior mirror bracket, LH- 35210-23010, RH- 35210-23000; Worklamp bulb- 38480-70800-7; Domelamp bulbs, 38480-70630.

Bulbs & flashers, etc cont'd; Long life monitor panel bulbs, 38480-70960SET; For long life flashers, refer to Service News 2004-003; Door & head liner push center rivets (plastic) 45020-70160.

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**Boom and Chassis**

<b>Boom</b>	<b>65TMV</b>	<b>65ZV</b>	<b>70ZV</b>	<b>80ZV</b>	<b>85ZV</b>	<b>90ZV</b>	<b>95ZV</b>	<b>115ZV</b>	
Commonly used shims & maximum allowable clearances	All pins for all ZV models have part number prefix 41621 followed by rest of part number								
Bucket to boom pin shims	20120	20120	20140	20140	20140	*	*	*	
Bucket to rod pin shims	N / A	20120	20290	20220	20200	20120	20290	21120	* Set dimension in accordance spacing by use of shims for 90~115ZV. See Shop Manual.
Rod to "Z" lever pin shims	N / A	20120	20290	20220	20200	20120	20290	21120	
"Z" lever to torque tube pin shims	N / A	20160	24500	20250	21780	20160	24500	20250	For all applications, insert as many as can be reasonably installed. Clearance should be less than 1/16".
Both ends of tilt cylinder shims	N / A	20140	N / A	20230	20230	20150	20200	20230	Never insert into boom cylinder areas, unless so directed by a Service News.
Boom cylinder upper pin to boom	20140	N / A	20200	N / A	N / A	N / A	N / A	N / A	
Boom cylinder lower pin to chassis	20140	N / A	20200	N / A	N / A	N / A	N / A	N / A	
65TMV only, stabilizer link	24690	N / A	N / A	N / A	N / A	N / A	N / A	N / A	
Upper boom to chassis x 4.5 mm shims	N / A	20150	25130	25130	24640	25120	25120	24820	<b>CAUTION</b>
Upper boom to chassis x 1 mm shims	N / A	25140	22140	22140	20160	24500	24500	20250	Wear gloves while performing this work.
Steering cylinder to chassis pin shims	20100	20100	20170	20170	20890	20890	20110	20140	
<b>Chassis</b>	<b>65TMV</b>	<b>65ZV</b>	<b>70ZV</b>	<b>80ZV</b>	<b>85ZV</b>	<b>90ZV</b>	<b>95ZV</b>	<b>115ZV</b>	
<b>Rear Drawbar</b>									
Drawbar pin	40000 26850	40000 26850	40000 26850	40000 26450	40000 26070	40000 38910	40000 38910	40000 38910	
Spring clip to retain drawbar pin	40045 20220	40045 20220	40045 20220	40045 20220	40045 20220	40045 20180	40045 20180	40045 20180	
Spring pin to retain drawbar pin [roll pin]	63011 05022	63011 05022	63011 05022	63011 05020	63011 05020	63011 05025	N / A	N / A	
<b>Articulation lock part numbers</b>	<b>65TMV</b>	<b>65ZV</b>	<b>70ZV</b>	<b>80ZV</b>	<b>85ZV</b>	<b>90ZV</b>	<b>95ZV</b>	<b>115ZV</b>	
Articulation lock bar	41605 50600	41605 50600	41605 50600	41600 34720	41600 34720	41600 33200	41600 36100	41600 36100	<b>DANGER</b>
Articulation lock pin	40000 35100	40000 35100	40000 35100	40000 35100	40000 35100	40000 35100	40000 35110	40000 35110	<b>Articulation area is a pinch point. Articulation lock is on machine to protect personnel. Always keep the articulation lock stored on machine. Use articulation lock when working in articulation joint.</b>
Spring pin to retain articulation lock pin [roll pin]	40033 60020	40033 60020	40033 60020	40033 60020	40033 60020	40033 60020	40033 20100	40033 20100	
Spring clip to retain drawbar pin	40045 20210	40045 20210	40045 20210	40045 20210	40045 20210	40045 20210	40045 20220	40045 20220	
<b>Center bearing shim numbers</b>									
Shim	20590	20590	20590	26400	21380	21380	21290	20960	All shim part numbers below have part number prefix 34200 Remove as required to tighten upper center bearing

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Chassis and Boom (continued)

Bucket information	65TMV	65ZV	70ZV	80ZV	85ZV	90ZV	95ZV	115ZV	Part Numbers
Wear edge (REVERSIBLE, CENTER)	2	2							30935-20080-7
			2						30935-20210-7
				2					30935-20390-7
					2				30935-20760-7
						2			30935-20160-7
							2		30935-20170-7
								1	30935-20910-7
Wear edge (REVERSIBLE, SIDE FOR ENDS)	2	2							30935-20070-7
			2	2	2				30935-20100-7
						2			30935-20150-7
							2		30935-20180-7
								2	30935-20920-7
Bolt and nut assembly (FOR EDGES)	10	10							43925-20020-7
			12	12	12				43925-20490-7
						14	14		43925-20040-7
								20	43925-20570-7
Wear edge (HEEL PLATE)	N/A	N/A	2	2					41656-20020-7
					2	2			41656-20040-7
							2		41656-20050-7
								2	41656-20120-7
Bolt and nut assembly (HEEL PLATE)	N/A	N/A	8	8	8	8	8		43925-20490-7
								8	43925-20530-7
Wear edge (SEGMENT TO FIT BETWEEN ADAPTERS)  <b>Important!</b> <b>Select teeth and segments as needed to protect tires from scuffing.</b>	7	7							30936-20010-7
			7	7	7				30936-20040-7
						7			30936-20020-7
							7		30936-20030-7
								7	30936-20050-7
Bolt and nut assembly (FOR SEGMENTS)	14	14							43925-20020-7
			14	14					43925-20490-7
					14				43925-20530-7
						14	14		43927-20040-7
								14	43925-20570-7

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Bucket information (continued)	65TMV	65ZV	70ZV	80ZV	85ZV	90ZV	95ZV	115ZV*	Part Number
Select adapter and teeth parts as required for the application.									
Adapter, center bolt-on type ( ESCO SUPER V )	6	6		6					ESC5739-V19
			6	6					ESC5740-V23
					6				ESC5738-V29
						6	6		ESC5722-V33
Adapter, left hand side bolt-on type ( ESCO SUPER V )	1	1		1					ESC5795L-V19
			1	1					ESC5788L-V23
					1				ESC5789L-V29
						1	1		ESC5798L-V33
Adapter, right hand side bolt-on type ( ESCO SUPER V )	1	1							ESC5795R-V19
			1	1					ESC5788R-V23
					1				ESC5789R-V29
						1	1		ESC5798R-V33
Bolt assembly for ESCO adapters	16	16							43927-20420-7
			16	16					43925-20500-7
					16				43927-20030-7
						20	22		43927-20100-7
Tooth (ESCO ABRASION DELTA) See note below.	N/A	N/A	8	8					ZZV23AD
					8				ZZV29AD
						8	8		ESCV33AD
Tooth (ESCO ABRASION ROCK) See note below.					8				ESCV33AR
						8	8		ESCV33AR
Tooth (ESCO GENERAL PURPOSE) See note below.		8							ESCV19TY
			8	8					ESCV23TY
					8				ESCV29TYL
						8	8		ESCV33TYL
Tooth (ESCO PENETRATION) See note below.		8	8	8					ZZV19VY
					8				ZZV29VY
						8	8		ZZV33VY
Tooth Lock for ESCO teeth See note below.		8	8	8					ESCV23PN
					8				ESCV29PN
						8	8		ESCV33PN

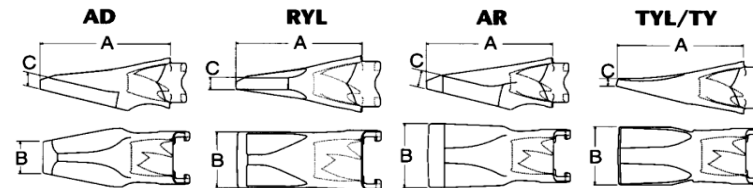
**Important!**

Select teeth and segments as needed to protect tires from scuffing.

**ESCO® SUPER V® Point Shapes for KAWASAKI® Wheel Loaders**

*The right point makes every bucket dig better, longer!*

\*See K-Tips for 115ZV weld-on adapters. Do not use bolt-on adapters for 115ZV.  
 See K-Tips for other tooth related information in the tooth and adapter guide.



The **AD** stands for **Abrasion Delta** point. This unique point combines abrasion resistance with penetration for quarry type jobs. The AD delivers maximum wear metal while staying sharp.

The **RYL** stands for **Rock point with Y rib**. This short point is used in high impact rock applications or as an alternative when impact is causing breakage in longer style points.

The **AR** stands for **Abrasion, Rock point**. This **FEL** point for highly abrasive applications offers maximum amount of wear metal for long wear life and high economic value. The heaviest **FEL** point offered by ESCO.

The **TYL** stands for general "T" or two-way with a Y rib. Long point. Used for a flush cut in normal position for general purpose applications. "Gauge" on the side helps show when to change points.

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**Maintenance; Lubricants & Coolants**

Engine oil	65TMV	65ZV	70ZV	80ZV	85ZV	90ZV	95ZV	115ZV	Comments
Engine oil filler cap part number	101322	101322	101322	200284	3914136	101322	101322	107981	Obtain through Cummins Dealer
Oil: Normal Temps; SAE 15W-40; Always less than 45°F (10°C) SAE 10W-30.	CI-4	CI-4	CI-4	CI-4	CI-4	CI-4	CI-4	CI-4	Check level daily
Refill Capacity in Gallons / Liters	3.7 / 14	3.7 / 14	3.7 / 14	5.8 / 22	7.1 / 27	9.0 / 34	12 / 45.4	16.1 / 61	Includes filter change
Hourly interval between changes	250	250	250	250	250	250	250	250	*More often when in extreme applications.

Fuel	65TMV	65ZV	70ZV	80ZV	85ZV	90ZV	95ZV	115ZV	Comments
Engine fuel filler cap part number	↪	↪	↪	↪	↪	↪	↪	↪	40314-60060 used for all models
Fuel grade for normal temperatures	#2 diesel	#2 diesel	#2 diesel	#2 diesel	#2 diesel	#2 diesel	#2 diesel	#2 diesel	Above 15 °F (26 °C)
Fuel grade for cold temperatures	#1 diesel	#1 diesel	#1 diesel	#1 diesel	#1 diesel	#1 diesel	#1 diesel	#1 diesel	Below 15 °F (26 °C)
Tank capacity in Gallons / Liters	55 / 210	55 / 210	75 / 285	64 / 240	79 / 300	87 / 330	112 / 425	177 / 670	
Remove cover and swab out tank - hour intervals	2000	2000	2000	2000	2000	2000	2000	2000	Also blow out primary fuel screens if so equipped

Coolant Mixture ratio of 53% Antifreeze / 47 % Water	65TMV	65ZV	70ZV	80ZV	85ZV	90ZV	95ZV	115ZV	Comments
Max. Antifreeze / Water capacity shown in gallons	6.0 / 5.4	6.0 / 5.4	6.3 / 5.6	7.7 / 6.8	8.1 / 7.2	8.4 / 7.5	13.5 / 11.9	16.7 / 15.5	Protects to -31°F (35°C)
Max. Antifreeze / Water capacity shown in liters	22.8 / 20.2	22.8 / 20.2	23.9 / 21.1	29.2 / 25.6	30.7 / 27.3	31.8 / 28.2	51 / 45	63.4 / 58.6	

Change interval for long life coolant. Three years/7,000 hours when using Zerex extended life extreme heavy duty pre-charged antifreeze / coolant. USE NO SILICATES OR PHOSPHATES!  
**NEVER MIX LONG LIFE COOLANT WITH OTHER TYPES.** THIS MAY DAMAGE SEALS AND GASKETS! If not replaced with long life coolant, replace every six months.

Important! When running in warm climate with no freezing temperatures, keep a minimum of 33% antifreeze mixture in cooling system. Excessive antifreeze may cause overheating.

DCA test intervals	↪	↪	↪	↪	↪	↪	↪	↪	↪	Test DCA4 levels twice a year
Block heater element p/n. 80/85ZV = 1000 W; 95ZV 1,500 W. Block heater electric cable part number	Obtain 65TM-V/65/70ZV heater parts through Kim Hotstart, Artic Fox, other.			3942197 3945281	3942197 3905113	4004165 3905113	3681362 3681360	N/A Cummins See left 65/70ZV	as adapters, gaskets, etc.	Obtain from Cummins - may require other parts

Transmission	65TMV	65ZV	70ZV	80ZV	85ZV	90ZV	95ZV	115ZV	Comments
Oil types below: Capacities are at right. [Gallons/Liters]	5.3 / 20	5.3 / 20	6.3 / 24	9.2 / 35	10 / 38	10 / 38	14.5 / 55	22.5 / 85	Check oil level daily
· First choice	↪	↪	↪	↪	↪	↪	↪	↪	Valvoline Drive Train Trans. Oil SAE 10W
· Second choice	↪	↪	↪	↪	↪	↪	↪	↪	SAE 10W API CD engine oil
· Third choice	↪	↪	↪	↪	↪	↪	↪	↪	ATF Dexron III/IIIE/III®
Hourly interval between changes / suction screen cleaning	1000	1000	1000	1000	1000	1000	1000	1000	Change filter every 500 hours

Hydraulic (Notes on ambient temperature below)	65TMV	65ZV	70ZV	80ZV	85ZV	90ZV	95ZV	115ZV	Comments
· Oil grade standard	46	46	46	46	46	46	46	46	↪ ISO VG grade
· Oil grade below 32 °F	32	32	32	32	32	32	32	32	↪ ISO VG grade
· Oil grade above 86 °F	68	68	68	68	68	68	68	68	↪ ISO VG grade
Hourly interval between changes	2000	2000	2000	2000	2000	2000	2000	2000	Clean suction strainer @ 2000 hours
Tank capacity to center of gauge in Gallons / Liters	16 / 62	16 / 62	24 / 90	22.7 / 85	32 / 120	41 / 155	40 / 150	59 / 225	
Check levels daily with boom down and bucket level.	See filter section for tank plug and seal part numbers for all models.							Use a premium anti-wear hydraulic oil.	

HVAC Refrigerant [All use approx. 4.25 lbs. Top-off using pressure chart]	R-134a	R-134a	R-134a	R-134a	R-134a	R-134a	R-134a	R-134a	Replace receiver drier - 3yrs/6000hrs, or when glass changes to pink or white.
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Axles Axles are vented to hydraulic tank to eliminate residual drain pressure application of brake piston.									Comments
Gear Oil: Valvoline Drive Train Trans. Oil SAE 50 (Gallons / Liters) Front	6.6 / 25	6.6 / 25	13.2 / 50	14.3 / 54	19.5 / 74	26.4 / 100	47.6 / 180	See Service News 96-001C for information on brake chatter.	
Gear Oil: Valvoline Drive Train Trans. Oil SAE 50 (Gallons / Liters) Rear	6.6 / 25	6.6 / 25	13.7 / 52	15.6 / 59	21.1 / 80	21.1 / 80	26.4 / 100		
Hourly interval between changes	2000	2000	2000	2000	2000	2000	2000	2000	Check level every 50 hours

**Important! Use of other gear oils of API Service GL-5 80W90 or SAE 85W140 may cause reduced performance, increased wear, and brake chatter.**

\* IMPORTANT ! Normal service intervals shown. Extreme temperatures, heavy dust, mud, snow, water, chemicals, etc. are severe application and require more frequent maintenance.

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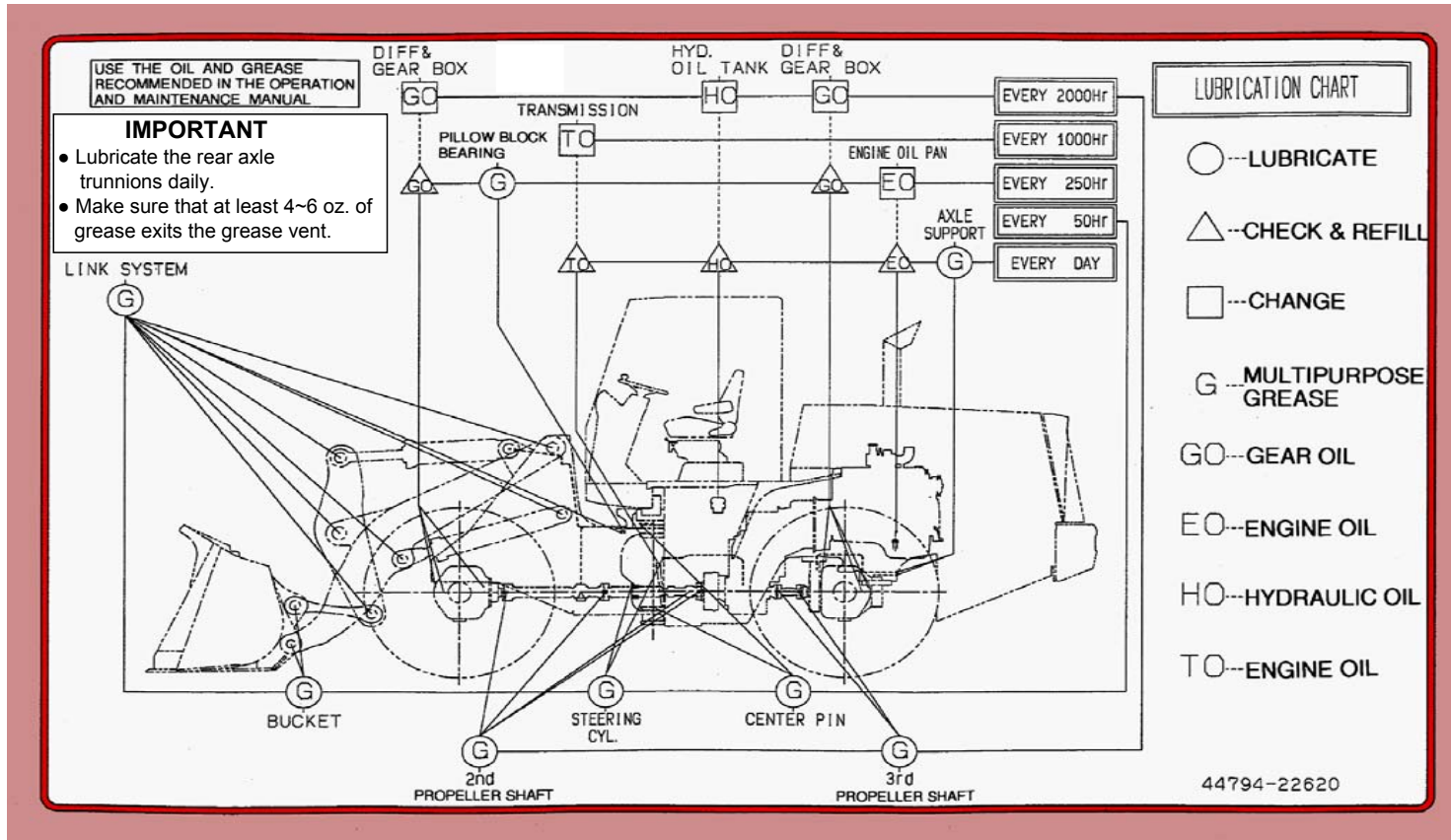
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**Typical Lubrication Chart. 70ZV shown. Others are similar.**



Read and understand the Operation and Maintenance Manual before performing work on machine. Refer to Shop Manual for further detailed explanations.

Note: There are initial 250 hour intervals on early service filters. These include; pilot strainer to brakes, pilot strainer to steering, hydraulic return filter, and T/M filter



Lubrication	65TMV	65ZV	70ZV	80ZV	85ZV	90ZV	95ZV	115ZV	Comments
IMPORANT ! Lubricate the rear axle trunnions daily.	→	→	→	→	→	→	→	→	Use NLGI #2 above -10°F (14°C)
Use EP grease with lithium base, 3~5% moly additive.	→	→	→	→	→	→	→	→	Use NLGI #1 below -10°F (14°C)
Never use 100% moly on universal joints.	←	←	←	←	←	←	←	←	NLGI = National Lubrication Grease Institute

Tires; Standard tires shown	17.5-25 L2	17.5-25 L2	20.5-25 L2	23.5-25 L2	26.5 25 L3	26.5 25 L3	29.5 25 L3	35/65 33 L4	Tire load. Maximum tire pressure with fully loaded bucket; Should not exceed 1.25 X cold tire inflation pressure.
Standard COLD tire inflation - pressures are in PSI / kPa	50 / 343	50 / 343	40 / 275	46 / 314	40 / 275	50 / 343	50 / 343	50 / 343	
Inflation shown is for front & rear tires. Do not overinflate! Do not exceed ton mile per hour rating. Inflate with N2 in long load & carry applications. For radials and/or load and carry applications, consult the tire manufacturer.									

Wheel lug torque	65TMV	65ZV	70ZV	80ZV	85ZV	90ZV	95ZV	115ZV	Check at PDI, 30 days and 250 hrs.
N•m/ft•lb	892/658	892/658	892/658	892/658	892/658	892/658	892/658	892/658	

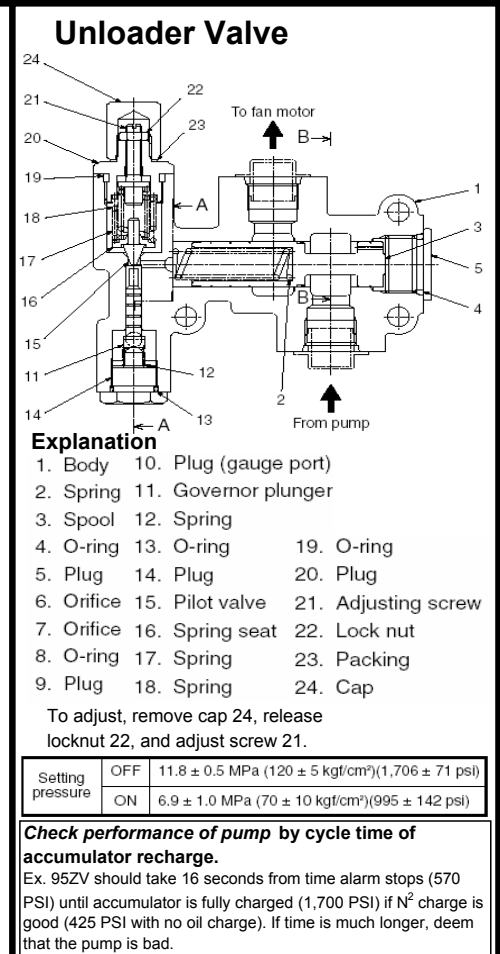
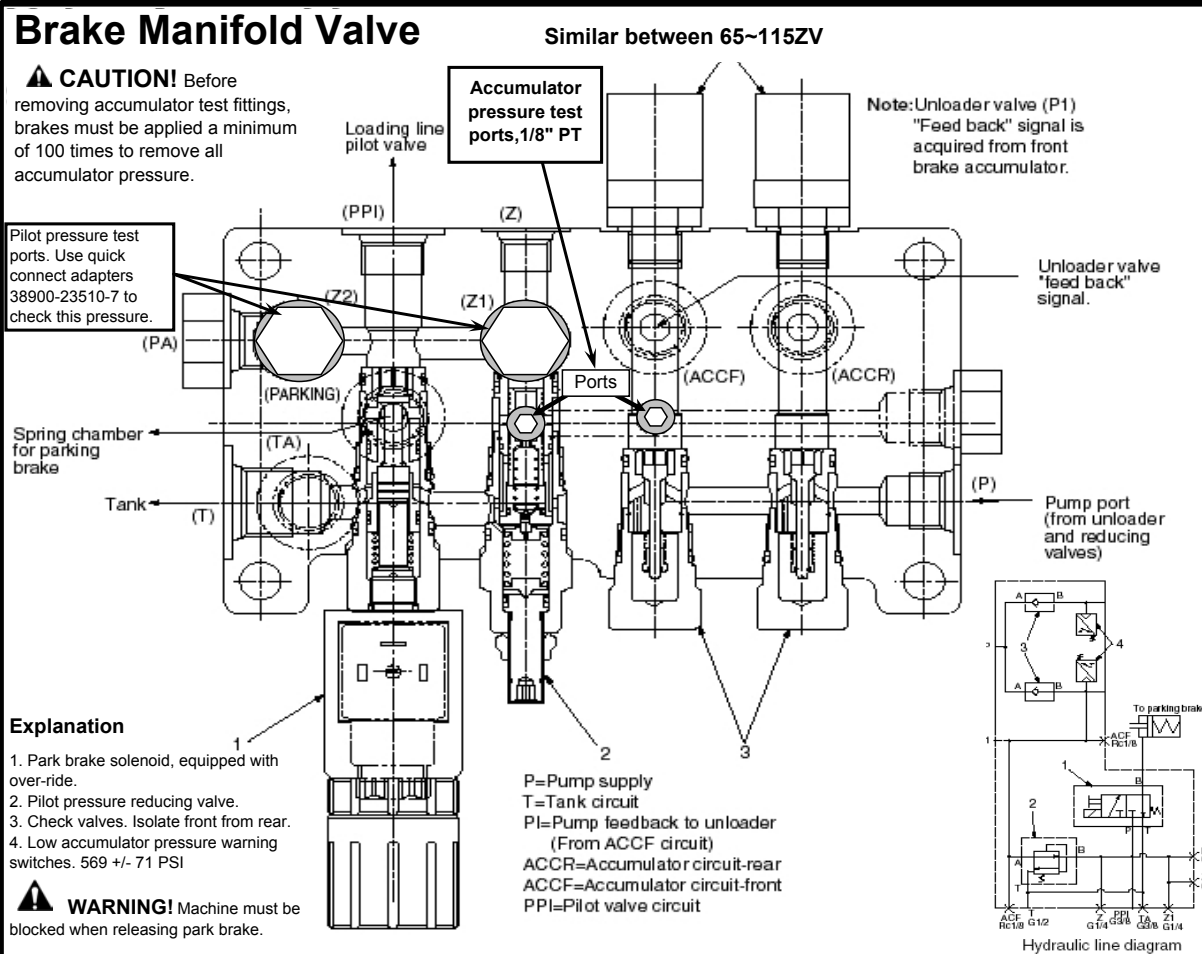
IMPORTANT ! Normal service intervals shown. Extreme temperatures, heavy dust, mud, snow, water, chemicals, etc. are severe application and require more frequent maintenance.

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Brake	65TMV	65ZV	70ZV	80ZV	85ZV	90ZV	95ZV	115ZV	Comments
Brake Pressure Reducing Valve [PSI]	N/A	N/A	1,783	N/A	N/A	N/A	1,783	1,783	Limits pressure. Mounted prior to brake manif.
Unloader valve setting; Cut in	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	Unloading signal from front brake accumulator. Measure at brake manifold.
Unloader valve setting; Cut out	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	
Brake accum. vol. Liters	0.5	0.5	1.5	1.5	3.0	3.0	3.0	3.0	Volume per unit
Seconds to charge accum. after alarm off	2.0	2.0	8.0	8.0	16.0	16.0	16.0	16.0	Seconds to full charge from alarm "off".
Brake accumulator pre-charge PSI / MPa Measure with kit ZZKL3001A	425/2.93	425/2.93	425/2.93	425/2.93	425/2.93	425/2.93	425/2.93	425/2.93	Check at PDI, final inspection and every 2000 hrs. with brake accumulators discharged by applying brakes 100 times.
Service brake wear measurements.	◆↔	◆↔	△↔	△↔	△↔	△↔	△↔	△↔	◆ Uses stem tool p/n 33240-20040. △ Use caliper. See Shop Manual for detail.
65TMV / 65ZV inboard planetary brakes need replaced when tool cannot be turned. 70~115ZV use caliper measurements found in Shop Manual. Measure with brake applied.									
<b>Note: When replacing service &amp; park brake friction material, retract pistons/adjusters. A vacuum pump may be used for this / 85~115ZV service brakes require use of bolts. See Shop Manual.</b>									
Park brake wear limit, material thickness. Mm / Inch	4.0 / 0.16	4.0 / 0.16	4.0 / 0.16	4.0 / 0.16	3.0 / 0.17	3.0 / 0.17	3.0 / 0.17	11.0 / 0.43	Check for oil on lining surface



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Hydraulic: Do all tests with oil at 120~180°F (48~82°C)	65TMV	65ZV	70ZV* <sup>A</sup>	80ZV	85ZV	90ZV	95ZV* <sup>A</sup>	115ZV* <sup>A</sup>	Comments
<b>Fan drive statistics</b> Measure fan pressures with pressure test kit ZZKL3002A [For models 70/95/115ZV, table below shows RPM's for early speed control] Note: 1,500 PSI = 10.32 MPa or 105.4 kg/cm <sup>2</sup>									
Verify performance of engine high and low speeds when checking fan speeds. - ECM engines may use Palm Quick CheckII/III for this. Others may be checked with a photo tach.									
Fan circuit max. PSI @ high temp	1,495	1,495	2,530	1,540	1,510	1,510	2,350	2,700	Full e/g RPM @ high temp
Fan speed max RPM's @ high temp	1,600	1,600	2,000	1,500	1,650	1,650	1,500	1,600	RPM @ HI
Fan circuit max. PSI @ low temp	670	670	1,320	670	670	670	1,350	1,280	Full e/g RPM @ low temp
Fan speed max. RPM's @ low temp	1,120	1,120	1,400	1,050	1,155	1,155	1,050	1,120	RPM @ HI

**\*<sup>A</sup>65/80/85/90ZV design shown.**  
 If fan speed appears low, check fan motor circuit pressure. Use a \*5,000 PSI gauge to test pressure.

**Fan Speed Adjustment**

1. Remove fittings that run lines for thermo-valve from ports Pp and Ts shown to left, and plug these off with 1/4 BSPP fittings.
2. Install \*5000 PSI gauge in Ps port.
3. Use a phototachometer to measure the fan revolutions, in comparison to pressure in table above.
4. If RPM's are not correct, adjust relief valve. Clockwise adjustment increases pressure and RPM's, counterclockwise decreases pressure and RPM's.

Note: Counter-rotation at time of shut off indicates MUV malfunction.

**Fan Speed Control**

This table compliments RPM/PSI table at top  
<sup>A</sup> Statistics for later production for 70/95/115ZV

Models to right	70C4-	97C4-	11C4-
Maximum's below	5131~	5141~	5031~
PSI @ high temp	2,130	2,335	2,625
RPM's @ high temp	2,000	1,500	1,600
PSI @ low temp	1,075	1,990	1,380
RPM's @ low temp	1,400	955	1,120

**\*\*70/95/115ZV early design shown.**  
 If fan speed appears low, check fan motor circuit pressure. Use a \*5,000 PSI gauge to test pressure.

**\*\*~70C4-5130, 97C4-5140, 11C4-5030**

**Fan Speed Control**

Note: Counter rotation at time of shut off indicates MUV malfunction.

**Fan Relief Adjustment**

1. Install \*5000 PSI gauge in PG test port. (1/4 BSPP test fitting.) Install gauge.
2. Install photo tach. Compare fan RPM's & PSI to table above. Adjust pressures if needed.
3. **High adjustment.** Disconnect solenoid wire. E/G RPM's must be high. Loosen high speed lock, & adjust high speed adjuster. Secure locknut.
4. **Low Adjustment.** E/G temp. less than 175 °F (80°C). Loosen low speed lock & adjust low speed adjm't. Secure lock.

**WARNING!**  
 This document is only a guide. Read and understand Shop Manual for specific information model by model for safety materials, and further details.

**Hydraulic line diagram**

High pressure set: 18.6 MPa (150 kgf/cm<sup>2</sup>) (2,700 psi)  
 Low pressure set: 8.8 MPa (90 kgf/cm<sup>2</sup>) (1,280 psi) at 150 L/min

**If fan speed does not perform as required, determine the cause.**

Is pump questionable?

(Refer to Shop Manual in Function and Structure Section for fan speed adjustment adjustment procedure.)

- See brake section. Check accumulator charge cycle time. Use stopwatch & check time from when alarm is off@570 PSI to full accum. charge of 1,700 PSI. (Accum. charge must be good.)
- If time is too long, check return filter, tank bottom and sump screens for pump debris.
- If pump tests good, relief tests good, and fan speed is low, question condition of fan motor.

\* Use 38900-23510-7 adapter for installing gauge in test port.

Ride control accumulator pre-charge PSI / MPa	600 / 4.14	600 / 4.14	600 / 4.14	600 / 4.14	600 / 4.14	800 / 5.52	800 / 5.52	800 / 5.52	Adjust pressure down* as required for operator comfort, and as required by machine site. Remember, tire inflation & seat adjustment affects m/c ride.
Turn "ON" keyswitch, "OFF" SCU breaker, & move boom lever to exhaust base end oil from boom cylinder & circuit	➔	➔	➔	➔	➔	➔	➔	➔	

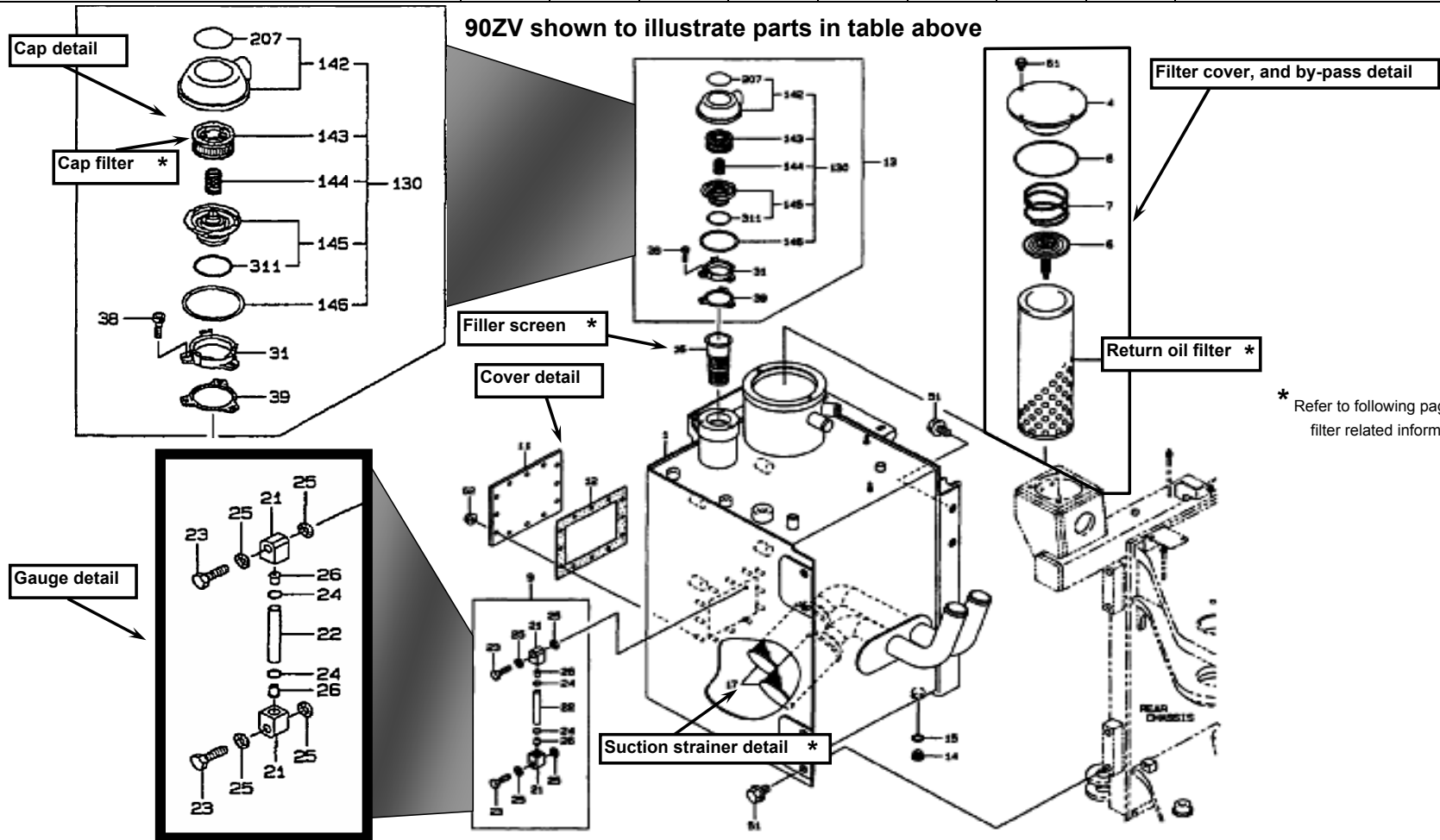
\*Typically N<sup>2</sup> pressure should be from 300-425 psi (2.07 MPa)

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**Hydraulic**

Tank	65TMV	65ZV	70ZV	80ZV	85ZV	90ZV	95ZV	115ZV	Comments
Do all tests with oil at 120~180°F (48~82°C)									
Tank pressure; Max. PSI / Mpa	4.3 / 0.03	4.3 / 0.03	4.3 / 0.03	4.3 / 0.03	4.3 / 0.03	4.3 / 0.03	4.3 / 0.03	4.3 / 0.03	Pressure is controlled by relief spring in cap
Air entry suction valve (in cap) setting PSI / Kpa	0.14 / 1	0.14 / 1	0.14 / 1	0.14 / 1	0.14 / 1	0.14 / 1	0.14 / 1	0.14 / 1	Suction is controlled by light spring in cap
Downward pressure required to remove cap in lbs / kgf	45 / 20	45 / 20	45 / 20	45 / 20	45 / 20	45 / 20	45 / 20	45 / 20	Unlock with key, push downward, turn.
Return filter filtration partical size rating μ	28	28	28	28	28	28	28	28	Refer to filter section for more info.
Return filter by-pass pressure setting PSI / MPa	14 / 0.1	14 / 0.1	14 / 0.1	14 / 0.1	14 / 0.1	14 / 0.1	14 / 0.1	14 / 0.1	
Suction strainer filtration partical size rating μ	105	105	105	105	105	105	105	105	Refer to filter section for more info.
Gauge part number (22 below)	↔	↔	↔	↔	↔	↔	↔	↔	All use 36700-90010; 1 required.
Seal for gauge clear tube (24 below)	↔	↔	↔	↔	↔	↔	↔	↔	All use 47131-90010; 2 required.
Seal for gauge mount. Do not overtighten! 4 required. (25)	↔	↔	↔	↔	↔	↔	↔	↔	◆ 65~90ZV; 46023-90010 △ 95/115ZV; 88111-21000



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Filters	Most E/G, water, fuel filter numbers are Fleetgard p/n's								
Engine	65TMV	65ZV	70ZV	80ZV	85ZV	90ZV	95ZV	115ZV	Comments
Engine oil filter [Part no x qty]	LF3959 x 1	LF3959 x 1	LF3970 x 1	LF9009 x 1	LF9009 x 1	LF9001 x 1	LF9000 x 1	LF3000 x 2	
Engine crankcase breather (one required)	3944730	3944730	3944730	3937652	3937652	N / A	N / A	56810	Obtain through Cummins
Fuel pump filter screen. (65~80ZV 10 digit p/n is KCM no.)	50401-02740	50401-02740	50401-02740	50401-02740	*YE3948108	*146483	*YE4076591	*YE3090769	* Obtain through Cummins; See s/news on topic
Fuel pump filter screen seal part number	N / A	N / A	N / A	N / A	N / A	*3021123	*YE3678846	N / A	* Obtain through Cummins
Fuel primary filter [Part no x qty]	FS1280 x 1	FS1280 x 1	FS19519 x 1	FS1280 x 1	50401-03480	FS1000 x 1	FS1040 x 1	FS1000 x 2	May be equipped with primary screen
Fuel secondary filter [Part no x qty]	FF5052 x 1	FF5052 x 1	Water/Fuel Ser YE3942468	FF5052 x 1	FS1022 x 1	N/A	*	N/A	* Change every 1,500 hrs.
Fuel filler strainer; See funnel warning in comment.	↪	↪	↪	↪	↪	↪	↪	↪	40330-60200. IMPORTANT! Be careful when filling not to break screen mesh
Fuel tank plug	↪	↪	↪	↪	↪	↪	↪	↪	41535-20100
Fuel tank plug seal	↪	↪	↪	↪	↪	↪	↪	↪	88111-12490
Coolant filter [one required] for 250 hour interval. Important! Check DCA4 level every 6 months.	N / A	N / A	N / A	WF2071	WF2071	WF2071	WF2127*	WF2071	Maintenance filter; Change @ 250 hrs. [*Except for 95ZV - change @ 2000 hrs.]
Coolant filter [one required] for coolant change interval	N / A	N / A	N / A	WF2074	WF2074	WF2074	WF2126	WF4026	Precharge filter; installed @ factory.
Air Outer filter	30981 70360	30981 70360	30981 70360	30981 70510	30981 70510	30981 70480	30981 70510 *	30981 70480 *	Clean/change by indicator light * 2 are required
Air Inner filter	30981 70370	30981 70370	30981 70370	30981 70500	30981 70500	30981 70490	30981 70500 *	30981 70490 *	Replace as needed; Never clean * 2 are required
Precleaner dust capture bowl part number	43890 70090	43890 70090	43890 70040	42730 70100	43890 70360-7	43890 70360-7	43890 70090 *	43890 70360-7 *	* 2 are required
<b>Hydraulic and pilot</b>	<b>65TMV</b>	<b>65ZV</b>	<b>70ZV</b>	<b>80ZV</b>	<b>85ZV</b>	<b>90ZV</b>	<b>95ZV</b>	<b>115ZV</b>	<b>Comments</b>
Drain plug gasket	↪	↪	↪	↪	↪	↪	↪	↪	88111-12490 for all models
Drain plug	↪	↪	↪	↪	↪	↪	↪	↪	41535-20010 for all models
Hydraulic tank suction screen	↪	↪	↪	↪	↪	↪	↪	↪	35530-70020 for 65~90ZV [1 - 95ZV] 40335-60020 2 for 115ZV [1 - 95ZV]
Hydraulic tank access plate gasket	↪	↪	↪	↪	↪	↪	↪	↪	31990-20020 for 65~90ZV 31990-20030 for 95/115ZV
Filler strainer primary filter; funnel warning in comment.	↪	↪	↪	↪	↪	↪	↪	↪	40330-60170 for all models. Be careful when filling not to break screen mesh.
Hydraulic return oil filter [1000 hour interval]	30981 60030	30981 60030	40338 20020	40338 20020	* 30981 20060	* 30981 20060	30981 20060	40338 20020 ^*	<b>CAUTION</b> Depressurize hydraulic tank before removing cover!
Hydraulic return oil filter cover ring	65210 22145	65210 22145	65210 22165	65210 22165	65210 22165	65210 22165	65210 22165	65210 22165 ^*	* On models 85/90ZV, drop oil level below sight glass prior to changing filter or dirt contamination may result. [^* 2 required]
Hydraulic tank cap filter [2000 hour interval]	30981 70330	30981 70330	30981 70330	30981 70330	30981 70330	30981 70330	30981 70330	30981 70330	Gasket p/n is 39600-71670; seal o-ring is p/n 47131-75740.
<b>Steering Orbitrol® &amp; brake strainers</b>	<b>65TMV</b>	<b>65ZV</b>	<b>70ZV</b>	<b>80ZV</b>	<b>85ZV</b>	<b>90ZV</b>	<b>95ZV</b>	<b>115ZV</b>	40337-60370 is for filter sleeve assembly
Brake and pilot manifold strainer	↪	↪	↪	↪	↪	↪	↪	↪	30981-70720 for all models
Orbitrol® reducing valve strainer	↪	↪	↪	↪	↪	↪	↪	↪	30981-70720 for all models

Important! Strainers shown above must be changed at first 250 hour interval. Then be cleaned or replaced every 2000 machine hours.

[Click here to go to Transmission Filters.](#) This document contains essential information for servicing Kawasaki Loaders

Torque Converter/Transmission	65TMV	65ZV	70ZV	80ZV	85ZV	90ZV	95ZV	115ZV	Comments
<b>Filters and screens</b>									Do all tests with oil at 120~180°F
Main transmission filter	1	1	1	1	1	1	1*	1*	ZZP171298*97C4-5141~.11C4-5031- use 31115-70010
Important! Change every 500 hours, or when by-pass light comes on. Use only this filter, as others may burst or damage filter head. Iso-mount with vibration free mounting device.									
Suction screen	1	1	1						40330-60340
Clean at time of oil change, every 1000 hours				1					40330-60250
Inspect sump with light and mirror to check for debris.					1	1	1	1	40330-60040
Suction screen gasket (All have prefix of 31190)	↪	↪	23970	↪	↪	↪	↪	↪	20410
Pressures @ Low RPM / High RPM +/- PSI	210 min / 280 PSI +/- 20 PSI			185 / 213 PSI +/- 28 PSI			* 350 +/- 21 / 400 +/- 20		* 15 PSI less for first range.
Pressures @ Low RPM / High RPM +/- MPa	1.45 / 1.93 MPa +/- 0.14			1.28 / 1.47 MPa +/- 0.16 MPa			* 2.41 / 2.76 MPa		* 0.11 MPa less in first range.

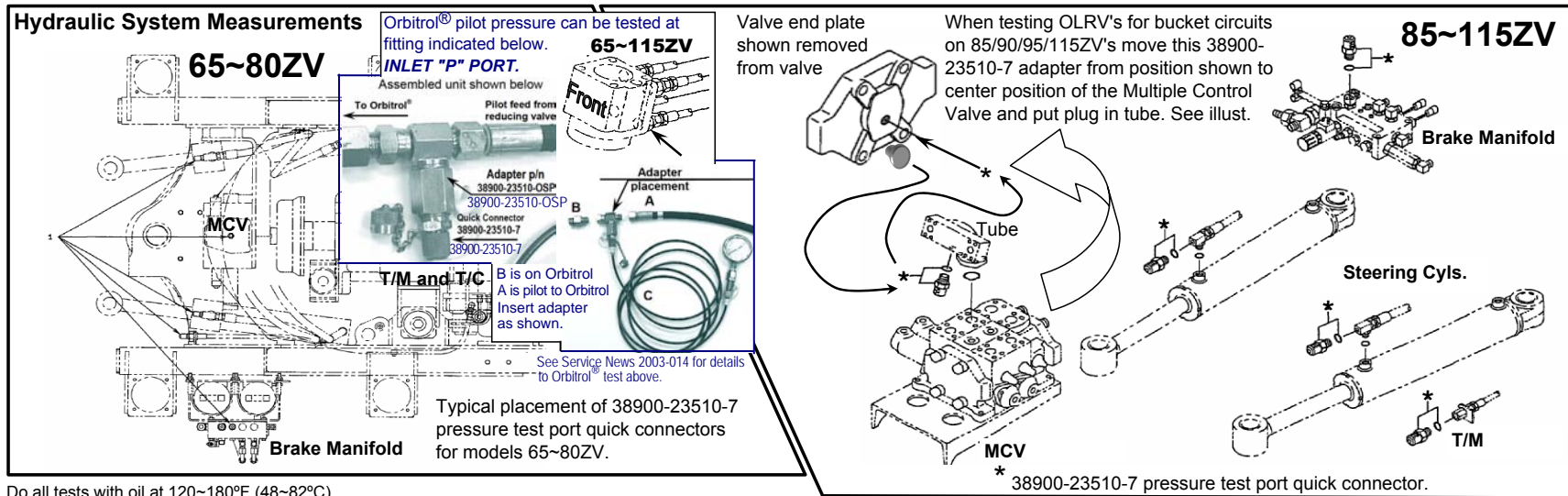
**Engine Stall Speed Performance (At PDI, measure engine RPM's with Photo tachometer or QUICK CHECK II/III & Palm Pilot if equipped with ECM.)**

	65TMV	65ZV	70ZV	80ZV	85ZV	90ZV	95ZV	115ZV	Comments
Low idle; Adjust to minimize mirror & handrail vibration.	800 +/- 25	800 +/- 25	800 +/- 50	850 +0 / -50	775 +/- 50	775 +/- 50	775 +/- 50	775 +/- 50	RPM [Min <sup>-1</sup> ] @ lowest possible speed
Maximum no-load speed. (High Idle)	2,400 +/- 30	2,400 +/- 30	2,600 +/- 50	2,450 +0 / -100	2,350 +/- 50	2,350 +/- 50	2,350 +/- 50	2,350 +/- 50	RPM [Min <sup>-1</sup> ] @ highest possible speed
Maximum speed in torque converter [t/c] stall	2,280 +/- 100	2,280 +/- 100	2,450 +/- 100	2,370 +0/- 200	2,270 +/- 100	2,240 +/- 100	2,170 +/- 100	2,130 +/- 100	RPM Transmission in F3, service brake on, & decutch not applied.
Maximum speed in hydraulic stall	2,290	2,290	2,460	2,380*	2,250	2,170	2,160	2,140	All + 0 / - 100 RPM [Min <sup>-1</sup> ] except*
Maximum speed in t/c and hyd. stall	1,730	1,730	1,890	1,950**	1,800	1,880	1,650	1,670	All + 150 / - 100 RPM's [Min <sup>-1</sup> ] except**

Note: Low or high engine stall speeds can indicate problems other than engine related troubles. [\*+0 / - 200] [\*\*+0 / - 250]

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Do all tests with oil at 120~180°F (48~82°C)

**Hydraulic Measurements**

	65TMV	65ZV	70ZV	80ZV	85ZV	90ZV	95ZV	115ZV	Comments
--	-------	------	------	------	------	------	------	-------	----------

<b>Multiple control valve</b>									
• Main relief valve setting pressure PSI/MPa (High E/G RPM)	△→	△→	◇→	◇→	△→	◇→	◇→	◇→	△2,990 +/- 71 [20.6 +/- .5] ◇2990+/-142 [20.6 +/- 1.0]
• Overload relief valve (OLRV; tilt circuit base) PSI/MPa IMPORTANT! Run at lowest E/G RPM while setting OLRV's	△→	◇→	◇→	◇→	◇→	◇→	◇→	◇→	△1,422 +/- 71 [9.8 +/- .5] ◇3,410 +/-142 [20.6 +/- 1.0]
• Overload relief valve (OLRV; tilt circuit rod) PSI/MPa IMPORTANT! Run at lowest E/G RPM while setting OLRV's	◇→	◇→	◇→	◇→	◇→	◇→	◇→	◇→	◇3,410 +/-142 [20.6 +/- 1.0]
Boom raise cycle time in seconds @ RPM Low / High Use cycle times to help determine pump condition	17.9 / 5.4	17.9 / 5.4	21.0 / 6.0	21.0 / 6.0	21.0 / 6.3	19.0 / 6.5	23.0 / 6.7	23.0 / 8.4	All are +/- 3.0 / 0.5 seconds Check with bucket empty.

**Steering valve**

	65TMV	65ZV	70ZV	80ZV	85ZV	90ZV	95ZV	115ZV	Comments
--	-------	------	------	------	------	------	------	-------	----------

• Main relief valve setting pressure PSI/MPa (High E/G RPM)	△→	△→	◇→	◇→	△→	◇→	◇→	◇→	△2,990 +/- 71 [20.6 +/- .5] ◇2,990+/-142 [20.6 +/- 1.0]
• Overload relief valve (OLRV; for both directions) PSI/MPa IMPORTANT! Run at lowest E/G RPM while setting OLRV's	△→	△→	△→	△→	△→	◇→	◇→	◇→	△3,560 +142 - 0.0 [24.5 +1.0 / - 0.0] ◇3,560 +71 / - 142 (24.5 +0.5 / -1.0)
Stop-to-stop cycle time in seconds @ RPM Low / High	3.4 / 2.3	3.4 / 2.3	5.0 / 2.0	5.0 / 2.0	4.0 / 2.8	4.4 / 2.5	5.0 / 2.4	5.0 / 3.9	All are +/- 0.5 / 0.3 seconds

**Reducing valve settings**

	65TMV	65ZV	70ZV	80ZV	85ZV	90ZV	95ZV	115ZV	Comments
--	-------	------	------	------	------	------	------	-------	----------

Pilot Reduction Valve Setting PSI / MPa +/- 43 / 0.3	510 / 3.5	510 / 3.5	510 / 3.5	510 / 3.5	510 / 3.5	510 / 3.5	510 / 3.5	510 / 3.5	Limits accumulator PSI for pilot
Steering Reduction Valve Setting PSI / MPa +/- 43 / 0.3	510 / 3.5	510 / 3.5	510 / 3.5	510 / 3.5	510 / 3.5	510 / 3.5	510 / 3.5	510 / 3.5	Limits steering PSI for Orbitrol® [Ref. S/News 2003-014] Typical pressures are 310-430 PSI, depend on steering/MCV action

**Cylinder drift rate**

	65TMV	65ZV	70ZV	80ZV	85ZV	90ZV	95ZV	115ZV	Comments
--	-------	------	------	------	------	------	------	-------	----------

Boom cylinder	1/8" / 3mm	1/8" / 3mm	1/8" / 3mm	1/8" / 3mm	1/8" / 3mm	1/8" / 3mm	1/8" / 3mm	1/8" / 3mm	Maximum drift per minute with oil hot
Bucket cylinder	5/32" / 4mm	5/32" / 4mm	5/32" / 4mm	5/32" / 4mm	5/32" / 4mm	5/32" / 4mm	5/32" / 4mm	5/32" / 4mm	

**IMPORTANT!**

Remove vinyl tape\* when finished.  
 Test w/ bucket empty

Vinyl tape or marker

Scale

Measure over a period of 10 minutes. Divide distance of rod retraction by mins. Drift should not exceed values given.

**WARNING**  
 Stay clear of boom.  
 Lock pilot control levers  
 Hang do not operate tag in cab.

\*or use marker instead of tape

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Date: Nov 15, 2004 (REV.)  
 Remove 2003-002BB and replace with this document

Electrical

All pressure switches / gauge sensors	65TMV	65ZV	70ZV	80ZV	85ZV	90ZV	95ZV	115ZV	Comments
Batteries; Reserve Capacity / CCA capacity [*AH]	*110 / 675	*110 / 675	320 / 1000	320 / 1000	320 / 1000	320 / 1000	435 / 1300	435 / 1300	*Refer to Service News 98-046C
Transmission oil temp switch	↪	↪	↪	↪	↪	↪	↪	↪	35037-20200; 248 °F (120 °C) or more will close s/w & sound alarm.
Transmission oil temp sensor for gauge	↪	↪	↪	↪	↪	↪	↪	↪	35829-60050; Check resistance as needed; @140°F (60°C) 56.3 ohms; @248°F (120°C) 10 ohms.
Engine coolant temp sensor for gauge	↪	↪	↪	↪	↪	↪	↪	↪	35829-60050; Check resistance as needed; @140°F (60°C) 56.3 ohms; @248°F (120°C) 10 ohms.
Transmission filter by-pass indicator switch <small>SI/News 2004-008</small>	N / A	N / A	N / A	N / A	N / A	N / A	↪	↪	ZZP165194; will bypass at 45 PSI (0.3 MPa)
Transmission filter by-pass temp. switch	N / A	N / A	N / A	N / A	N / A	N / A	↪	↪	35037-60030; remains opened below 122 °F (50°C) to keep light off with thick oil.
Starting aid temp switch	↪	↪	↪	↪	↪	↪	↪	↪	35037-20020; disengages ether start at approximately 100 °F (38°C) and above
Engine air filter clogged switch <small>Note that the margin of protection for filter is 4x. Filters collapse w/ 100 " H2O</small>	↪	↪	↪	↪	↪	↪	↪ x 2	↪ x 2	35830-70010; Air filter resistance, closes circuit above 635mmAq (or 25 inches H2O)
ECM part numbers (software procured from Cummins)	N / A	N / A	3990517	N / A	3991502	3408501	3681405	3330511	Early Cummins (see parts cat & s/n)
Engine oil pressure switch data	65TMV	65ZV	70ZV	80ZV	85ZV	90ZV	95ZV	115ZV	Comments
• Oil pressure switch warning threshold PSI (MPa)	12 (0.08)	12 (0.08)	12 (0.08)	12 (0.08)	12 (0.08)	12 (0.08)	16 (0.10)	16 (0.10)	↪ Switches close with pressure less than value shown here. p/n's below.
• Normal oil pressure range at HI; PSI (MPa)	45~60 (0.31~0.41)	45~60 (0.31~0.41)	45~60 (0.31~0.41)	30~75 (0.21~0.52)	30~75 (0.21~0.52)	30~65 (0.21~0.45)	35~40 (0.24~0.27)	50~75 (0.34~0.52)	50401-00720-7, 65ZV/TMV/80ZV; 4076931, 70/85ZV; 3417189, 90ZV; 3417185, 95ZV; 50401-03610, 115ZV.
• Minimum oil pressure range at LI; PSI (MPa)	15 (0.10)	15 (0.10)	15 (0.10)	10 (0.07)	10 (0.07)	10 (0.07)	15 (0.10)	20 (0.14)	With oil at approximately 200 °F (94 °C)
Thermostat; Temp at which starts to open / fully open (not elect) E/G outlet --> 105~115 °F (40~45 °C) above ambient temp.	184/195	184/195	184/195	184/195	183/196	180/199	180/200	180/202	Temperature comparison; 180 °F=82.2°C / 200 °F=93.3°C
Engine speed sensors *ECM's use digital / analog converter for tachometer.	35825 60070	35825 60070	*	35825 60070	*	*	** 35051 60080	** 35051 60080	*65TMV; 65/80ZV for tachometer drive. **95/115ZV are for SCU operation - clutch fill.
Coolant level switch	N / A	N / A	N / A	N / A	N / A	N / A	35824 20010	35824 20010	Use seal number 47131-20240.
Declutch [late design] s/w application pressures to disengage t/m	→	→	→	→	→	→	→	→	35047-20270 w/ white band = [kg/cm2] 5 on/3 off [60610 not declutch]
Brake oil pressure alarm switch	↪	↪	↪	↪	↪	↪	↪	↪	35047-60250; Sounds when below about 570 PSI/40 Kgf/cm2 (3.9 MPa)
Ground speed sensor data	65TMV	65ZV	70ZV	80ZV	85ZV	90ZV	95ZV	115ZV	Comments
Ground Speed Sensor, for SCU auto shift R/C "ON/OFF"	35820 60080	35820 60080	35820 60080	N / A	N / A	N / A	N / A	N / A	700Ω@77°F (25°C). Note that resistance will vary +/-10% with temperature.
Check continuity from SCU through harness. See comments	N / A	N / A	N / A	35051 60080	35051 60080	35051 60080	35051 60080	35051 60080	2.3kΩ@77°F (25°C). Note that resistance will vary +/-10% with temperature.
Pressure differential sensor [clutch fill]	N / A	N / A	N / A	N / A	N / A	N / A	95ZV↪	↪	35820-60050
Acts as proximity switch-signal full clutch engagement	N / A	N / A	N / A	N / A	N / A	N / A	N / A	115ZV↪	358542-70070

Morse / Williams Throttle pedal calibration for engines with ECM's - Turn on key s/w, slowly step down and up three times [in about 5 seconds] & shut off key s/w. Do this when reconnecting terminals of battery, reinstalling old pedal, installing a new pedal, reconnecting ECM, or installing new ECM, (p/n in parts catalogs). 70/85/90/95/115/135ZV are all equipped with ECM's. Williams pedals are retrofittable to 95ZV units originally equipped with Morse pedals that have received the turbocharger spooling recalibration software. [Contact KCM.] ↗w/ rod inserted.

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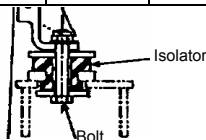
**Torque Values, Quick Reference Chart**

Driveline universal joint bolt torque values	65TMV	65ZV	70ZV	80ZV	85ZV	90ZV	95ZV	115ZV	Comments
Number 1 propeller shaft lb-ft / kg-M	N / A	N / A	N / A	N / A	N / A	N / A	N / A	105 / 14.5	Same value for both front and rear universal joint fasteners. Before applying fastening torque to bolts, threads must be clean and free of oil. See entry on topic below. Note information on universal joint and spline wear dimensions. Replace when limit is exceeded.
Number 2 propeller shaft lb-ft / kg-M	59 / 8.2	59 / 8.2	105 / 14.5	105 / 14.5	105 / 14.5	105 / 14.5	105 / 14.5	163 / 22.5	
Pillow bearing bolt torque value	159 / 22	159 / 22	159 / 22	159 / 22	159 / 22	326 / 45	307 / 42	532 / 73.5	
Number 3 propeller shaft lb-ft / kg-M	59 / 8.2	59 / 8.2	59 / 8.2	59 / 8.2	59 / 8.2	105 / 14.5	105 / 14.5	105 / 14.5	
U-joint spider bearing freeplay limit. Values in inches / mm.	0.009 / 0.2	0.009 / 0.2	0.009 / 0.2	0.009 / 0.2	0.009 / 0.2	0.009 / 0.2	0.009 / 0.2	0.009 / 0.2	
Spline freeplay limit. Values in inches / mm.	0.012 / 0.3	0.012 / 0.3	0.012 / 0.3	0.012 / 0.3	0.012 / 0.3	0.012 / 0.3	0.012 / 0.3	0.012 / 0.3	
Note: Clean and apply Loctite ® Primer and Loctite ® 277 for bolts and nuts that are in 24mm in diameter or greater, and 271 to bolts and nuts that are smaller than 24mm in diameter. Refer to Service News 99-026B for information on liquid & semi-solid threadlocking compounds & metal surface primers. <b>NEVER RE-USE DRIVELINE BOLTS AND NUTS!</b>									

**Isolator Mounts**

Engine isolator mount bolts lb-ft / kg-M	70 / 9.6	70 / 9.6	70 / 9.6	307 / 42.5	307 / 42.5	307 / 42.5	307 / 42.5	217 / 30.0	* Refer to Service News 99-033 for adjustment procedure.
Transmission isolator mount bolts lb-ft / kg-M	307 / 42.5	307 / 42.5	307 / 42.5	*307 / 42.5	159 / 22	159 / 22	159 / 22	307 / 42.5	

**IMPORTANT! Isolator mounts must not be overtightened!**



**IMPORTANT! Excessive bolt torque compression on isolators can cause isolator to lose elasticity and transfer vibrations to surrounding parts and sheet metal. Never overtorque mounts.**

**Welding Repairs (all models)**

First choice of rod (or wire equivalent) for all models	↪	↪	↪	↪	↪	↪	↪	↪	E-9018	Pre-heat to 400°F/204°C before welding, allow to cool naturally or with insulation.
Second choice of rod (or wire equivalent) for all models	↪	↪	↪	↪	↪	↪	↪	↪	E-7018	

**Note:** Refer to Service News 99-004B, & 2003-004 for further information on welding procedures and materials.

Always follow Kawasaki's specific welding instructions and general instructions in Shop Manual (Note that it is not necessary to disconnect the ECM and SCU, but the breaker in SCU can be turn to "OFF" position).

- Connect ground close to work area, and route welding leads far away from machine at right angle to where working so as to avoid inductive transfer of electro-magnetic energy.
- Unplug positive and negative leads of battery.
- Be aware of flammables, hoses, glass, oils, painted surfaces, and weld splatter so as not to damage property.

**Hydraulic Hose**

Operating temperature is from -40°F/-40°C to + 250°F/120°C	All hoses are wire braid reinforced and adhere to applicable SAE100R standards for working and burst pressure ratings. <b>Contact KCM for high heat hoses, and extreme cold temperature artic package hoses.</b>									
High pressure hose specifications	↪	↪	↪	↪	↪	↪	↪	↪	↪	Operating pressure is 2,990 PSI / 20.5 MPa. Example shown is Aeroquip ® FC136 series hose.
Low pressure hose specifications for pilot pressure.	↪	↪	↪	↪	↪	↪	↪	↪	↪	Operating pressure is 510 PSI / 3.5 MPa. Hose is rated for 1,000 PSI operating pressure.

**NEVER REPLACE A HYDRAULIC HOSE WITH A LOWER PRESSURE RATED HOSE.**

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