CATERPILLAR®

Service Manual

Models
TH336C, TH337C, TH406C, TH407C, TH414C, TH514C, TH417C

SN MJR00150 to Present, SN THM00150 to Present,
SN DJB00150 to Present, SN SXJ00150 to Present,
SN GAT00150 to Present, SN RCH00150 to Present,
SN MLH00150 to Present, SN JJT00150 to Present,
SN KEK00150 to Present, SN RWW00150 to Present,
SN MWC00150 to Present, SN KKW00150 to Present,
SN RRJ00150 to Present, SN RRW00150 to Present

31200799
UENR6251-06

Revised
January 31, 2018

1.6 SAFETY INSTRUCTIONS

Following are general safety statements to consider ***before*** performing maintenance procedures on the telehandler. Additional statements related to specific tasks and procedures are located throughout this manual and are listed prior to any work instructions to provide safety information before the potential of a hazard occurs.

For all safety messages, carefully read, understand and follow the instructions ***before*** proceeding.

1.6.1 Personal Hazards

PERSONAL SAFETY GEAR: Wear all the protective clothing and personal safety gear necessary to perform the job safely. This might include heavy gloves, safety glasses or goggles, filter mask or respirator, safety shoes or a hard hat.

LIFTING: **NEVER** lift a heavy object without the help of at least one assistant or a suitable sling and hoist.

1.6.2 Equipment Hazards

LIFTING OF EQUIPMENT: Before using any lifting equipment (chains, slings, brackets, hooks, etc.), verify that it is of the proper capacity, in good working order, and is properly attached.

NEVER stand or otherwise become positioned under a suspended load or under raised equipment. The load or equipment could fall or tip.

Do Not use a hoist, jack or jack stands only to support equipment. Always support equipment with the proper capacity blocks or stands properly rated for the load.

HAND TOOLS: Always use the proper tool for the job; keep tools clean and in good working order, and use special service tools only as recommended.

1.6.3 General Hazards

SOLVENTS: Only use approved solvents that are known to be safe for use.

HOUSEKEEPING: Keep the work area and operator cab clean, and remove all hazards (debris, oil, tools, etc.).

FIRST AID: Immediately clean, dress and report all injuries (cuts, abrasions, burns, etc.), no matter how minor the injury may seem. Know the location of a First Aid Kit, and know how to use it.

CLEANLINESS: Wear eye protection, and clean all components with a high pressure or steam cleaner before attempting service.

When removing hydraulic components, plug hose ends and connections to prevent excess leakage and contamination. Place a suitable catch basin beneath the machine to capture fluid run off.

It is good practice to avoid pressure-washing electrical/ electronic components. In the event pressure-washing the machine is needed, ensure the machine is shut down before pressure-washing. Should pressure-washing be utilized to wash areas containing electrical/electronic components, Caterpillar recommends a maximum pressure of 52 bar (750 psi) at a minimum distance of 30,5 cm (12 in) away from these components. If electrical/electronic components are sprayed, spraying must not be direct and for brief time periods to avoid heavy saturation,

Check and obey all Federal, State and/or Local regulations regarding waste storage, disposal and recycling.

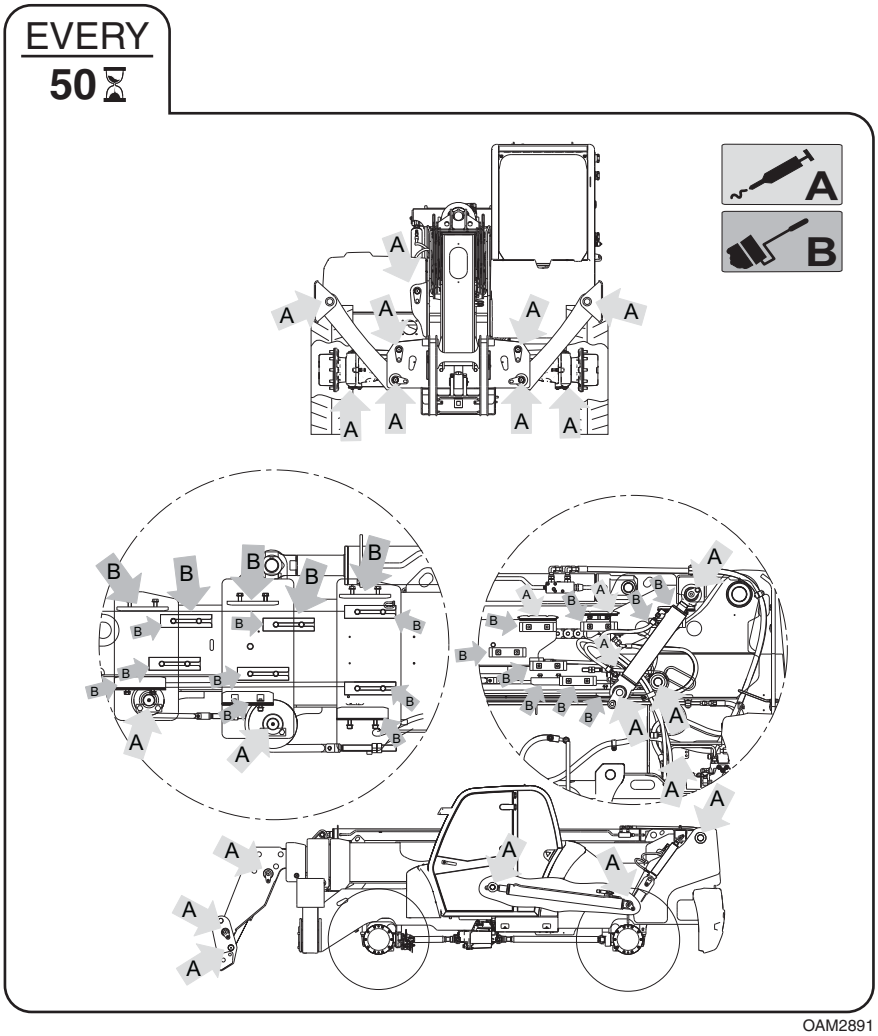
b. TH414C

Size	Tire Type	Minimum Ply/ Star Rating	Fill Type	Pressure
15.5/80-24	TR01	16 Ply	Pneumatic	4,25 Bar (62 psi)
			Liquid Filled	Approx 6,0 L (200 oz)
15.5-25	L-2	12 Ply	Pneumatic	4,0 Bar (58 psi)
			Liquid Filled	Approx 4,6 L (155 oz)
400/80-24	Power CL	N/A	Pneumatic	4,5 Bar (65 psi)
			Liquid Filled	Approx 6,0 L (200 oz)
440-80-24	Power CL	N/A	Pneumatic	4,0 Bar (58 psi)
			Liquid Filled	Approx 6,4 L (215 oz)

c. TH514C & TH417C

Size	Tire Type	Minimum Ply/ Star Rating	Fill Type	Pressure
14-24	TG02	16 Ply	Pneumatic	4,25 Bar (61 psi)
			Foam Filled (ANSI only)	Approx 264 kg (582 lb)
			Liquid Filled	Approx 4,6 L (155 oz)
14-24	SGG-2A	16 Ply	Pneumatic	5,25 Bar (76 psi)
			Foam Filled (ANSI only)	Approx 264 kg (582 lb)
			Liquid Filled	Approx 4,6 L (155 oz)

d. TH417C



2.7.2 Metric Fastener Torque Chart

Values for Zinc Yellow Chromate Fasteners (Ref 4150707)*							
CLASS 8.8 METRIC (HEX/SOCKET HEAD) BOLTS CLASS 8 METRIC NUTS							
Size	Pitch	Tensile Stress Area	Clamp Load See Note 4	Torque (Dry or Loctite® 263™)	Torque (Lube)	Torque (Loctite® 262™ or 271™ or Vibra-TITE™ 131)	Torque (Loctite® 242™ or 271™ or Vibra-TITE™ 111 or 141)
		Sq mm	KN	[N.m]		[N.m]	[N.m]
3	0.5	5.03	2.19	1.3	1.0	1.2	1.4
3.5	0.6	6.78	2.95	2.1	1.6	1.9	2.3
4	0.7	8.78	3.82	3.1	2.3	2.8	3.4
5	0.8	14.20	6.18	6.2	4.6	5.6	6.8
6	1	20.10	8.74	11	7.9	9.4	12
7	1	28.90	12.6	18	13	16	19
8	1.25	36.60	15.9	26	19	23	28
10	1.5	58.00	25.2	50	38	45	55
12	1.75	84.30	36.7	88	66	79	97
14	2	115	50.0	140	105	126	154
16	2	157	68.3	219	164	197	241
18	2.5	192	83.5	301	226	271	331
20	2.5	245	106.5	426	320	383	469
22	2.5	303	132.0	581	436	523	639
24	3	353	153.5	737	553	663	811
27	3	459	199.5	1080	810	970	1130
30	3.5	561	244.0	1460	1100	1320	1530
33	3.5	694	302.0	1990	1490	1790	2090
36	4	817	355.5	2560	1920	2300	2690
42	4.5	1120	487.0	4090	3070	3680	4290

NOTES: 1. THESE TORQUE VALUES DO NOT APPLY TO CADMIUM PLATED FASTENERS 5000059K

2. ALL TORQUE VALUES ARE STATIC TORQUE MEASURED PER STANDARD AUDIT METHODS TOLERANCE = ±10%

3. * ASSEMBLY USES HARDENED WASHER

4. CLAMP LOAD LISTED FOR SHCS IS SAME AS GRADE 8 OR CLASS 10.9 AND DOES NOT REPRESENT FULL STRENGTH CAPABILITY OF SHCS. IF HIGHER LOAD IS REQUIRED, ADDITIONAL TESTING IS REQUIRED.

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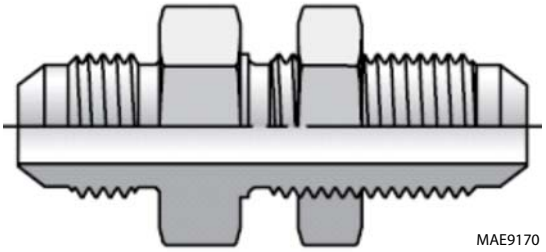
a. Bulkhead Fittings (BH) - INCH



TYPE/FITTING IDENTIFICATION				FASTENING JAM NUT FOR BULKHEAD CONNECTORS					
Material	Type	Dash Size	Thread Size	Torque					
				[Ft-Lb]			[Nm]		
			(UNF)	Min	Nom	Max	Min	Nom	Max
STEEL FITTINGS	O-RING FACE SEAL (ORFS) BULKHEAD FITTING	4	9/16-18	15	16	17	20	22	23
		6	11/16-16	25	27	28	34	37	38
		8	13/16-16	55	58	61	75	79	83
		10	1-14	85	90	94	115	122	127
		12	1 3/16-12	135	142	149	183	193	202
		14	1 5/16-12	170	179	187	230	243	254
		16	1 7/16-12	200	210	220	271	285	298
		20	1 11/16-12	245	258	270	332	350	366
		24	2-12	270	284	297	366	385	403
	Type	Dash Size	Thread Size	Torque					
				[Ft-Lb]			[Nm]		
			(UNF)	Min	Nom	Max	Min	Nom	Max
	37° FLARE (JLIC) BULKHEAD FITTING	3	3/8-24	8	9	9	11	12	12
		4	7/16-20	13	14	14	18	19	19
		5	1/2-20	20	21	22	27	28	30
		6	9/16-18	25	27	28	34	37	38
		8	3/4-16	50	53	55	68	72	75
		10	7/8-14	85	90	94	115	122	127
		12	1 1/16-12	135	142	149	183	193	202
		14	1 3/16-12	170	179	187	230	243	254
		16	1 5/16-12	200	210	220	271	285	298
		20	1 5/8-12	245	258	270	332	350	366
		24	1 7/8-12	270	284	297	366	385	403
		32	2 1/2-12	310	326	341	420	442	462

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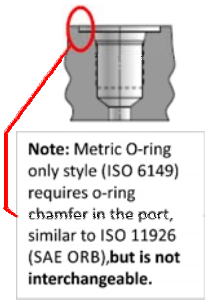
a. Metric Pipe Parallel O-Ring Boss (MPP)



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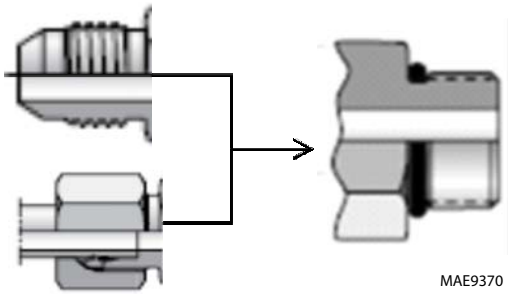
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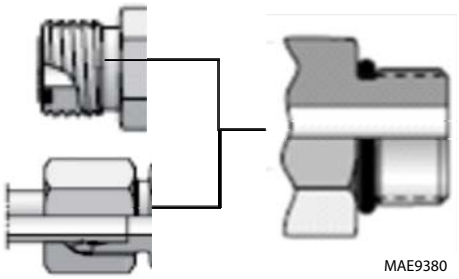
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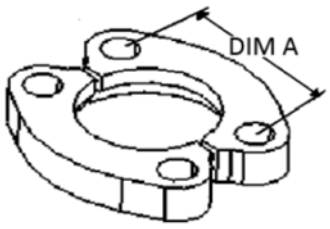
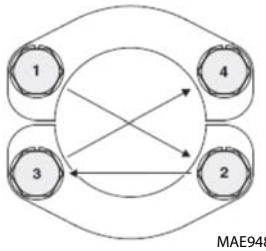
TYPE/FITTING IDENTIFICATION			STUD ENDS WITH 37° (JIC) OR L SERIES DIN (MBTL) OPPOSITE END						STUD ENDS WITH (ORFS) OR S SERIES DIN (MBTS) OPPOSITE END					
Material	Thread M Size	Connecting Tube O.D.	Torque						Torque					
			[Ft-Lb]			[Nm]			[Ft-Lb]			[Nm]		
	(metric)	(mm)	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max
STEEL FITTINGS WITH STEEL MATING COMPONENTS; UN-LUBRICATED THREADS	M8x1	4	6	7	7	8	9	9	8	9	9	10	12	12
	M10x1	6	11	12	12	15	16	16	15	16	17	20	22	23
	M12x1.5	8	18	19	20	25	26	27	26	28	29	35	38	39
	M14x1.5	10	26	28	29	35	38	39	33	35	36	45	47	49
	M16x1.5	12	30	32	33	40	43	45	41	43	45	55	58	61
	M18x1.5	15	33	35	36	45	47	49	52	55	57	70	75	77
	M20x1.5	--	--	--	--	--	--	--	59	62	65	80	84	88
	M22x1.5	18	44	46	48	60	62	65	74	78	81	100	106	110
	M27x2	22	74	78	81	100	106	110	125	132	138	170	179	187
	M30x2	--	95	100	105	130	136	142	175	184	193	237	249	262
	M33x2	25	120	126	132	160	171	179	230	242	253	310	328	343
	M38x2	--	135	142	149	183	193	202	235	247	259	319	335	351
	M42x2	30	155	163	171	210	221	232	245	258	270	330	350	366
	M48x2	38	190	200	209	260	271	283	310	326	341	420	442	462
	M60x2	50	230	242	253	315	328	343	370	389	407	500	527	552
Material	Thread M Size	Connecting Tube O.D.	Torque						Torque					
			[Ft-Lb]			[Nm]			[Ft-Lb]			[Nm]		
	(metric)	(mm)	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max
ALUMINUM/ BRASS FITTINGS OR ALUMINUM/ BRASS MATING COMPONENTS; UN-LUBRICATED THREADS	M8x1	4	4	5	5	5	7	7	5	6	6	7	8	8
	M10x1	6	7	8	8	9	11	11	10	11	11	14	15	15
	M12x1.5	8	12	13	13	16	18	18	17	18	19	23	24	26
	M14x1.5	10	17	18	19	23	24	26	21	22	23	28	30	31
	M16x1.5	12	20	21	21	27	28	28	27	28	29	37	38	39
	M18x1.5	15	21	22	23	28	30	31	34	36	37	46	49	50
	M20x1.5	--	--	--	--	--	--	--	30	40	42	41	54	57
	M22x1.5	18	29	30	31	39	41	42	48	51	53	65	69	72
	M27x2	22	48	51	53	65	69	72	81	86	90	110	117	122
	M30x2	--	62	65	68	84	88	92	114	120	125	155	163	169
	M33x2	25	78	82	86	106	111	117	150	157	164	203	213	222
	M38x2	--	88	93	97	119	126	132	153	161	168	207	218	228
	M42x2	30	101	106	111	137	144	150	159	168	176	216	228	239
	M48x2	38	124	130	136	168	176	184	202	212	222	274	287	301
	M60x2	50	150	157	164	203	213	222	241	253	265	327	343	359

a. Flange Code (FL61 & FL62) - Inch Fasteners





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TYPE/FITTING IDENTIFICATION
STEEL 4-BOLT FLANGE SAE J518
(INCH FASTENERS)

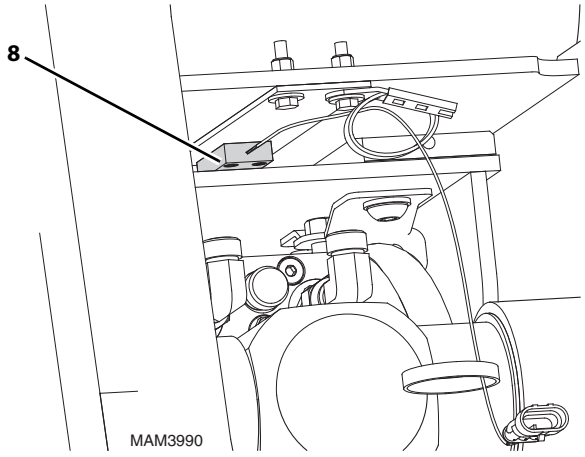
Type	Inch Flange SAE Dash Size	Flange Size		A*		Bolt Thread Size	Fastener Torque for Flanges Equipped with GRADE 5 Screws						Fastener Torque for Flanges Equipped with GRADE 8 Screws					
							[Ft-Lb]			[Nm]			[Ft-Lb]			[Nm]		
		(in)	(mm)	(in)	(mm)	(UNF)	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max
CODE 61 SPLIT FLANGE (FL61)	8	0.50	13	1.50	38.10	5/16-18	18	19	19	24	25	26	24	25	26	32	34	35
	12	0.75	19	1.88	47.75	3/8-16	32	33	35	43	45	47	44	46	49	60	63	66
	16	1.00	25	2.06	52.32	3/8-16	32	33	35	43	45	47	44	46	49	60	63	66
	20	1.25	32	2.31	58.67	7/16-14	52	54	57	70	74	77	68	71	75	92	97	101
	24	1.50	38	2.75	69.85	1/2-13	77	81	85	105	110	116	111	116	122	150	158	165
	32	2.00	51	3.06	77.72	1/2-13	77	81	85	105	110	116	111	116	122	150	158	165
	40	2.50	64	3.50	88.90	1/2-13	77	81	85	105	110	116	111	116	122	150	158	165
	48	3.00	76	4.19	106.43	5/8-11	155	163	170	210	221	231	218	228	239	295	310	325
	56	3.50	89	4.75	120.65	5/8-11	155	163	170	210	221	231	218	228	239	295	310	325
	64	4.00	102	5.13	130.30	5/8-11	155	163	170	210	221	231	218	228	239	295	310	325
	80	5.00	127	6.00	152.40	5/8-11	155	163	170	210	221	231	218	228	239	295	310	325

Type	Inch Flange SAE Dash Size	Flange Size		A*		Bolt Thread Size	Fastener Torque for Flanges Equipped with GRADE 5 Screws						Fastener Torque for Flanges Equipped with GRADE 8 Screws					
							[Ft-Lb]			[Nm]			[Ft-Lb]			[Nm]		
		(in)	(mm)	(in)	(mm)	(UNF)	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max
CODE 62 SPLIT FLANGE (FL62)	8	0.50	13	1.59	40.39	5/16-18	--	--	--	--	--	--	24	25	26	32	34	35
	12	0.75	19	2.00	50.80	3/8-16	--	--	--	--	--	--	44	46	49	60	63	66
	16	1.00	25	2.25	57.15	7/16-14	--	--	--	--	--	--	68	71	75	92	97	101
	20	1.25	32	2.62	66.55	1/2-13	--	--	--	--	--	--	111	116	122	150	158	165
	20	1.25	32	2.62	66.55	--	--	--	--	--	--	--	--	--	--	--	--	--
	24	1.50	38	3.12	79.25	5/8-11	--	--	--	--	--	--	218	228	239	295	310	325
	32	2.00	51	3.81	96.77	3/4-10	--	--	--	--	--	--	332	348	365	450	473	495

NOTE: * A dimension for reference only.

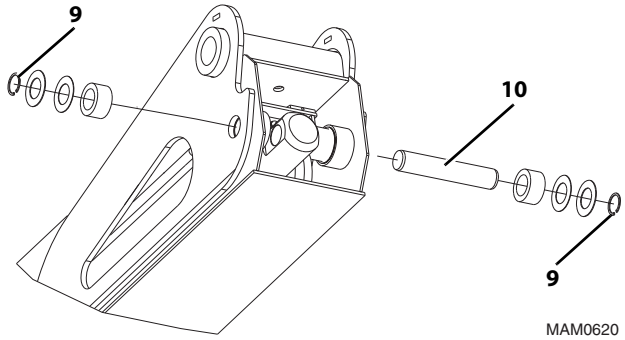
3.3.3 Second Section Boom Removal

1. Remove any attachment from the quick coupler assembly.
2. Be sure there is enough room in front of the machine to allow the boom sections to be removed. Park the machine on a hard, level surface, fully retract the boom, lower the boom, place the transmission in (N) NEUTRAL, engage the park brake and shut the engine OFF.
3. Place a Do Not Operate Tag on both the ignition key switch and the steering wheel.
4. Properly disconnect the battery. Refer to Section 9.11, "Battery", for procedure.
5. Open the engine cover. Allow the system fluids to cool.
6. Remove the quick coupler assembly. Refer to Section 3.23.1, "Quick Coupler Removal (TH336C, TH337C, TH406C & TH407C)".
7. Label, disconnect and cap the tilt hoses and (if equipped) auxiliary hydraulic hoses attached to the machine at the boom head. Plug and cap the hose ends to prevent dirt and debris from entering the hydraulic system.
8. Place a sling around the tilt cylinder and remove the retaining rings and pin at the barrel end of the tilt cylinder. Remove tilt cylinder.



9. Disconnect and remove the boom retract sensor (**8**) from the rear of the first boom section.
10. Label, disconnect and cap the extend/retract hydraulic hoses on the extend/retract cylinder at the rear of the boom. Plug and cap the hose ends to prevent dirt and debris from entering the hydraulic system.
11. Remove the top and side wear pads from the rear of the second boom section.

Note: *Tag each pad, backing plate, shim and bolts from each location.*



12. Remove the retaining rings (**9**) from the rear of the extend/retract cylinder.
13. Remove the extend/retract cylinder mounting pin (**10**).

Note: *Tag each spacer and shim from each side of the extend/retract cylinder.*

14. Support the front of the boom by placing a sling behind the boom head. Pull the second boom section out of the first boom section approximately 15 - 20 cm (6 - 8 in).
15. Pull the tilt hoses and (if equipped) auxiliary hydraulic hoses through the rear of the boom.
16. Remove the top, side and bottom wear pads from the front of the first boom section.

Note: *Tag each pad, backing plate, shim and bolts from each location.*

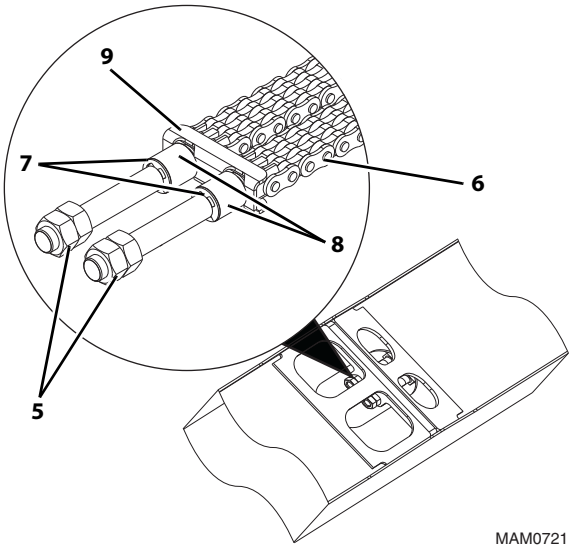
17. Pull the second boom section halfway out of the first boom section, reposition the sling, balancing the second boom section and remove from the first boom section.
18. Set the second boom section on level ground. Set the complete boom on suitable stands to begin tear down.
19. Inspect the boom and welds. Consult the local Caterpillar dealer if structural damage is detected.
20. Inspect hoses, hardware, wear pads, mounting points and other components visible with the first boom section. Replace any item if damaged.
21. Inspect all wear pads for wear. (Refer to Section 3.22.1, "Wear Pad Inspection").

3.3.4 First Boom Section Removal

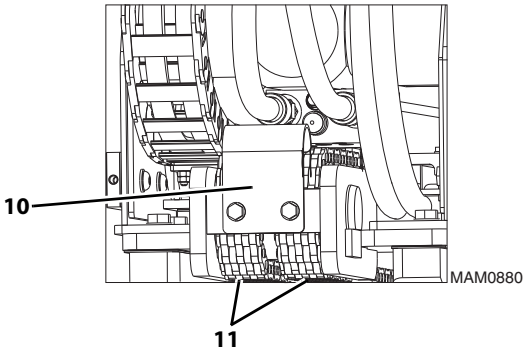
1. Temporarily connect the battery. Refer to Section 9.11, "Battery", for procedure.
2. Remove boom angle sensor arm. Refer to Section 9.14.7, "Boom Angle Sensor".

3.6.5 Second and Third Boom Section Installation

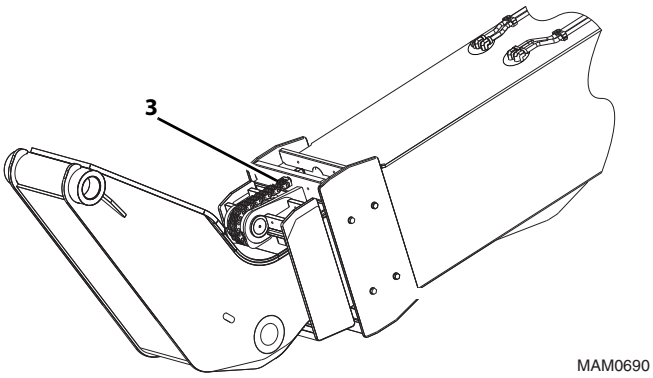
1. Place the first boom section upside down on suitable supports.
2. Lubricate the inside first boom section on area's where the second boom section wear pads will slide.
3. Using a suitable sling, balance the second and third boom sections and carefully slide 0,9 - 1,22 m (3 - 4 ft) into the front of the first boom section.
4. Set the second and third boom sections onto a suitable support and reset the sling under the boom head of the third boom section.



5. Install the clevis bracket (**5**), two spacers (**6**) and two circlips (**7**), previously removed from the extend chains (**8**).
6. Install both extend chains (**8**) to the top of the first boom section
7. Install the locknuts and jam nuts (**9**) to the extend chains (**8**) and allowing the extend chains to hang out over the rear of the first boom section. Do Not tighten the lock nuts and jam nuts at this time.
8. Lay the extend/retract cylinder hoses, tilt hoses, auxiliary/electrical hoses behind the second and third boom sections being careful to protect the hoses against being damaged when installing the second and third boom sections into the first boom section.
9. Carefully slide the hoses and the two boom sections into the first boom section. Leave 152 -203 mm (6 - 8 in) in of the two boom sections out to be able to install the wear pad block and the wear pads in the front of the first boom section.
10. Install the wear pads, spacers and shims at the front of the first boom section. Apply Loctite® 242™ and torque the wear pad mounting bolts to 92 - 106 Nm (68 - 78 lb-ft).

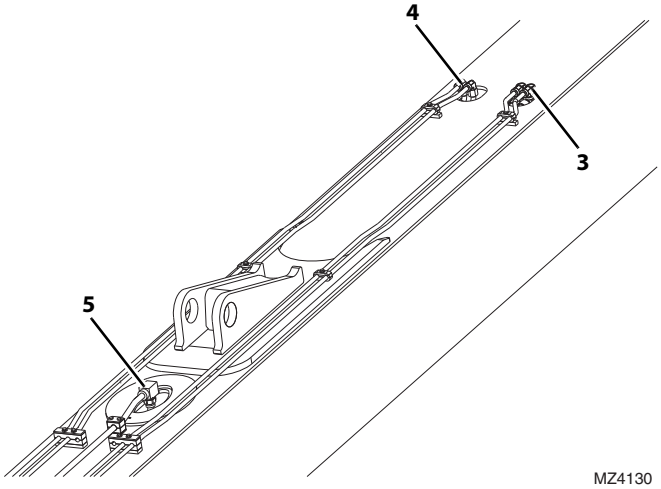


11. Connect both extend chains (**11**) at the rear of the third boom section.
12. Feed the extend/retract hoses, tilt hoses and auxiliary/electrical hoses between the second and first boom sections.
13. Connect the extend/retract hoses, tilt hoses and auxiliary/electrical hoses to the proper tubes on the bottom of the first boom section.
14. Install the hose stop bracket (**10**).
15. Install the previously removed boom retract sensor. Refer to Section 3.27, "Boom Retract Sensor Adjustment", for detailed adjustment instructions.



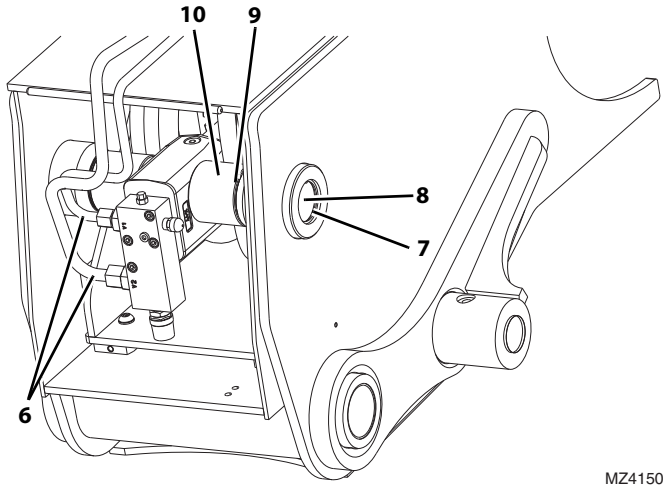
16. Install the lock nut and jam nut (**3**) on the retract chain at the front of the first boom section.
17. Tighten all hose clamps. Connect the auxiliary hoses to the quick disconnects on the side of the boom head. Connect the electrical cable to the plug mounted below the auxiliary quick disconnects if equipped.
18. Install the tilt cylinder in the boom head, install the mounting pin and keeper bolt, locking the mounting pin and tilt cylinder into position.
19. Connect the tilt cylinder hoses to the proper fittings on the tilt cylinder.

2. Label, disconnect and cap the tilt circuit hoses from the tilt cylinder at the front of the third boom section. Disconnect the electrical plug connection from the boom head. Label and remove the electrical plug from the end of the electrical cable. Label, disconnect and cap the auxiliary circuit hoses from the quick disconnect fittings at the front of the third boom section. Cap all fittings and openings to prevent dirt and debris from entering the hydraulic system.
3. Place a sling around the tilt cylinder and remove the retaining rings and pin at the barrel end of the tilt cylinder. Remove tilt cylinder.
4. Remove the side and top wear pads, spacers and shims from the front inside of the first boom section. Label and tag each set of wear pads being removed.



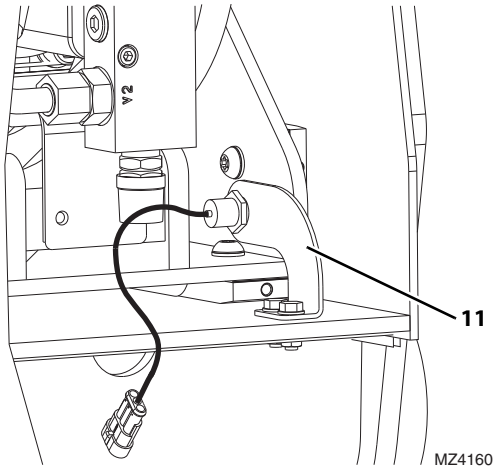
MZ4130

5. Disconnect both tilt hoses (**3**) and (if equipped) both auxiliary hoses (**4**) at the bottom of the first boom section. Disconnect the top tandem extend/retract cylinder hose (**5**) at the bottom of the first boom section. Plug the hose ends with plastic plugs (use plastic plugs for the needed clearance when removing the hoses from between the sections) and cap the tube ends to prevent dirt and debris from entering the hydraulic system.



MZ4150

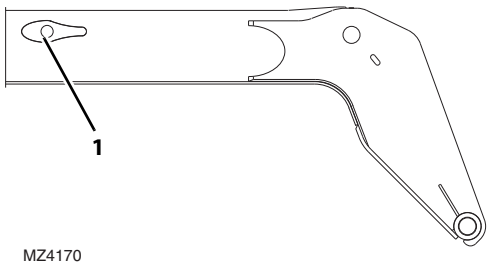
6. Disconnect both extend/retract tubes (**6**) from the tandem cylinder at the rear of the boom. Plug the tube ends and cap the cylinder fittings to prevent dirt and debris from entering the hydraulic system.
7. Remove the circlip (**7**), pin (**8**), shims (**9**) and spacer (**10**) from each side of the rear tandem cylinder rod end. Note the location and number of shims for assembly.
8. Pull the disconnected hoses and electrical cable from the rear of the boom.



MZ4160

9. Remove the boom retract sensor (**11**) from the rear of the first boom section.
10. Place a sling around the second boom section, lift and slowly pull the second and third boom section approximately half way out of the first boom section. Lower the second and third boom sections onto a suitable support.

10. Install both clamps under the first boom section holding the extend/retract cylinder tubes.
11. Properly connect the battery. Refer to Section 9.11, "Battery", for procedure.
12. Close and secure the engine cover.



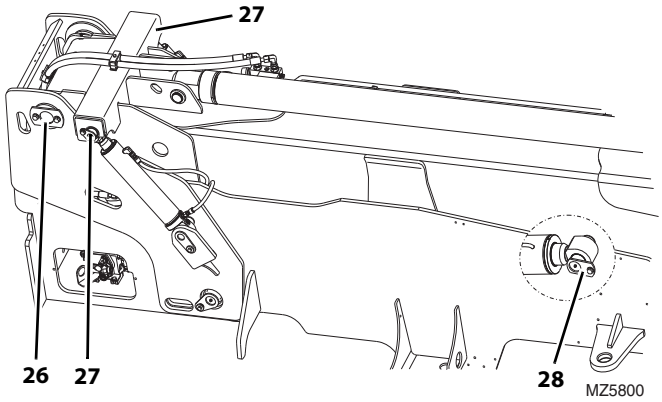
MZ4170

13. Start the engine and slowly extend boom to allow access to the tandem extend/retract cylinder mounting pin in the third boom section (**1**).
14. Shut engine OFF.
15. Align the tandem extend/retract cylinder rod and install the mounting pin (**1**) and retaining rings.
16. Start the engine and operate all boom functions several times to bleed any air out of the hydraulic system. Check for fluid leaks. Check the hydraulic fluid level in the tank and add fluid as required.
17. Clean up all debris, hydraulic fluid, etc., in, on, near and around the machine.

3.18.10 Complete Boom Installation

Note: *Light lubrication of the boom wear surfaces with a factory authorized grease is recommended to keep the boom wear surfaces lubricated properly. Light lubrication of the boom wear surfaces is also recommended when the machine is stored, to help prevent rusting.*

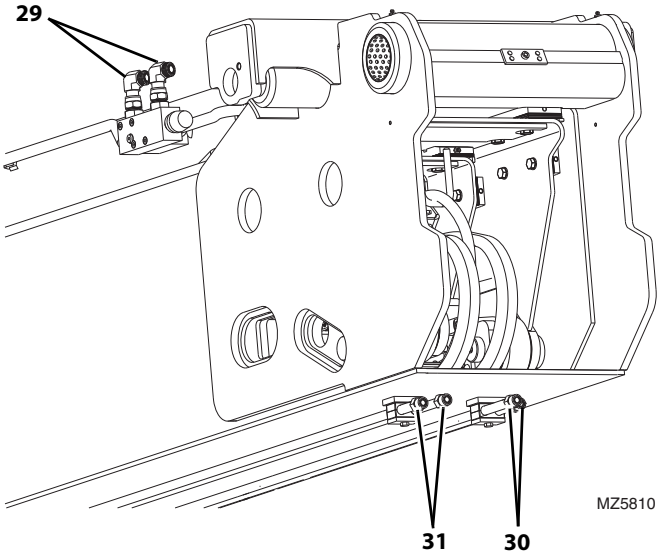
1. Park the machine on a hard, level surface. Make sure park brake is set, key is removed from the ignition and "Do Not Operate" tag is placed in clear view in the cab.



2. Using suitable slings, balance the boom assembly, lift and carefully guide the boom into place. Align the frame pivot bore with the boom assembly pivot bore. Install boom pivot pin (**26**). Apply Loctite® 242™ and torque lock bolts to 90 Nm (66 lb-ft).
3. With the sling still in place, install both Compensation cylinders, pins and lock bolts (**27**). Apply Loctite® 242™ and torque to 90 Nm (66 lb-ft).
4. With the sling still in place, install the rod end of the Lift/Lower cylinder, pin and lock bolt (**28**). Apply Loctite® 242™ and torque to 90 Nm (66 lb-ft).

Note: *Raising the boom up or down with the sling maybe necessary so the boom, Compensation and Lift/Lower cylinder bores can be aligned for easier pin installation.*

Note: *Grease the boom pivot bore, compensation cylinder rod ends, lift/lower cylinder rod end and pins before installing.*



5. Remove the caps from Extend/Retract cylinder fittings and plugs from Extend/Retract cylinder hoses. Attach each hose to the Extend/Retract cylinder fittings (**29**) and tighten until wrench-tight. Mark the hose fitting then tighten each hose firmly 1 to 1 1/2 flats.
6. Remove the caps from both Tilt tubes (**30**) and Auxiliary tubes (**31**) and plugs from both Tilt hoses and both Auxiliary hoses. Attach both sets of hoses to the Tilt tubes and the Auxiliary tubes and tighten until wrench-tight. Mark the hose fitting then tighten each hose firmly 1 to 1 1/2 flats.
7. Connect the boom angle indicator rod to the switch at the inside left rear corner of the main boom section and frame. Refer to Section 9.14.7, "Boom Angle Sensor", for adjustment information.
8. Start the engine and operate all boom functions several times. Check for leaks, and check the hydraulic fluid level in the reservoir; add fluid if required.
9. Clean up all debris, hydraulic fluid, etc., in, on, near and around the machine.

NOTICE

EQUIPMENT DAMAGE. Do Not operate with the boom prop in place. Damage to the boom prop and/or the lift/lower cylinder could occur.

7. Shut engine OFF.

b. Prop Removal

1. If needed, start machine and slowly raise the boom until the boom prop is clear of the lift/lower rod end.
2. Remove the o-rings (**3**) and boom prop (**1**) from the cylinder. Return the boom prop to the proper location and secure.
3. Lower boom, shut engine OFF.

3.26 EMERGENCY BOOM LOWERING PROCEDURE

⚠ WARNING

To avoid instability of the machine, the extend/retract cylinder **MUST BE** fully retracted prior to retracting the lift cylinder. If circumstances prevent retraction of the extend/retract cylinder first, lower the lift cylinder the minimum amount necessary and resume retraction of the extend/retract cylinder as soon as possible.

3.26.1 Equipment and Supplies Required

Auxiliary Hydraulic Power Supply:

- Portable hydraulic unit or another machine with an auxiliary hydraulic power supply with a capacity to hold up to 35 L (9 gal) of hydraulic oil from the machine during lowering process.

NOTICE

EQUIPMENT DAMAGE. Auxiliary Hydraulic Power Supply hydraulic oil must be compatible with hydraulic oil shown in Section 2.3, “Fluids and Lubricant Capacities”

Hoses:

- Two Hydraulic Hoses - Approximately 3,0 m (10 ft) each, with a minimum I.D. of 9,5 mm (0.375 in) and a minimum rating of 275,8 bar (4000 psi).

Fittings:

- Two -8 ORFS Caps
- Two -8 ORFS Plugs

Adaptors:

- Two -8 ORFS Adaptors

Note: *Machine extend/retract and lift/lower hoses are -8 ORFS. The adaptor size may vary depending on the hose ends of the auxiliary hydraulic power supply.*

4.2 OPERATOR CAB

WARNING

Do Not service the machine without following all safety precautions as outlined in Section 1, “Safety Practices”, of this manual.

4.2.1 Operator Cab Safety

WARNING

The protection offered by this ROPS/FOPS will be impaired if subjected to any modification or structural damage, at which time replacement is necessary. ROPS/FOPS must be properly installed using fasteners of correct size, grade, and torqued to their specified value.

WARNING

Do Not weld, grind, drill, repair or modify the cab in any way. Any modification or damage to cab structural components requires cab replacement.

Refer to the appropriate parts manual for ordering information.

4.2.2 Serial Number Plate

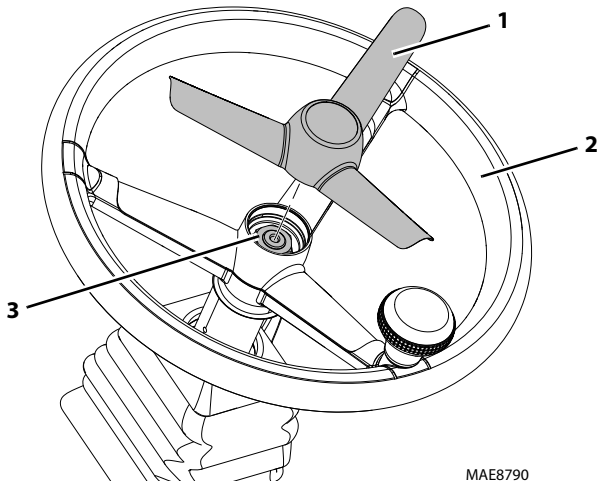
The cab serial number plate is located on the left side of the cab, below the seat. Information specified on the serial number plate includes the cab model number, the cab serial number and other data. Write this information down in a convenient location to use in cab correspondence.

4.3 CAB COMPONENTS

4.3.1 Steering Wheel

a. Steering Wheel Removal

1. Park the machine on a firm, level surface, fully retract the boom, lower the boom, place transmission in (N) NEUTRAL, engage the park brake and shut the engine OFF.
2. Place a Do Not Operate Tag on both the ignition key switch and the steering wheel.
3. Open the engine covers. Allow the system fluids to cool.
4. Properly disconnect the battery. Refer to Section 9.11, “Battery”, for procedure.



5. Remove steering insert (**1**) out of steering wheel.
6. Mark steering wheel (**2**) and shaft to ensure proper installation. Remove nut and washer (**3**) securing the steering wheel (**2**) to splined steering column shaft.
7. Use a steering wheel puller to remove steering wheel (**2**) from splined shaft.

4.4 CAB REMOVAL

WARNING

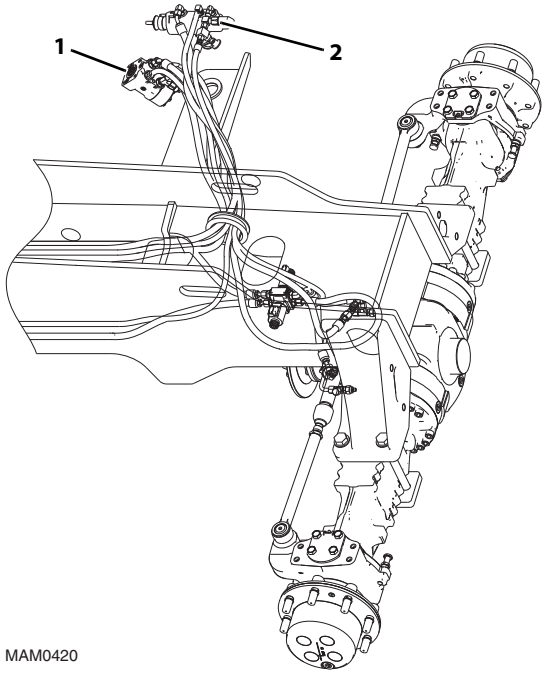
The protection offered by this ROPS/FOPS will be impaired if subjected to any modification or structural damage, at which time replacement is necessary. ROPS/FOPS must be properly installed using fasteners of correct size and grade, and torqued to their specified value.

Note: *To help ensure safety and optimum performance, replace the cab if it is damaged. Refer to the appropriate parts manual for ordering information.*

Inspect the cab, its welds and mounts. If modification, damage, a cracked weld and/or fatigued metal is discovered, replace the cab. Contact the local Caterpillar dealer with any questions about the suitability or condition of a cab.

Note: *Remove and label cab components as needed before removing the cab from the machine. Label, disconnect and cap hydraulic hoses. Transfer cab parts to the replacement cab after the replacement cab is securely mounted on the machine.*

1. Park the machine on a firm, level surface. Allow sufficient overhead and side clearance for cab removal. Level the machine, fully retract the boom, lower the boom, place transmission in (N) NEUTRAL, engage the park brake and shut the engine OFF.
2. Block all four wheels to help prevent the machine from moving. Assure that there is sufficient overhead and side clearance for cab removal.
3. Open the engine cover. Allow the system fluids to cool.
4. Properly disconnect the battery. Refer to Section 9.11, “Battery”, for procedure.
5. Place a funnel at the base of the radiator to channel the drained coolant into the container. Remove the drain plug and allow the coolant to drain.
6. Transfer the coolant to a container with a cover, and label as “Used Antifreeze”. Dispose of the used coolant at an approved recycling facility.
7. Tighten the radiator drain plug.
8. Label and disconnect the cab heater hoses. Refer to Section 4.3.9, “Heater System (if equipped)” and Section 4.3.10, “Heater and Air Conditioning System (if equipped)”.
9. Remove the protective cover from the front of the cab.



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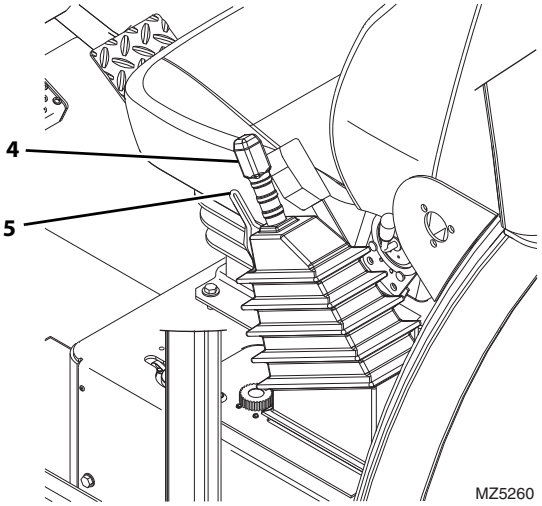
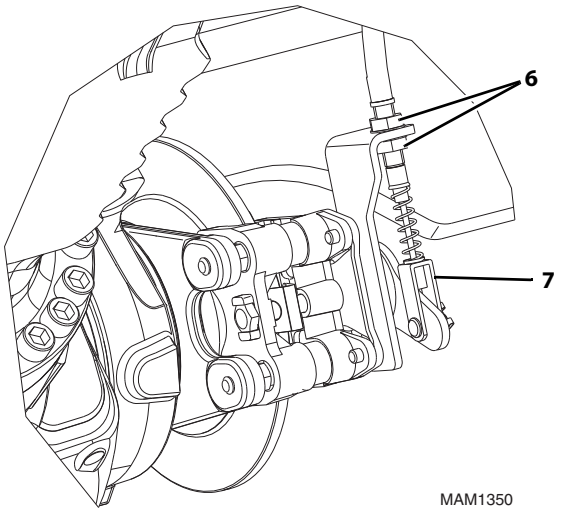
10. Label, disconnect and cap all hydraulic hoses attached to the steering orbital valve (**1**). Cap all fittings and openings to keep dirt and debris from entering the hydraulic system.
11. Label, disconnect and cap all hydraulic hoses attached to the service brake valve (**2**). Cap all fittings and openings to keep dirt and debris from entering the hydraulic system.
12. Disconnect the cab ground strap.
13. Remove the hydraulic oil reservoir. Refer to Section 8.7.3, “Hydraulic Oil Reservoir Removal/Installation”.
14. Remove the fuel tank. Refer to Section 7.6.2, “Fuel Tank”.
15. Label and disconnect the cab harness connectors. Move the harnesses clear of the cab to prevent damage during cab removal.

5.5.3 Mechanical Park Brake Adjustment

1. Chock all wheels to prevent machine from moving.



2. Place the park brake in the disengaged position. Depress the release lever (**5**) and push the park brake lever (**4**) downward.



3. Adjust lock nuts (**6**) to remove any slack in the park brake cable (**7**).
4. Sitting in the operators seat, adjust the park brake cable by turning the adjuster knob (**4**) clockwise to increase park brake force. Turn the adjuster knob counterclockwise to decrease park brake force.

5.6 HYDRAULIC PARK BRAKE

For detailed hydraulic park brake removal, Refer to Section 5.3, "Axle Specifications and Maintenance Information".

5.6.1 Park Brake Test

The following procedure is used in order to determine if the parking brake is functional. This procedure is not intended to measure the maximum brake performance.

Note: *Refer to Section 9.4.1, "Keypad", for additional information.*

Note: *The hand held Analyzer can also be used if desired.*

1. Verify the machine is on a dry, level surface and the test area is clear of personnel and obstacles.
2. Engage the park brake and start the machine.
3. Access Level 3 on the display screen.
4. Select PARK BRAKE TEST from the calibration menu.
5. The operator will be asked: PERFORM PARK BRAKE TEST? To begin the test, press the Enter button.

Note: *Pressing the ESC button will return the operator back to the CALIBRATIONS menu.*

Note: *If there is an active fault pertaining to a drive direction or gear selection inputs, the analyzer will not permit the test to be run and show PARK BRAKE TEST FAILED.*

6. With the park brake test now running, the analyzer will prompt the operator to SET PARK BRAKE.

Note: *If J4-5 is LOW when the operator presses the Enter button, the control system will respond with a PARK BRAKE TEST FAILED message and any concluding button press will return the analyzer back to CALIBRATION: PARK BRAKE TEST menu screen.*

7. If J4-5 is HIGH when the operator presses the Enter button, the analyzer will prompt the operator to Shift To Second Gear.

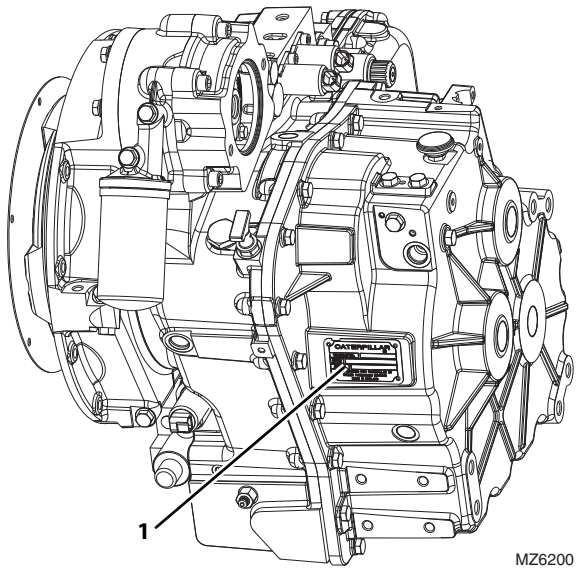
Note: *If J4-11 is LOW or J4-11 is HIGH and one of the other gear select inputs is HIGH when the operator presses the Enter button, the control system will respond with a PARK BRAKE TEST FAILED message and any concluding button press will return the analyzer back to CALIBRATION: PARK BRAKE TEST menu screen.*

WARNING

Do Not service the machine without following all safety precautions as outlined in Section 1, "Safety Practices", of this manual.

Note: *These instructions cover only the routine maintenance, removal, installation and troubleshooting of the transmission. Refer to the local Caterpillar dealer and the applicable Transmission Service Manual for assistance with comprehensive transmission diagnosis, repair and component replacement.*

6.2 TRANSMISSION SERIAL NUMBER



The transmission serial number plate (**1**) is located on the front of the transmission case behind the oil dipstick. Information contained in the serial number is required in correspondence with the transmission manufacturer.

6.3 SPECIFICATIONS AND MAINTENANCE INFORMATION

For transmission, oil specifications and maintenance information, refer to Section 2, "General Information and Specifications".

Detailed transmission parts and service information can be found in SIS Web.

6.4 TRANSMISSION REPLACEMENT

Cleanliness is of extreme importance. Before attempting to remove the transmission, thoroughly clean the exterior of the transmission to help prevent dirt from entering during the replacement process. Avoid spraying water or cleaning solution onto or near the transmission shift solenoids and other electrical components.

6.4.1 Transmission Removal

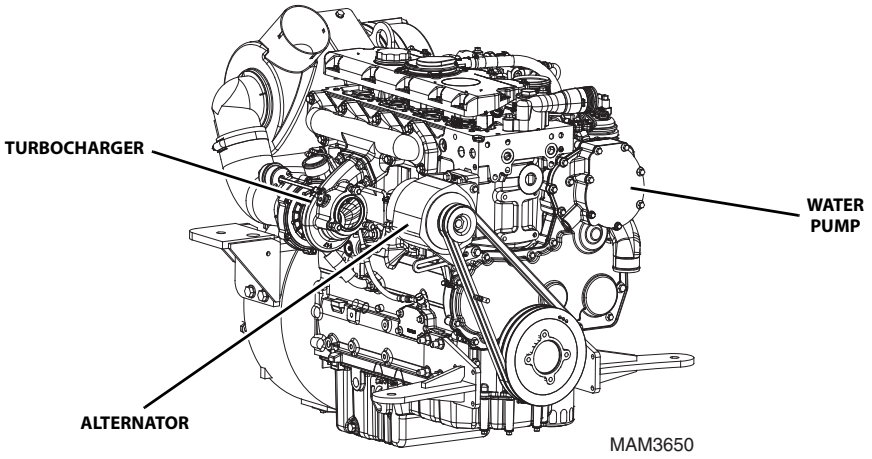
WARNING

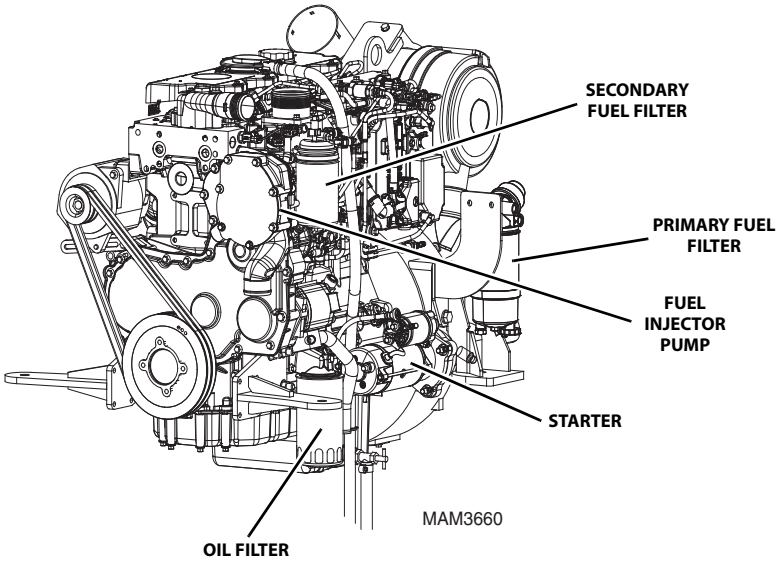
NEVER lift a transmission alone; enlist the help of at least one assistant or use a suitable hoist or overhead crane and sling with a minimum lifting capacity of 454 kg (1000 lb).

1. Park the machine on a firm, level surface, level the machine, fully retract the boom, lower the boom, place the transmission in (N) NEUTRAL, engage the park brake and shut the engine OFF.
2. Place a Do Not Operate Tag on both the ignition key switch and steering wheel.
3. Open the engine cover. Allow the system fluids to cool.
4. Properly disconnect the battery(s). Refer to Section 9.11, "Battery", for procedure.
5. Drain the hydraulic oil reservoir. Refer to Section 8.7.1, "Hydraulic Oil Reservoir Draining".
6. If not previously removed, remove the implement pump. Refer to Section 8.8.1, "Pump Replacement".
7. Refer to Section 7.9, "Engine Replacement", for detailed removal instructions.
8. Thoroughly clean the transmission and surrounding area, including all hoses and fittings, before proceeding.
9. Place a suitable receptacle under the transmission/ transfer case drain plugs. Remove the transmission drain plug, and allow the transmission oil to drain into the receptacle.
10. Remove the transmission transfer case drain plug, and allow the transfer case oil to drain into the receptacle.
11. Transfer the used transmission oil into a suitable, covered container, and label the container as "Used Oil". Dispose of used oil at an approved recycling facility. Clean and reinstall the transmission and transfer case drain plugs.

SN THM00150 to Present
SN SXJ00150 to Present
SN RCH00150 to Present
SN JJT00150 to Present

93,1 kW





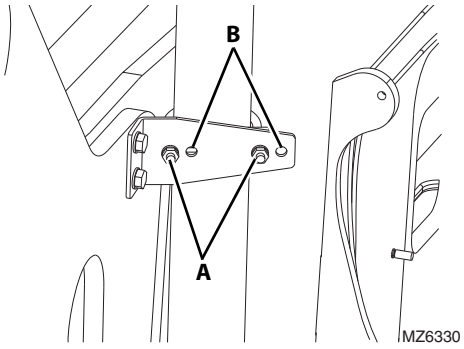
8. Remove and retain all hardware (**6**) securing heatshield (**7**). Remove heatshield.
9. Remove clamps (**8** and **9**) that secure exhaust pipe (**5**).
10. Remove exhaust pipe (**5**).

7.7.2 Exhaust System Installation - 75 kW

SN MJR00150 to Present, SN DJB00150 to Present, SN GAT00150 to Present, SN MLH00150 to Present, SN KEK00150 to Present, SN MWC00150 to Present and SN RRJ00150 to Present

Note: *Keep all clamps loosened until entire exhaust system is in place.*

1. Install exhaust pipe (**5**).
2. Secure with new clamps (**8** and **9**). Do Not tighten.
3. Install exhaust pipe (**3**).
4. Secure with new clamp (**4**). Do Not tighten.
5. Install the tail pipe (**2**).
6. Secure with new clamps (**1**). Do Not tighten.



TH336C, TH337C, TH406C & TH407C -
Use mounting holes "**A**".

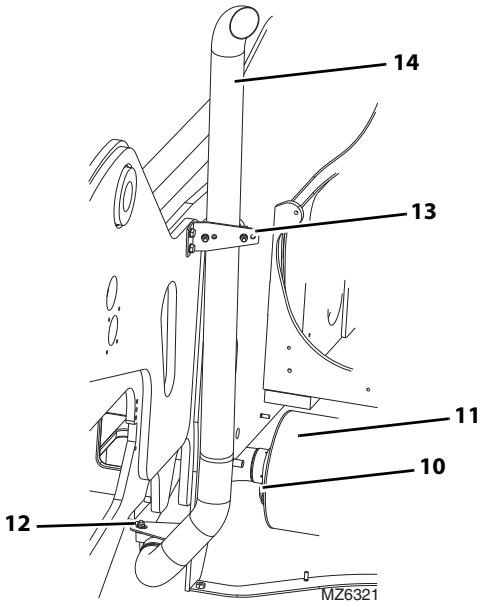
TH414C, TH514C & TH417C -
Use mounting holes "**B**".

7. Adjust exhaust and tail pipes for proper clearance then tighten all clamps. Torque to 12 Nm (9 lb-ft).
8. Re-Install the heatshield (**7**) with hardware (**6**) removed earlier.
9. Properly connect battery. Refer to Section 9.11, "Battery", for procedure.
10. Start engine and check for exhaust leaks at all exhaust connections. Adjust or repair as needed.
11. Install the belly pan.
12. Close and secure the engine cover.
13. Remove the Do Not Operate Tag from the ignition key switch and the steering wheel.

7.7.3 Exhaust System Removal - 74.5 kW

SN THM00150 to Present, SN SXJ00150 to Present, SN RCH00150 to Present, SN JJT00150 to Present, SN RWW00150 to Present, SN KKW00150 to Present, SN RRW00150 to Present

1. Park machine on a firm, level surface, level machine, fully retract boom, lower boom, place transmission in (N) NEUTRAL, engage parking brake, and shut engine OFF.
2. Place a Do Not Operate Tag on both ignition key switch and steering wheel.
3. Open engine cover. Allow the system fluids to cool.
4. Properly disconnect battery.Refer to Section 9.11, "Battery", for procedure.
5. Remove belly pan.



6. Loosen and remove tail pipe clamp (**10**) at muffler (**11**).
7. Loosen and remove two clamps (**12** and **13**) securing tail pipe (**14**) to muffler (**11**).
8. Remove tail pipe (**14**) from muffler (**11**).

7.9.3 Engine Disassembly, Inspection and Service

Engine disassembly, internal inspection, service, repair and assembly procedures are covered in the CAT service manual. Several special engine service tools are required to properly service the CAT engine. Contact the local Caterpillar dealer for further information.

Note: *If engine is being replaced, there may be external components that will be required to be transferred from original engine to replacement engine depending upon who you purchase new engine from and configuration of your replacement engine. Refer to appropriate CAT user manual for detailed procedures that cover transfer of original engine components to replacement engine.*

7.9.4 Engine/Transmission Installation

1. Attach a lifting chain to front and rear engine lift brackets, and lift engine/transmission clear of ground.

Note: *Apply Loctite® 243™ to engine mount bracket bolts before installation.*

2. Lift engine/transmission and slowly push and lower into engine compartment. Have an assistant ensure that engine/transmission clears frame, hose and harness components during engine/transmission installation. Position engine/transmission brackets over frame mounts.
3. Align motor mount holes and install front mounting bolts and washers.
4. Align motor mount holes and install rear mounting bolts and washers.
5. Lower the engine onto the mounts and remove the lifting chains.
6. Install flat washer, lock washer and nut on front two mounting bolts.
7. Torque engine/transmission mounting bolts to mounts to 241 Nm (178 lb-ft).
8. Install air cleaner. Refer to Section 7.8, “Air Cleaner Assembly”.
9. Install exhaust pipe. Refer to Section 7.7, “Engine Exhaust System”.
10. Install radiator assembly. Refer to Section 7.4.3, “Radiator Assembly Removal - 75 kW”.
11. Install the drive shaft assemblies. Refer to Section 5.10.5, “Drive Shaft Installation”.
12. Connect and secure all the previously labeled hydraulic hoses, fuel lines and electrical wire connections on the engine and transmission.
13. Install heater and cooling hoses to the engine and tighten clamps (if equipped).
14. Install hood (**1**), end covers (**2**) and belly pans (**3**) from engine compartment. and adjust if necessary.
15. Install and properly connect battery(s). Refer to Section 9.11, “Battery”, for procedure.
16. Check that all hydraulic system, electrical system, cooling system, fuel system and exhaust system connections are correct and connected tightly.

Note: *Have an assistant stand by with a Class B fire extinguisher.*

17. Check for proper fluid levels prior to startup. Refer to Section 2.3, “Fluids and Lubricant Capacities”.
18. Start engine and run to normal operating temperature then shut off engine. While engine is cooling, check for leaks.
19. Allow engine to cool. Check radiator coolant level, and top off with coolant.
20. Check for leaks from engine, main hydraulic pump and lines, transmission, hydraulic reservoir and fuel tank. Check levels of all fluids and lubricants. Fill as required.

Note: *During full throttle check:*

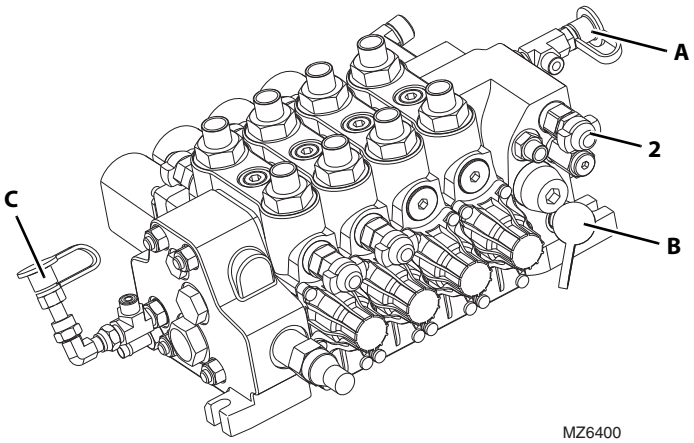
- Do Not operate any hydraulic function.
- Do Not steer or apply any pressure to the steering wheel.
- Keep transmission in (N) NEUTRAL.

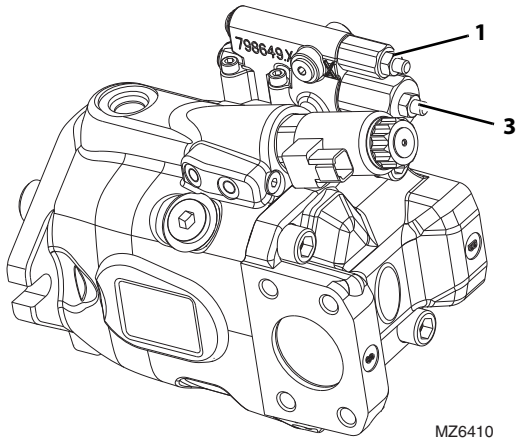
21. Check engine rpm at full throttle.
22. Purge hydraulic system of air by operating all boom functions through their entire range of motion several times.
23. Check hydraulic oil level. If oil is warm, oil level should be visible in upper gauge window.
24. Check for proper operation of all components.
25. Turn engine OFF
26. Install the oil pan cover underneath the engine compartment.
27. Close and secure engine cover.
28. Remove Do Not Operate Tag from ignition key switch and steering wheel.

7.10 ENGINE TROUBLESHOOTING

Refer to Section 7.3, “Specifications and Maintenance Information”, for detailed engine service information.

c. Pressure Specifications





Note: *All pressure check are to be performed at High Idle unless noted.*

	Hydraulic Circuit	Test Port	Procedure	Adjustment Location	Pressure Range
1	Steer Pressure	LS1 (**A**)	Connect gauge to LS1 port, select 2 wheel steer, run engine at high idle, turn steering wheel one direction to lock. Hold and check pressure. Note: Do not operate any other function while checking pressure.	N/A	168 - 178 Bar 2467 - 2582 psi
2	Pump Margin	LS1 (**A**) & P (**B**)	Connect one gauge to LS1 port, and connect one gauge to P port, select 2 wheel steer, run engine at high idle, turn steering wheel one direction to lock. Hold and check pressure. The margin pressure is the difference between the pressures measured at the LS1 Port and the P Port.	1	18,5 - 23,5 Bar 269 - 340.8 PSI
3	Load Sense	LS1 (**A**)	Connect gauge to LS1 port, level boom and bottom boom retract.	2	225 - 235 Bar 3263 - 3408 PSI
4	Maximum Pump Pressure	P (**B**)	Connect gauge to P port, level boom and bottom boom retract.	3	245 - 255 Bar 3553 - 3698 PSI
5	Stand-By Pressure	P (**B**)	Connect gauge to P port, check pressure at Low idle with no function.	N/A	15 - 35 Bar 218 - 508 PSI
6	Pilot Pressure	PR (**C**)	Connect gauge to PR port, check pressure with no function.	N/A	25 - 30 Bar (362 - 435 PSI)
7	Auxiliary Pressure	Auxiliary Port	Connect gauge to Auxiliary Coupling, check pressure at coupling.	N/A	245-255 Bar 3553 - 3698 PSI

8.8 ENGINE IMPLEMENT PUMP

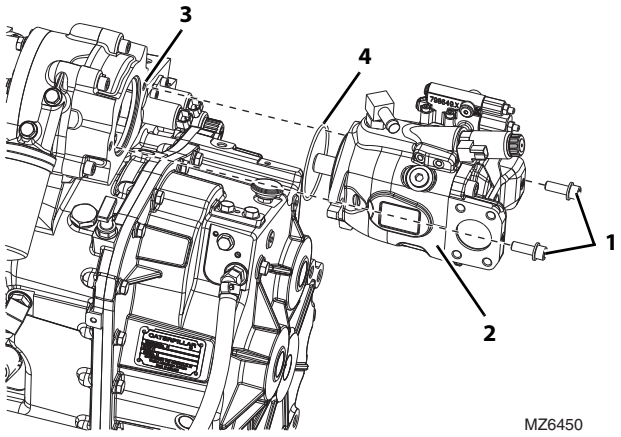
8.8.1 Pump Replacement

a. Pump Removal

1. Park the machine on a firm, level surface, level the machine, fully retract the boom, lower the boom, place the transmission in (N) NEUTRAL, engage the park brake and shut the engine OFF.
2. Place a Do Not Operate Tag on both the ignition key switch and the steering wheel.
3. Open the engine cover. Allow the system fluids to cool.
4. Properly disconnect the battery. Refer to Section 9.11, "Battery", for procedure.
5. Drain the hydraulic reservoir. Refer to Section 8.7.1, "Hydraulic Oil Reservoir Draining".
6. Remove the engine compartment belly pan.
7. Thoroughly clean the pump and surrounding area, including all hoses and fittings before proceeding.

Note: *Cap all hoses as you remove them to prevent unnecessary fluid spillage.*

8. Label, disconnect and cap the hydraulic hoses attached to the pump.

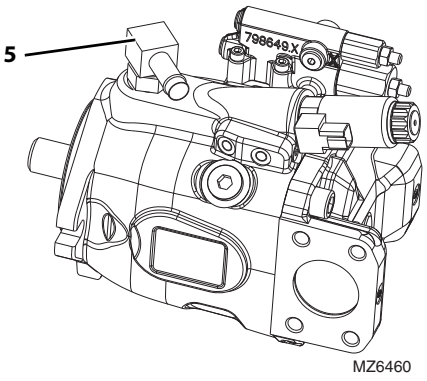


9. Remove the two bolts and two lockwashers (**1**) securing the pump (**2**) to the adapter plate (**3**). Remove the o-ring (**4**) located between the plate and the pump. Wipe up any hydraulic oil spillage.
10. If necessary, remove the four bolts securing the adapter plate to the transmission. Remove the adapter plate.
11. If a new pump will be installed, remove all hose fittings from the pump.

Note: *Do Not disassemble the operating pump. The pump is pre-set from the manufacturer.*

b. Pump Installation

1. Apply Loctite® 243™ to all mounting bolts.
2. If the adapter plate was removed, place into position with a new, oiled o-ring on the engine. Secure with the previously used hardware.
3. Place the pump and a new, oiled o-ring into position on the adapter plate. Align the pump shaft with the internal gear, so that the machined teeth mesh together.
4. Align the bolt holes with the pump mount holes. Secure the pump to the adapter plate with the two bolts and washers. Torque as required.
5. Uncap and connect the previously labeled hydraulic hoses to their appropriate locations.
6. Fill the hydraulic reservoir. Refer to Section 8.7.2, "Hydraulic Oil Reservoir Filling".



7. Prime the pump by filling the case with fresh, filtered hydraulic oil from a clean container through the 45° elbow fitting (**5**) port.
8. Remove the fitting noting the orientation. Fill the pump, install and tighten the 45° elbow fitting.
9. Check all routing of hoses and tubing for sharp bends or interference with any rotating members.
10. Inspect for leaks and check all fluid levels. The hydraulic reservoir oil level must be to the middle of the sight gauge.
11. Install the belly pan.
12. Properly connect the battery. Refer to Section 9.11, "Battery", for procedure.
13. Close and secure the engine cover.
14. Start machine and verify proper operation.
15. Remove the Do Not Operate Tag from the ignition key switch and the steering wheel.

c. Implement Pump Test

Refer to Section 8.4.1, "Pressure Checks and Adjustments".

a. General Cylinder Disassembly

1. Clean the cylinder with a suitable cleaner before disassembly. Remove all dirt, debris and grease from the cylinder.
2. Clamp the barrel end of the cylinder in a soft-jawed vise or other acceptable holding equipment if possible.

⚠ WARNING

Significant pressure may be trapped inside the cylinder. Exercise caution when removing a counterbalance valve or a pilot-operated check valve from a cylinder.

Note: *Avoid using excessive force when clamping the cylinder in a vise. Apply only enough force to hold the cylinder securely. Excessive force can damage the cylinder tube.*

3. If applicable, remove the counterbalance valve from the side of the cylinder barrel.

Note: *Do Not tamper with or attempt to adjust the counterbalance valve cartridge. If adjustment or replacement is necessary, replace the counterbalance valve with a new part.*

4. Extend the rod as required to allow access to the base of the cylinder.

Note: *Protect the finish of the rod at all times. Damage to the surface of the rod can cause seal failure.*

5. Using a pin spanner wrench, unscrew the head gland from the tube. A considerable amount of force will be needed to remove the head gland. Carefully slide the head gland down along the rod toward the rod eye, away from the cylinder barrel.

Note: *When sliding the rod and piston assembly out of the barrel, prevent the threaded end of the barrel from damaging the piston. Keep the rod centered within the barrel to help prevent binding.*

6. Carefully pull the rod assembly along with the head gland out of the cylinder barrel.
7. Fasten the rod eye in a soft-jawed vise, and place a padded support under and near the threaded end of the rod to prevent any damage to the rod.
8. Remove the set screw from the piston head.

Note: *It may be necessary to apply heat to break the bond of the sealant between the piston and the rod before the piston can be removed.*

Some cylinder parts are sealed with a special organic sealant and locking compound. Before attempting to disassemble these parts, remove any accessible seals from the area of the bonded parts. Wipe off any hydraulic oil, then heat the part(s) uniformly to break the bond. A temperature of 149 - 204° C (300 - 400° F) will destroy the bond. Avoid overheating, or the parts may become distorted or damaged. Apply sufficient torque for removal while the parts are still hot. The sealant often leaves a white, powdery residue on threads and other parts, which must be removed by brushing with a soft brass wire brush prior to reassembly.

9. Remove the piston head from the rod and carefully slide the head gland off the end of the rod.
10. Remove all seals, back-up rings and o-rings from the piston head and all seals, back-up rings and o-rings from the head gland.

Note: *The head gland bearing will need to be inspected to determine if replacement is necessary.*

Do Not attempt to salvage cylinder seals, sealing rings or o-rings. ALWAYS use a new, complete seal kit when rebuilding hydraulic components. Consult the parts catalog for ordering information.

b. Cylinder Cleaning Instructions

1. Discard all seals, back-up rings and o-rings. Replace with new items from seal kit to ensure proper cylinder function.
2. Clean all metal parts with an approved cleaning solvent such as trichlorethylene. Carefully clean cavities, grooves, threads, etc.

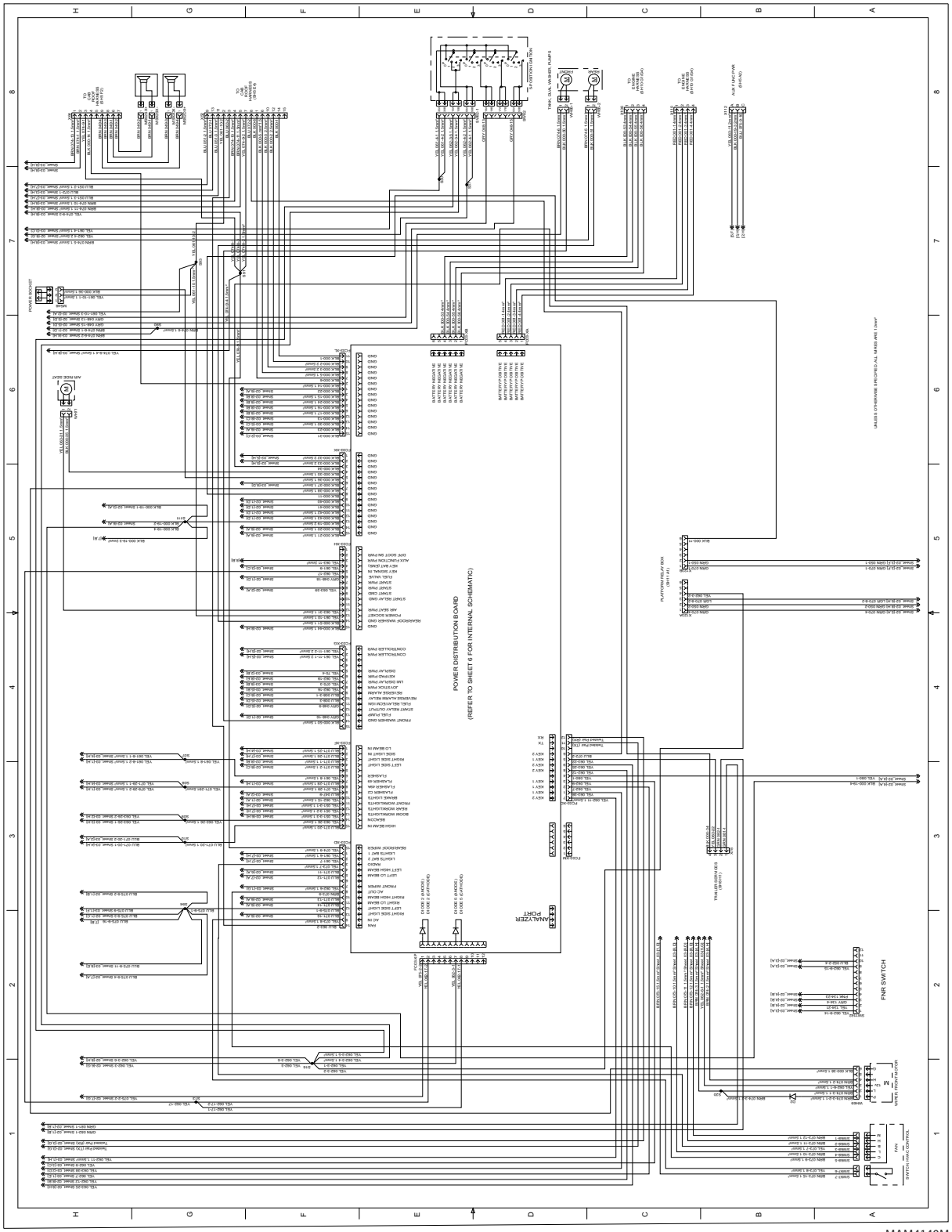
Note: *If a white powdery residue is present on threads or parts, it can be removed by using a soft brass wire brush. Wipe clean with Loctite® Cleaner prior to reassembly.*

Menu	Setting/Submenu	Visible	Comment
ECM Service Tool Access?	ECM Tool Access? Yes: Enter, No: ESC	Access Level 1	When YES, the UGM shall not transmit CANbus messages. This will allow maximum bandwidth for Caterpillar and Deutz service tools during re-programming. Power cycle is required to resume normal operation.

9.5.2 Personalities

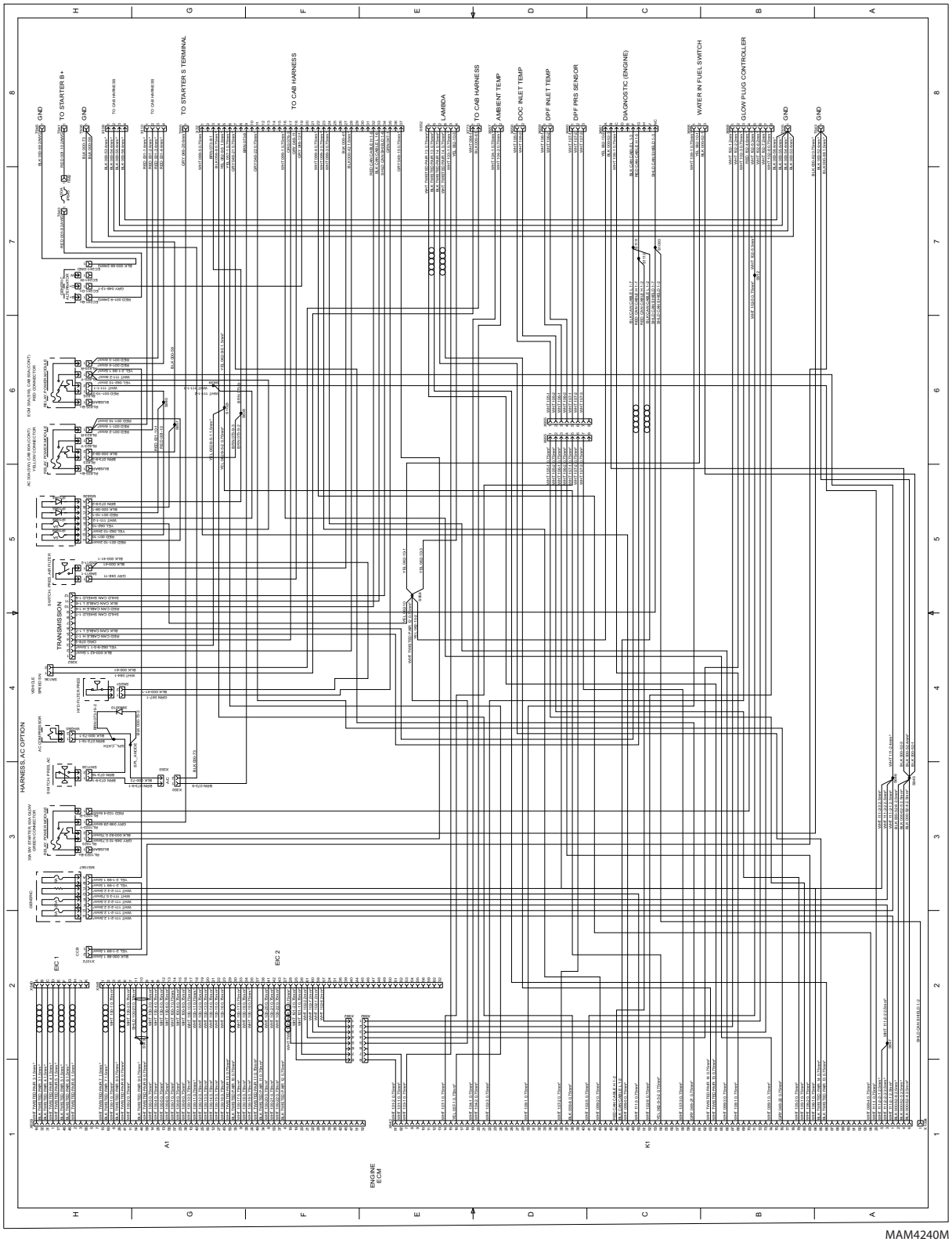
Function	Description	Default Value
Main Lift	Allows the owner to adjust the Max Lift Up and Max Lift Down function speeds	1400 mA (up) 1600 mA (down)
Soft Lift	Allows the owner to adjust the derate value when the boom enters the soft lift zone	40% (TH336C & TH406C) 45% (TH337C & TH407C) 35% (TH414C)
Telescope	Allows the owner to adjust the Max Retract and Max Extend function speeds	1300 mA
Fork Tilt	Allows the owner to adjust the Max Fork Tilt Up and Max Fork Tilt Down function speeds	1150 mA
Platform Level	Allows the owner to adjust the Max Platform Level Up and Max Platform Level Down function speeds	800 mA
Platform Rotate	Allows the owner to adjust the Max Platform Left and Max Platform Right function speeds	1000 mA
Platform Lift	Allows the owner to adjust the Max Platform Lift Up and Max Platform Lift Down function speeds	1020 mA (up) 960 mA (down)
Platform Telescope	Allows the owner to adjust the Max Platform Retract and Max Platform Extend function speeds	1000 mA (in) 1080 mA (out)
Outriggers	Allows the owner to adjust the Max Outrigger Up and Max Outrigger Down function speeds	1000 mA
Frame Level	Allows the owner to adjust the Max Frame Level Left and Max Frame Level Right function speeds	1000 mA
Bucket Lift	Allows the owner to adjust the Max Bucket Up and Max Bucket Down function speeds	1400 mA (up) 1600 mA (down)
Bucket Telescope	Allows the owner to adjust the Max Bucket Retract and Max Bucket Extend function speeds	1300 mA
Bucket Tilt	Allows the owner to adjust the Max Bucket Tilt Up and Max Bucket Tilt Down function speeds	1400 mA (up) 1600 mA (down)
Auxiliary Function	Allows the owner to adjust the Accel, Decel, and Max Function Coil A and Max Function Coil B function speeds	1500 mA

9.8.3 Cab Harness Electrical Schematic 3 of 3



MAM4140M

9.8.13 CAT C3.4 Engine



MAM4240M

9.12.2 Electrical Master Switch Installation

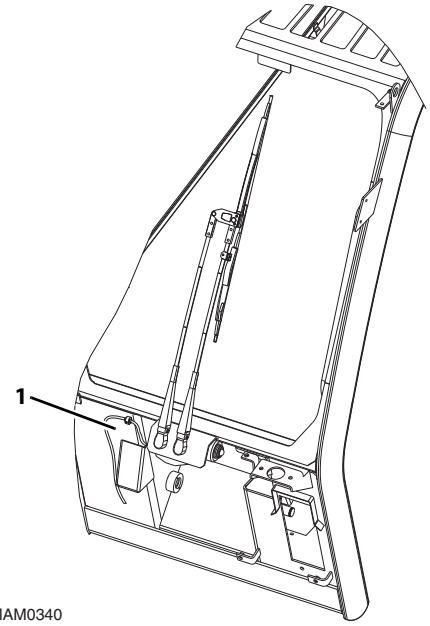
1. Install the master electrical switch (**3**) to the mounting bracket and align the switch locator pin (**5**) in the mounting bracket.
2. Install previously removed master electrical switch mounting nut (**4**) and torque to 14 - 20 lb-ft (19 - 27 Nm).
3. Connect previously labeled electrical cables (**2**). Secure cables if required.
4. Properly connect the battery. Refer Section 9.11, "Battery", for procedure.
5. Close and secure engine cover.
6. Remove Do Not Operate Tag from ignition key switch and steering wheel.
7. Verify proper operation of the electrical master switch.

9.13 WINDOW WIPER SYSTEM (IF EQUIPPED)

9.13.1 Front Windshield Wiper Motor

a. Removal

1. Park the machine on a firm, level surface, level the machine, fully retract the boom, lower the boom, place transmission in (N) NEUTRAL, engage the park brake and shut the engine OFF.
2. Place a Do Not Operate Tag on both the ignition key switch and the steering wheel, stating that the machine should not be operated.
3. Open the engine cover. Allow the system fluids to cool.
4. Properly disconnect the battery. Refer to Section 9.11, "Battery", for procedure.
5. Remove the cab cover.
6. Disconnect the cab harness connectors from the wiper motor.



7. Disconnect the reservoir hose attached to the wiper motor (**1**).
8. Remove the linkage attached to the wiper motor.
9. Loosen and remove the bolts holding the wiper motor to the mounting bracket.

Note: *Retain all hardware removed from the wiper assembly for possible reuse on the replacement motor housing.*

10. Remove the motor from the front of the cab.

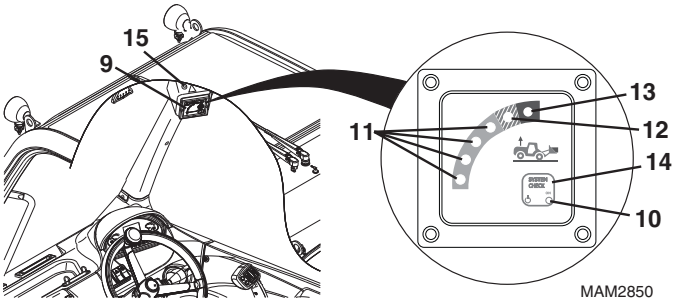
9.18 LOAD STABILITY INDICATOR (LSI) (CE & AUS)

9.18.1 Load Stability Indicator

WARNING

TIP OVER HAZARD. The LSI considers only longitudinal stability limitations, observe all operating parameters. Failure to follow operating parameters of the telehandler could damage the equipment and/or cause tip over.

Note: *The Load Stability Indicator is NOT a serviceable item. The LSI must be inspected and/or replaced by the local Caterpillar dealer.*



The LSI (**9**) provides visual and audible indication of forward stability limitations when machine is static on firm, level surface.

- Green LED (**10**) will illuminate when LSI power is on.
- When approaching forward stability limitations LEDs progressively illuminate, green (**11**), then orange (**12**) and finally red (**13**).
- If the red LED iluminates, the warning buzzer also sounds.

The LSI has two modes:

Active Mode (TH336C, TH337C, TH406C, TH407C, TH414C, TH514C & TH417C)

- As the telehandler reaches forward stability limitations and the red LED (**13**) illuminates, the automatic function cut-out is activated. All boom, frame level and outrigger functions are disabled except boom retract (CE & AUS) and boom lift (CE). Retract boom to fully re-enable functions.
- In some instances the LSI system may slow down or stop boom functions if operated close to forward stability limitations. When LEDs begin to flash, certain functions can not be operated. Retract boom and/or return the joystick to neutral position for a short period to allow system to reset and LEDs to stop flashing before proceeding with operation.

Passive Mode (TH336C, TH337C, TH406C & TH407C)

- The orange LED (**15**) illuminates when either of the following occurs:
  - The boom is fully retracted.
  - The park brake is not applied and transmission is in the forward or reverse position.
- When approaching forward stability limitations, visual and audible indication is provided and the automatic function cut-out and/or slow down feature is disabled.
- Travel in accordance with the requirements set forth in Section 1 - General Safety Practices.
- When placing a load, ensure axles are not fully steered in either direction.

WARNING

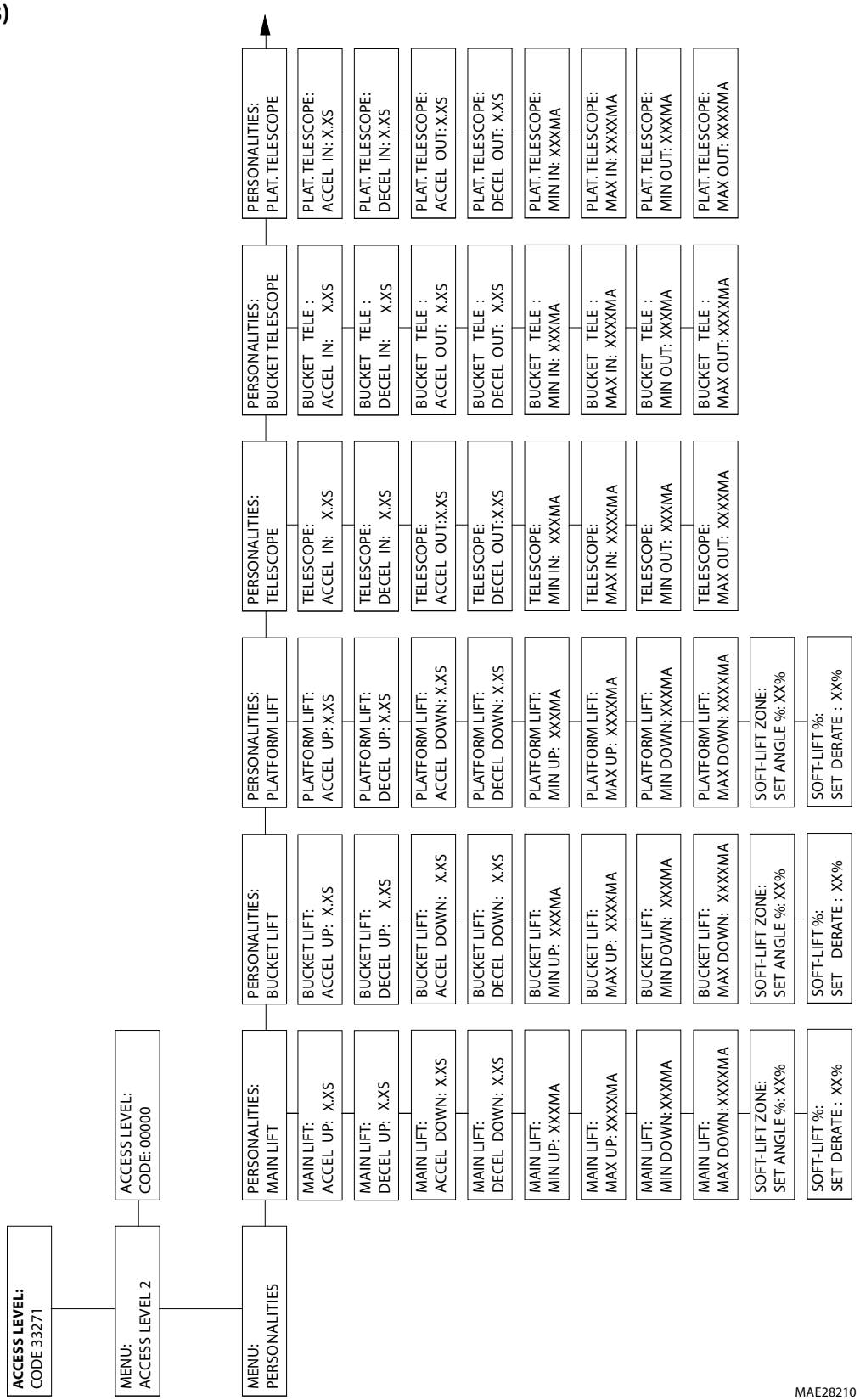
TIP OVER HAZARD. If the green, orange and red LEDs flash and warning buzzer sounds, retract and lower boom immediately. Determine cause and correct before continued use.

- Test the LSI (**14**) at the beginning of each work shift.

1. Fully retract and level the boom, with no load. Do not raise the boom during this test.
2. Level frame using level in cab.
3. Press the system check button on the LSI display. This will cause all LEDs to flash on and an audible warning to sound. This indicates that the system is functioning properly. If the test gives a different result, the system is not functioning properly and the machine must be removed from service and repaired before continued operation.

9.21.2 Analyzer Software Version P4.5

(Sheet 1 of 8)



Message	Fault Code	Indicators	Other Actions Taken	Trigger for Fault	Latch Until
PLATFORM LEVEL UP PREVENTED – INPUT HIGH AT POWER UP	2114	5000mS	Platform Level Up & Down are prevented	Machine Setup's PLATFORM OPTION is ENABLED; Platform Mode; PLT J1-9 Platform Level Up Switch is closed at power-up	Power cycled
PLATFORM LEVEL DOWN PREVENTED – INPUT HIGH AT POWER UP	2115	5000mS	Platform Level Up & Down are prevented	Machine Setup's PLATFORM OPTION is ENABLED; Platform Mode; PLT J1-10 Platform Level Down Switch is closed at power-up in platform mode	Power cycled
APU SWITCH INPUT INVALID – INPUT HIGH AT POWER UP	2116	5000mS	APU functionality is prevented Lift Up is prevented above +10° Telescope Out is prevented once the boom is fully retracted	Machine Setup's PLATFORM OPTION is ENABLED; Platform Attached; PLT J4-16 APU Enable Switch is closed at power-up	The switch is open momentarily (1,000mS)
PLATFORM JOYSTICK NOT IN NEUTRAL POSITION AT POWER UP	2117	5000mS	Main Lift and Telescope functions are prevented	Machine Setup's PLATFORM OPTION is ENABLED; Platform Mode; platform joystick is not in neutral position at power-up	The platform joystick returns to the neutral position
ENGINE PRE-HEAT PREVENTED – INPUT HIGH AT POWER UP	2118	5000mS	Engine pre-heat is prevented	Cabin Mode is active; UGM J4-20 Engine Pre-Heat is energized at power-up Machine Setup's PLATFORM OPTION is ENABLED; Platform Mode is active; PLG J1-23 Engine Pre-Heat is energized at power-up	The switch is open momentarily (1,000mS)
FRAME LEVEL RIGHT INPUT – INVALID SIGNAL	2119	5000mS	Frame Level Left & Right are prevented	Machine Setup's MODEL is TH414C, TH417C, or TH514C and the UGM J4-17 Frame Leveling Right Switch is closed at power-up	Power cycled
FRAME LEVEL LEFT INPUT – INVALID SIGNAL	2120	5000mS	Frame Level Left & Right are prevented	Machine Setup's MODEL is TH414C, TH417C, or TH514C and the UGM J4-9 Frame Leveling Left Switch is closed at power-up	Power cycled
HYDRAULIC QUICK CONNECT INPUT – INVALID SIGNAL	2121	5000mS	Hydraulic Quick Connect is prevented	Machine Setup's HYDRAULIC QUICK CONNECT is YES; UGM J7-35 Hydraulic Quick Connect On is high at power-up Machine Setup's HYDRAULIC QUICK CONNECT is YES; UGM J3-10 Hydraulic Quick Connect Off is low at power-up Machine Setup's HYDRAULIC QUICK CONNECT is YES; UGM J7-35 Hydraulic Quick Connect On and UGM J3-10 Hydraulic Quick Connect Off are the same state for 500mS	Power cycled
CONTINUOUS AUXILIARY HYDRAULICS SWITCH HIGH AT POWER UP	2122	5000mS	Continuous Auxiliary Hydraulics are prevented	The cabin joystick's S switch is closed at power-up	The switch is open momentarily (1,000mS)

Message	Fault Code	Indicators	Other Actions Taken	Trigger for Fault	Latch Until
TELESCOPE POSITION SWITCHES – CONFLICTING STATES	2558	5000mS	Platform Mode is prevented	Machine Setup's PLATFORM OPTION is ENABLED; platform attached; MODEL is TH417C; Boom Extension Limit Switch 1 (UGM J7-8) and Switch 2 (AM J1-4) indicate Critical (de-energized); Boom Retracted Switch (UGM J3-8) indicates Retracted (energized)	Power cycle
BOOM RETRACTED SENSOR FAULTY – SENSING INVALID	2560	Continuously	Boom extended (ignore J3-8 Boom Retracted Switch)	Machine Setup's BOOM RETRACT is YES and the J3-8 Boom Retracted Switch becomes unhealthy	Power cycled or boom retracted switch becomes healthy
FUNCTIONS LOCKED OUT – TCM CONSTANT DATA VERSION IMPROPER	2562	Continuously	Boom functions, Auxiliary A/B, Stabilizer, and Frame Leveling are prevented Engine Start is prevented	TCM Constant Data version does not agree with Application	Re-program TCM; Power cycled
TEMPERATURE CUTOUT ACTIVE - AMBIENT TEMPERATURE TOO LOW	2568	Continuously	Platform Lift, Telescope, Level, and Rotate prevented until Function Enable Switch is open Platform Lift, Telescope, Level, and Rotate function speeds de-rated to 60% (Constant Data) Refer to Low Temperature Cutout functionality	Machine Setup's TEMP CUTOUT is YES; Platform Mode; Low Temperature Cutout active; DTC 6649 is not active	Low Temperature Cutout inactive and Trigger Switch is open

g. Output Drivers

Message	Fault Code	Indicators	Other Actions Taken	Trigger for Fault	Latch Until
MAIN LIFT UP VALVE – OPEN CIRCUIT	33181	5000mS	Lift Up is prevented	Open-circuit is detected on UGM J2-11	Power cycled
MAIN LIFT VALVES – SHORT TO BATTERY	33182	Continuously	Lift Up is prevented Lift Down is prevented UGM J3-2 Lift Return is disabled	Short to battery is detected on UGM J2-11 or UGM J2-22	Power cycled
MAIN LIFT UP VALVE – SHORT TO GROUND	33183	Continuously	Lift Up is prevented Lift Down is prevented UGM J3-2 Lift Return is disabled	Short to ground is detected on UGM J2-11	Power cycled
MAIN LIFT DOWN VALVE – OPEN CIRCUIT	33184	5000mS	Lift Down is prevented	Open-circuit is detected on UGM J2-22	Power cycled
MAIN LIFT DOWN VALVE – SHORT TO GROUND	33185	Continuously	Lift Up is prevented Lift Down is prevented UGM J3-2 Lift Return is disabled	Short to ground is detected on UGM J2-22	Power cycled

j. Transmission and Drive System

Message	Fault Code	Indicators	Other Actions Taken	Trigger for Fault	Latch Until
HIGH TRANSMISSION OIL TEMPERATURE CRITICAL	461	Continuously	–	Transmission oil temperature is critical	Transmission oil temperature is normal
CONFLICTING DRIVE DIRECTION SIGNALS	462	5000mS	Column selector position is regarded as neutral Cabin joystick's FNR must be used for direction selection	Machine Setup's COLUMN SELECTOR is YES; more than one of the column selector digital inputs (UGM J4-4, J4-21, J4-23) is energized for at least 3,000mS	Power cycled
DRIVE DIRECTION SIGNAL LOST	463	5000mS	Column selector position is regarded as neutral Cabin joystick's FNR must be used for direction selection	Machine Setup's COLUMN SELECTOR is YES; all column selector digital inputs (UGM J4-4, J4-21, J4-23) are de-energized for at least 3,000mS	Power cycled
VEHICLE SPEED SENSOR – NOT RESPONDING	468	5000mS	Display "99" as Vehicle Speed on cabin display Restrict direction and gear selection to present state or associated neutral state when this occurs during operation Retain this fault through power cycles Restrict direction and gear selection to F3, N3, R2 (Platform Gear Restriction is not active) if this fault is active from the previous power cycle and Machine Setup's TRANSMISSION is TURNER 6F/3R. Restrict direction and gear selection to F2, N2, R2 (Platform Gear Restriction is not active) if this fault is active from the previous power cycle and Machine Setup's TRANSMISSION is TURNER 4F/3R.	Direction Selection is Forward or Reverse; Park Brake is not engaged; Service Brake is not applied; Engine RPM >1000 RPM; No vehicle speed counts > 40,000mS	Vehicle speed counts detected for 5,000mS
VEHICLE OVERSPEED	469	Continuously	Flash Vehicle Speed on cabin display	Vehicle speed is greater than 43KPH	Vehicle speed below threshold for 1000mS
PUMP DISPLACEMENT VALVE – SHORT TO BATTERY OR OPEN CIRCUIT	4618	5000mS	–	Anti-Stall functionality is enabled; short to battery or open-circuit is detected on TCM J5-1 for 1,000mS	Power cycled
PUMP DISPLACEMENT VALVE – SHORT TO GROUND	4619	5000mS	–	Anti-Stall functionality is enabled; short to ground is detected on TCM J5-1 at power-up *(momentarily energize digital output if engine speed is zero)*	Power cycled

9.24 ENGINE FAULT CODES

9.24.1 92.5 kW & 106 kW

SN MJR00150 to Present, DJB00150 to Present, GAT00150 to Present & SN MLH00150 to Present

Message	Fault Code	Indicators
No Diagnostic Code Detected	N/A	
Cylinder #1 Injector data incorrect	651	2
Cylinder #1 Injector current below normal	651-5	5
Cylinder #1 Injector current above normal	651-6	6
Cylinder #2 Injector data incorrect	652-2	2
Cylinder #2 Injector current below normal	652-5	5
Cylinder #2 Injector current above normal	652-6	6
Cylinder #3 Injector data incorrect	653-2	2
Cylinder #3 Injector current below normal	653-5	5
Cylinder #3 Injector current above normal	653-6	6
Cylinder #4 Injector data incorrect	654-2	2
Cylinder #4 Injector current below normal	654-5	5
Cylinder #4 Injector current above normal	654-6	6
Cylinder #5 Injector data incorrect	655-2	2
Cylinder #5 Injector current below normal	655-5	5
Cylinder #5 Injector current above normal	655-6	6
Cylinder #6 Injector data incorrect	656-2	2
Cylinder #6 Injector current below normal	656-5	5
Cylinder #6 Injector current above normal	656-6	6
Fuel Control Valve current below normal	1076-5	5
Fuel Control Valve current above normal	1076-6	6
8 Volt DC Supply voltage above normal	678-3	3
8 Volt DC Supply voltage below normal	678-4	4
Throttle Position Sensor erratic, intermittent, or incorrect	91-2	

Fault Code Description	DTC/Code (SPN)	SYMPTOM (FMI)
Number of ECU Resets Erratic / Intermittent	152	2
Accelerator Pedal 1 Low Idle Switch Erratic / Intermittent	558	2
Accelerator Pedal 2 Low Idle Switch Erratic / Intermittent	2970	2
Start Signal Indicator Erratic / Intermittent	1041	2
Engine Air Intake Temperature Voltage Above Normal	172	3
Engine Air Intake Temperature Voltage Below Normal	172	4
High ECU Temperature (1)	1136	15
Low ECU Temperature (1)	1136	17
ECU Temperature Erratic / Intermittent	1136	2
Engine Throttle Actuator Control Command Not Responding Properly	3464	7
Engine Throttle Actuator Control Command Not Responding Properly	3464	7
Engine Throttle Actuator Current Below Normal	5419	5
Engine Throttle Actuator Current Above Normal	5419	6
Engine Throttle Actuator Current Above Normal	5419	6
Engine Throttle Actuator Current Below Normal	5419	5
Engine Throttle Actuator Current Below Normal	5419	5
Engine Throttle Actuator Current Above Normal	5419	6
Engine Throttle Actuator Current Above Normal	5419	6
Engine Throttle Actuator Current Above Normal	5419	6
Engine Throttle Actuator Current Above Normal	5419	6
Engine Throttle Actuator Current Below Normal	5419	5
Engine Throttle Actuator #1 Current High	5419	6
Engine Throttle Actuator #1 Not Responding Properly	5419	7
Engine Throttle Actuator #1 Not Responding Properly	5419	7
Engine Throttle Valve #1 Position Voltage above normal	51	3

SECTION CONTENTS

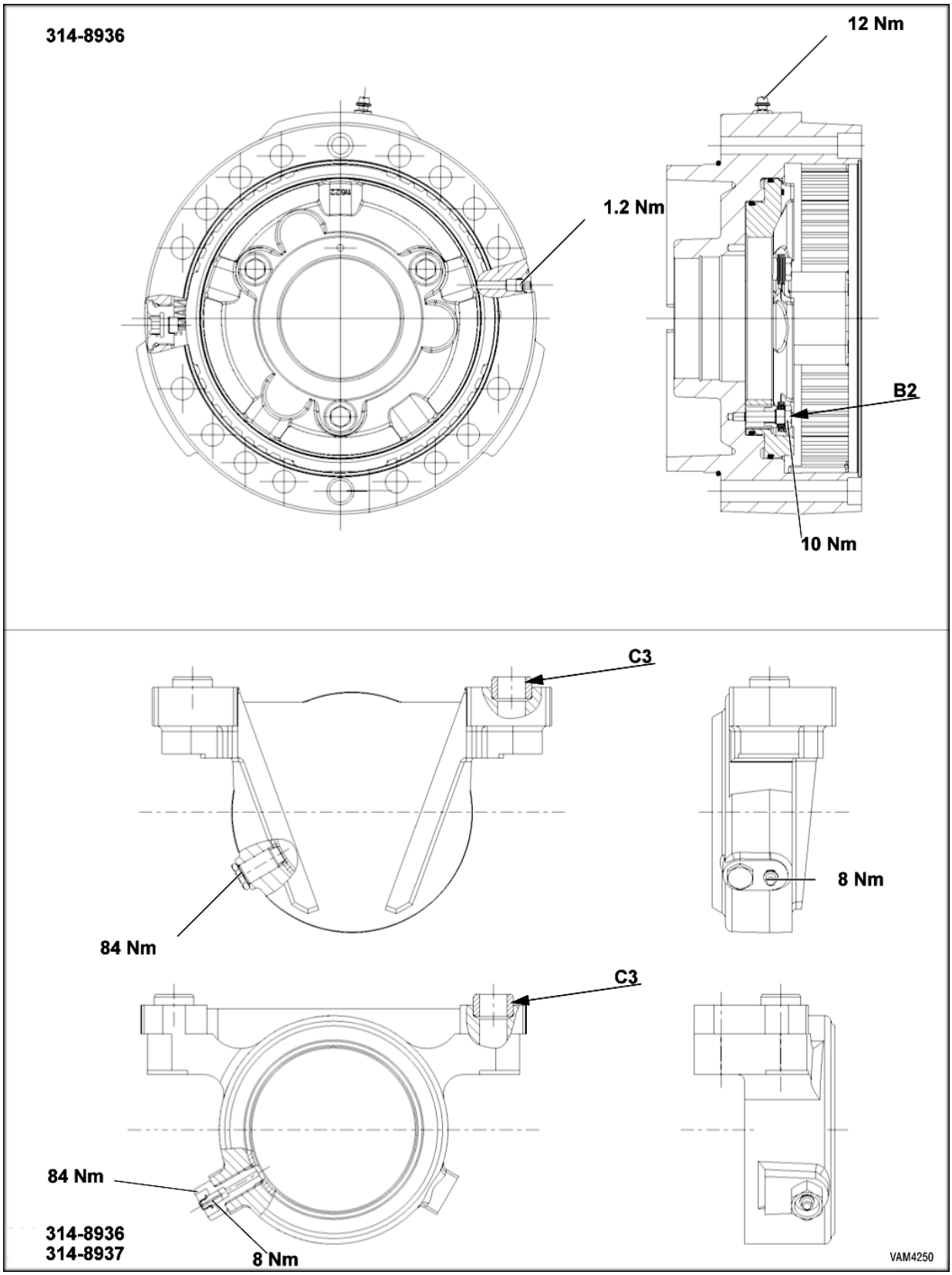
2.6 TECHNICAL FEATURES

Front axle	*Rear Axle*	*MACHINE*
314-8936	**314-8937**	*PART NUMBER*
26.43M	**26.43M**	*MODEL*
Limited Slip	***Open***	*DIFFERENTIAL TYPE*

VAM4260

VALUES	DESCRIPTION
2.909 / 1	*Bevel gear ratio*
6.923 / 1	*Epicyclic reduction gear ratio*
20.14 / 1	*Total ratio*
641 kg	*Dry weight 314-8936*
615 kg	*Dry weight 314-8937*
○ ●	*Input rotation 314-8936* *CLOCK WISE (C.W.)* *COUNTER CLOCK WISE (C.C.W.)*
● ○	*Input rotation 314-8937* *CLOCK WISE (C.W.)* *COUNTER CLOCK WISE (C.C.W.)*
$45°\ ^{0}_{-0,2}$	*Steering angle* 314-8936
$45°\ ^{\pm 1}$	*Steering angle 314-8937*
$A\ ^{0}_{-2}$	*Toe-in 314-8936*
$A\ ^{\pm 1}$	*Toe-in 3148937*
11.5 litri/*litres*	*Differential oil capacity*
1.5 litri/*litres*	*Epicyclic reduction gear oil capacity (each side)*
CAT TDTO **CAT Multipurpose Grease** **NLGI Grade 2**	*Oil specification*
Wet discs brake	*Type of brake 314-8936*
Without	*Type of brake 314-8937*
Mineral oil	*Oil specification for brake actuation*
13 cc	*Oil displacement for brakes actuation (each side)*
44 bar	*Maximum operating pressure*

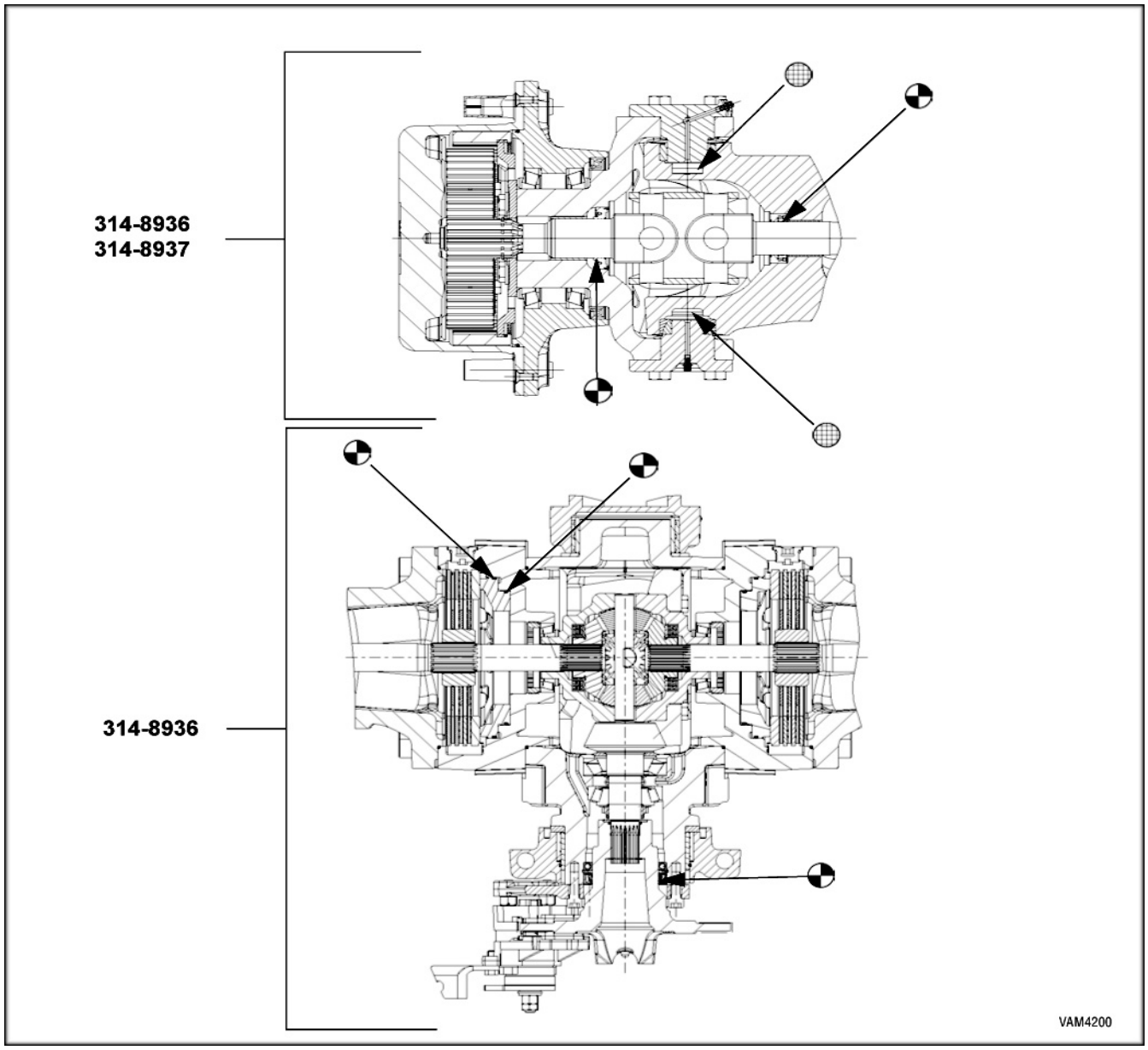
VAM4270

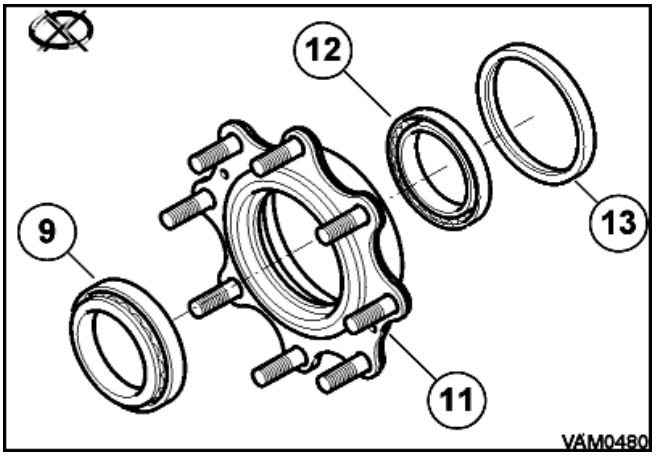

314-8936
12 Nm
1.2 Nm
B2
10 Nm
C3
84 Nm
8 Nm
C3
84 Nm
314-8936
314-8937
8 Nm
VAM4250

3.4 GREASE IN ASSEMBLY

Grease application in assembly		
	Tecnolube® POLYMER 400	*Apply on the indicated surfaces*
	CAT Multipurpose NLGI Gr 2 CAT TDTO	*Fill/Apply in excess*

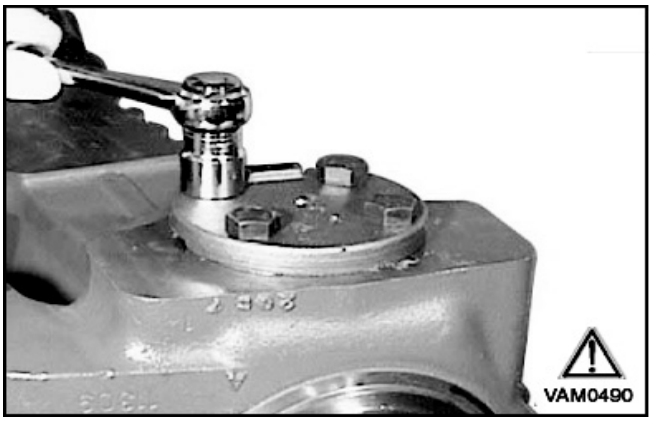
VAM4210





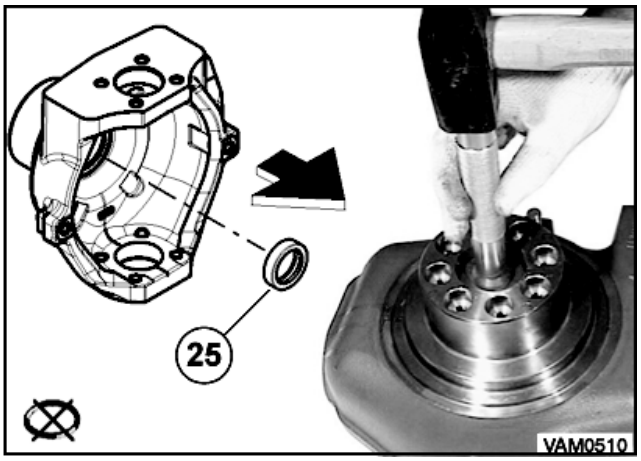
Note: *The following is a destructive operation for the seal ring (**13**).*

7. Position the wheel hub (**11**) on a flat surface and remove the seal ring (**13**).
   Remove the bearing cones (**9** and **12**) using a hammer and a suitable drift.
   Remove the bearing cone (**12**) from the swivel housing end (**14**) using a suitable extractor.



8. Unscrew and remove the fastening screws (**15**) and (**21**) from the upper (**17**) and lower (**19**) king pins.
   Danger: before removing the king pins (**17**) and (**19**), secure the swivel housing (**14**) with a belt or a rope to a hoist or any other supporting device, observe all current safety regulations to guarantee operator's safety.
   Remove the king pins (**17**) and (**19)**.

9. Remove the swivel housing (**14**) from the axle beam and from the short shaft of the double U-Joint. Collect the belleville washers (**26**) and (**27**).



10. Position the swivel housing (**14**) on a flat surface and take the seal ring (**25**) out with an extractor.

Note: *This is a destructive operation for the seal ring. Turn the swivel housing and take the bush (**24**) out, using a suitable drift and hammer.*

d. Install new Seal (**15**) on Adjusting Bolt (**2**), inserting through inner Cam (**4**) until Seal (**15**) bottoms out on Torque plate.

Note: Prior to installation of the cams (**4**), it is recommended to apply anti-seize and lubricating compound to ramp areas of cams.

e. Install new Cam (**4**) on Adjustment Bolt (**2**), taking care to orient protrusions into Holes in Torque Plates (**5**)

f. Install Ball Assembly (8) onto Adjusting Bolt (**2**), orienting balls into pockets of Inner Cam (**4**). Install outer Cam (**4**) onto Adjustment Bolt (**2**) orienting pockets onto Balls of Ball Assembly (**8**). Install boot (**3**) over cam assembly.

g. Install lever (**1**), using protrusions on back of outer Cam (**4**) and holes in Lever (**1**) to orient lever to proper operating position.

h. Install remaining washer and nuts and follow procedure in Paragraph 5.

Note: Make sure to orient coated face of thrust washer (11) toward stainless steel washer (**17**).

6. LINING REPLACEMENT

a. Loosen two adjustment Locking Nuts (**12** and **13**) enough to remove each Torque Plate (**5** and **7**) away from disc far enough to provide backlash to remove old carrier and lining assemblies and install new ones. (It may be necessary to remove one or both nuts).

b. Collapse the two Lining retraction Springs (**10**) and remove them from brake Head Assembly.

c. Remove Torque Plates (**5** and **7**) away from disc, move Carrier and Lining Assemblies (**6**) out of pockets, and remove from the Brake Head Assembly from the side.

Note: Prior to installation of the new linings, it is recommended that a coating of anti-seize and lubricating compound be applied to the interface of the sleeve (**9**) and the torque plates (5 and **7**).

After grease has been applied, move torque plates back and forth on sleeve as far as possible to insure that the grease has been introduced into the bores of the torque plates.

d. Install new Carrier and Lining Assemblies **(6)** in each Torque Plate (**5** and **7**).

e. Install the two Lining Retention springs (**10**) into Brake Head Assembly. Be sure spring's feet are positioned properly in holes in both Lining Carrier Assemblies (**6**). Adjust brake per Paragraph 3.

7. SLEEVE SEAL REPLACEMENT

a. Loosen the two locking nuts on the mounting bolts and remove the mounting bolt/sleeve assembly (**9**) from the brake.

b. Insert sleeve seals (**18**) between the torque plates (**5** and **7**) and align with the sleeve bores.

Note: Prior to installation of the mounting bolt and sleeve assembly, it is recommended that grease (anti-seize and lubricating compound) be applied to the sleeve and bores of the torque plates.

c. Insert mounting bolt and sleeve assembly through the front torque plate (**5**) and sleeve seal (**18**), and back torque plate (**7**)**.**

d. Mount per paragraph 3b and adjust per paragraph 4.

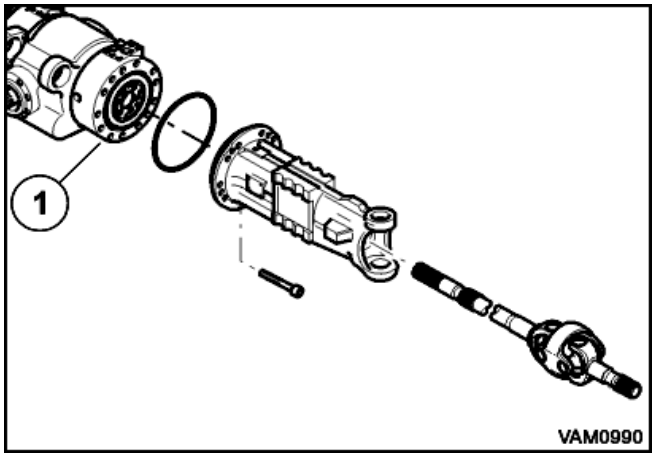
8. BRACKET CABLE RETENTION REPLACEMENT

a. Remove the screws (**19**) of the bracket (**20**) from the front torque plate (**5**). Remove the bracket (**20**).

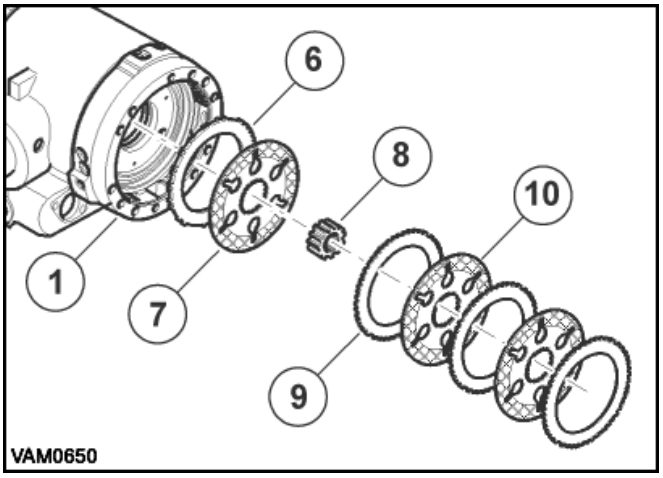
b. Position the bracket (**20**) in correspondence with the threaded holes of the pad support of the torque plate**(5)**.

c. Fix the bracket (**20**) to the front torque plate (**5**) with the appropriate screws (**19**)**.**
Tighten the screws to 63 Nm.

4.7.4 Brake Disk Replacement

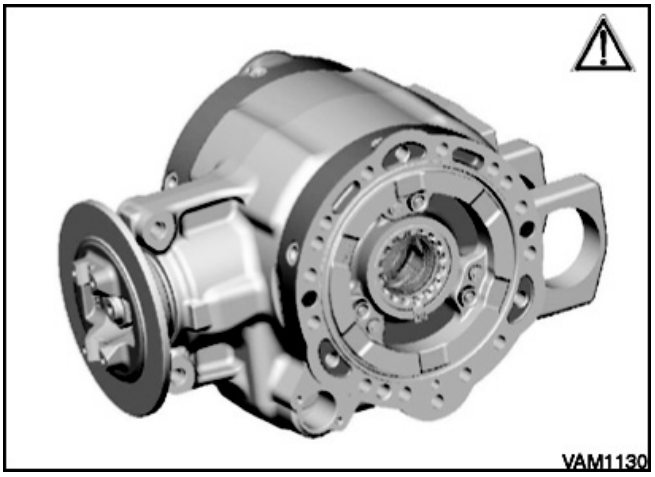


1. Remove the beam trumpet group from the brake flange (**1**).
   See: section 4.8.2, disassembly



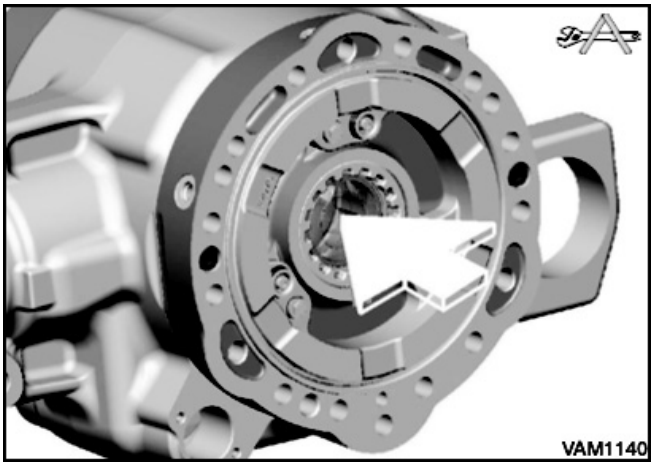
2. Remove from the brake flange (**1**) the brake counter plate (**9**) and brake plate (**10**)**,** the brake disk carrier gear (**8**) the brake plate (**7**) and the brake counter plate (**6**).

Note: *Remember the position of the brake disk carrier, it must be reassembled in the same position.*



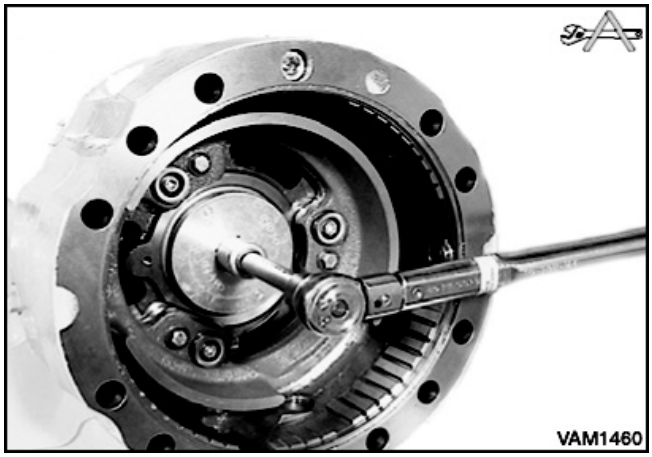
3. To replace worn brake disks with new disks the brake piston must be pushed in the original position. Remove straight threads, bleeds or plugs from the service brake oil port.

Danger: risk of ejection of oil from the axle.

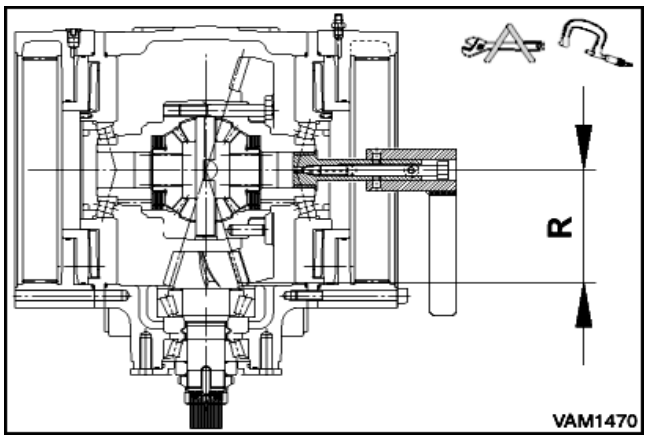


4. Push the brake piston (**4**) at the end of stroke using the special tool (Sec. 5) and the handle (Sec. 5) with a hammer.

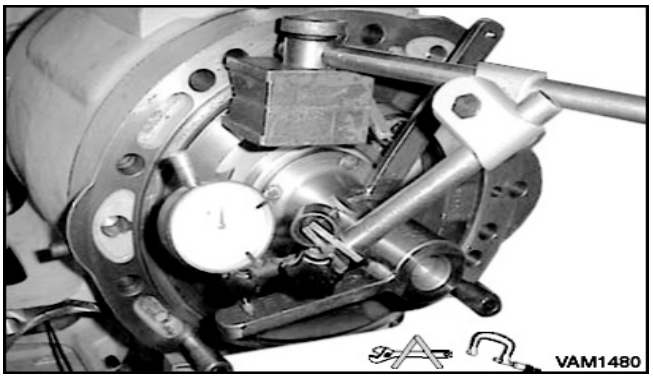
Note: *Position the pad with accuracy to avoid damage to the brake piston.*



9. Screw both adjuster ring nuts (**8**) using the special tool (Sec. 5) till the backlash is eliminated and the differential bearings are slightly loaded.



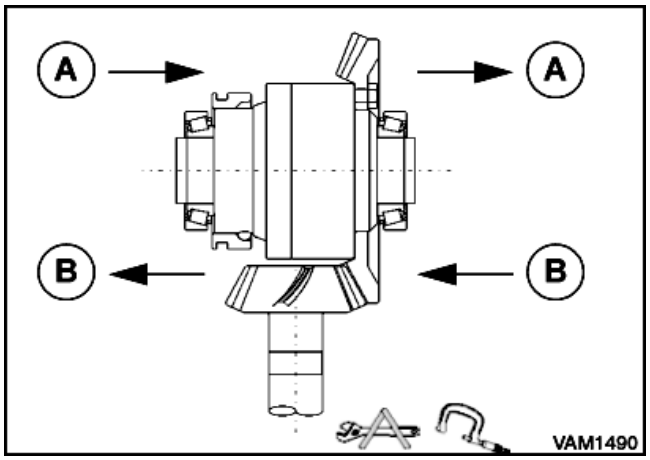
10. Assemble the special tool (Sec. 5) on the differential housing hole. Position a comparator with the feeler in contact with and at a 90° with respect to the surface of the special tool bracket, in correspondence with the reference **R** value.



11. Move the bracket of the special tool (Sec. 5) installed on the differential housing hole alternately by hand.
Measure backlash between pinion and crown.
Check if the backlash is within the prescribed range:

0.15÷0.30 mm

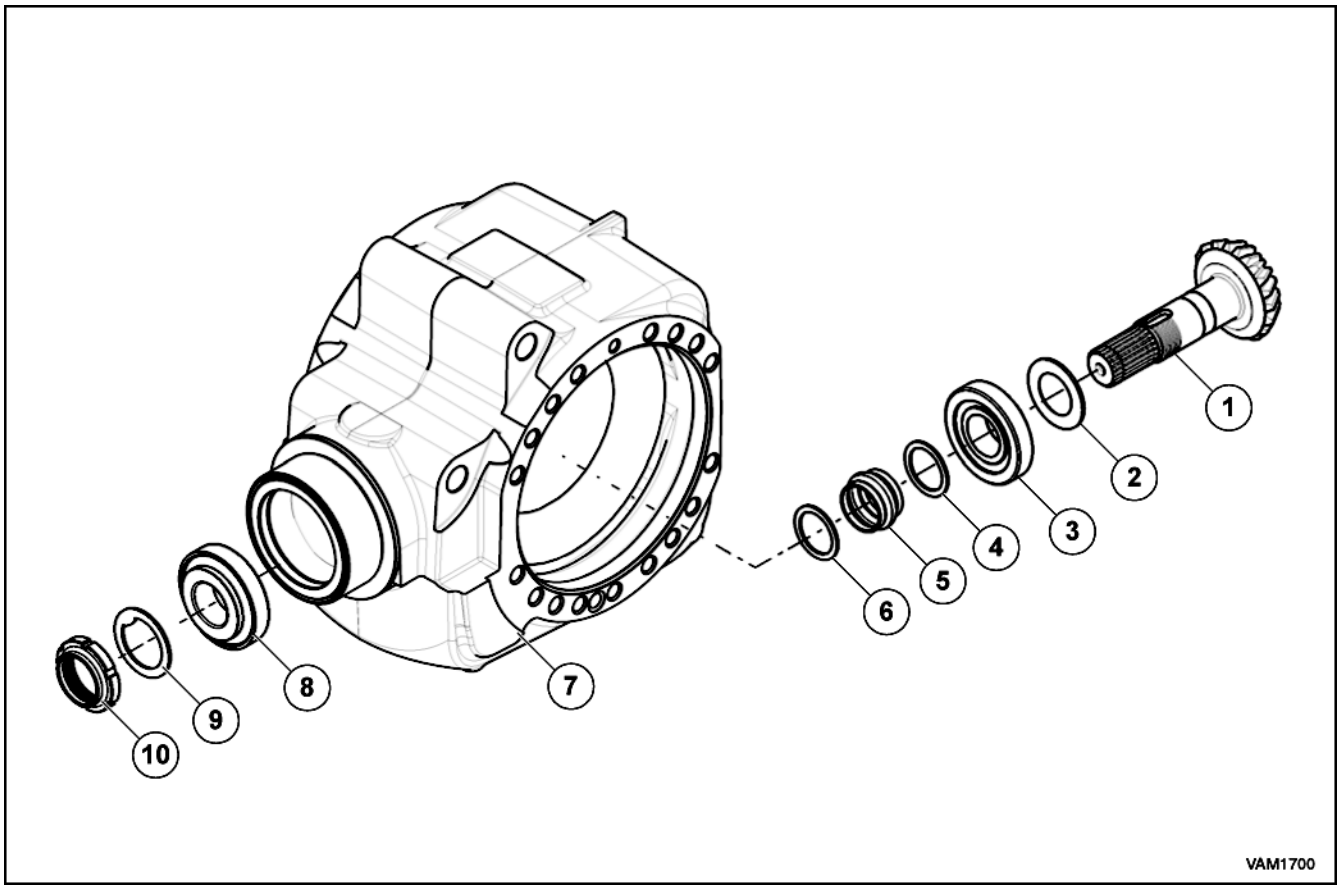
Set the backlash by turning the adjusting ring nuts (**8**) using the special tool (Sec. 5).



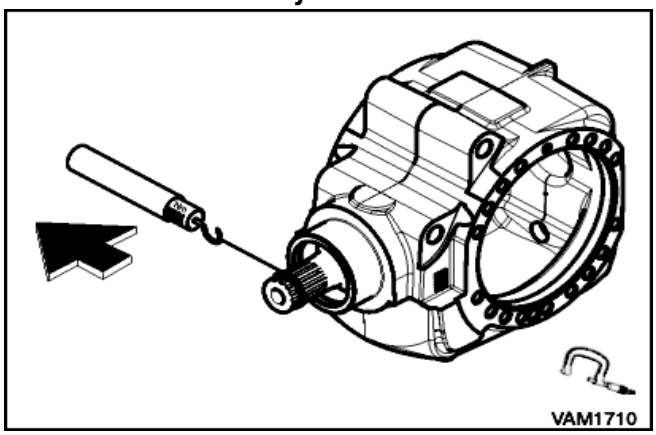
12. Adjust the ring nuts (**8**)**,** remembering that:
- if **the measured backlash is less** than the given tolerance range, screw the ring nut from the side opposite to the ring gear and unscrew the opposite one of the same measure (**A);**
- if **the measured backlash is greater** than the given tolerance range, screw the ring nut from the side of the ring gear and unscrew the opposite one of the same measure (**B**).

4.12 PINION GROUP

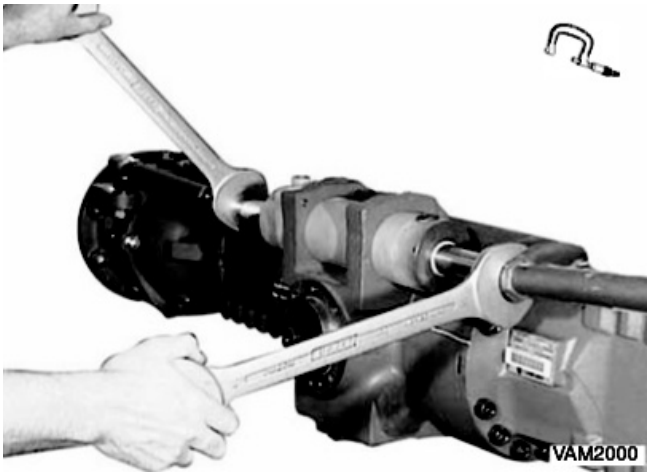
4.12.1 General Drawing



4.12.2 Disassembly



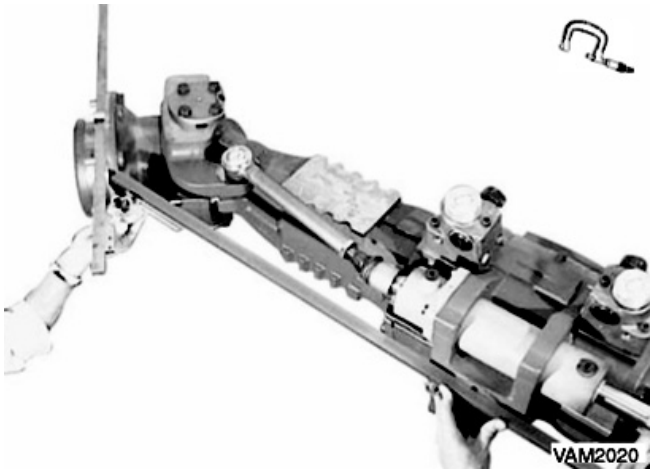
1. Remove the differential group (**See** section 4.9.2, disassembly).
   Measure the starting preloading P_0 of the pinion bearings using a dynamometer whose cord is wound on the pinion splined end.
   Note that the value P_0 is necessary during the bearings reassembly.
   See section 4.9.3, assembly.



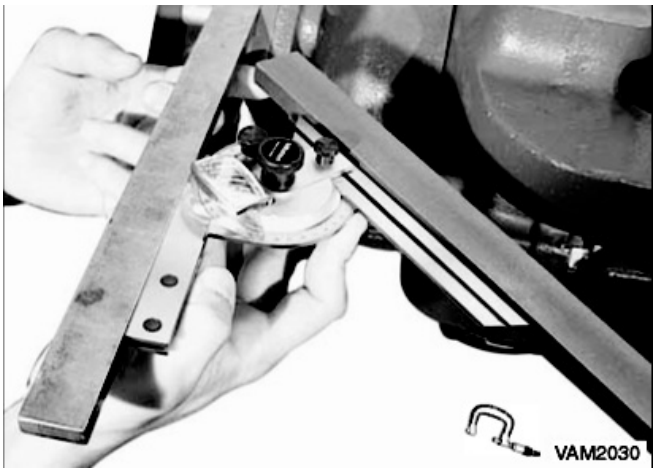
5. If toe-in is incorrect, use two wrenches on the guide rods (**1**) to screw the two joint tie rods (**3**) in and out equally until the toe-in is within the specified tolerance (see 2.8).

6. After adjusting the toe-in, screw in the lock nuts (**2**) of the guide rods (**1**) to the specified tightening torque (see 2.8).

4.13.3 Steering angle adjustment



1. Use the same bars that were attached for the toe-in adjustment and a long bar perfectly leaned over the machined part of the central body (pinion side), so the two bars form an acute angle at the maximum steering.



2. Set a protractor to the specified angle (Sec. 2.6) and position it on the long bar.
   Move a wheel side until it forms, with the two bars, the angle fixed by the protractor.

TH 406C	110/80
TH 407C	115/80

LIFT

300 Bar
Ratio 4:1

260 Bar
Ratio 4:1

70 Bar

TELE

70/50

70 Bar

TH 406C	125/85
TH 407C	130/90

TILT

330 Bar
Ratio 4.2:1

COMPENSATION

65/45

300 Bar
Ratio 7.3:1

A4
B4

AUX 1
(STANDARD)

MAIN CONTROL VALVE

DLS
(LS STEER)

P GAUGE

3.5 Bar

231 Bar

0.7 l/min

30 Bar

STEERING
SELECT VALVE

240 Bar

180 Bar

STEERING VALVE
(ORBITAL)

8 BAR
NORM OPEN

FRONT STEER

REAR STEER

MASTER CYLINDER

M/C

BOOSTED BRAKE ACTUATION

REVERSE & DEMAND FAN

16.8cc

19Bar

260Bar

DRIVE RATIO
1:1.088 WITH ENGINE

19cc

CAT: 207 bar

8 Bar

3.45 Bar

beta(10)=1000

FILL

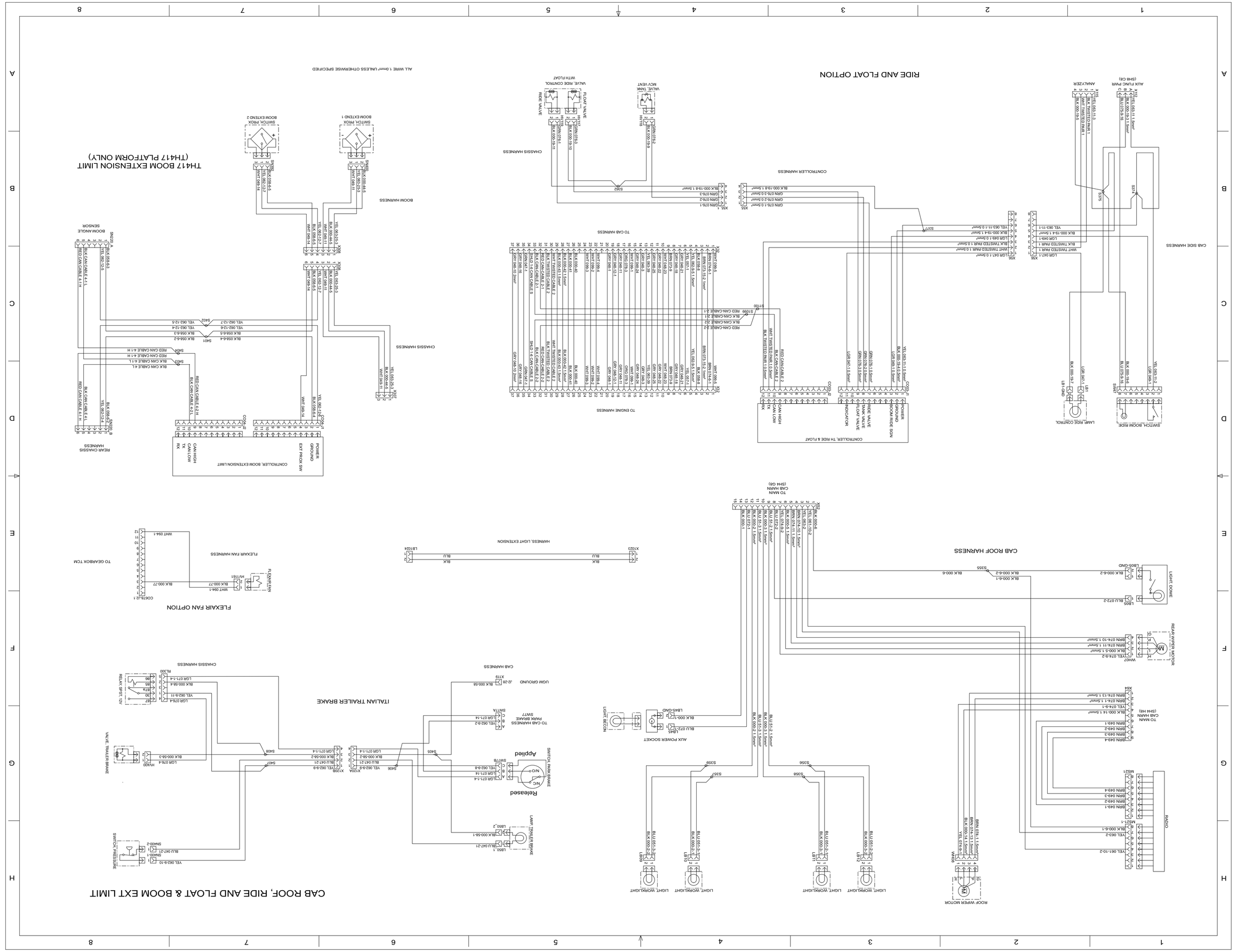
ENGINE:FAN PUMP
DRIVE RATIO
1:1.0588

PUMP DATA	
MACHINE	CC
CATERPILLAR TH336C /TH406C TH337C / TH407C	63

TH336C, TH337C, TH406C & TH407C

S/N MJR00150 & After
S/N THM00150 & After
S/N DJB00150 & After
S/N SXJ00150 & After
S/N GAT00150 & After
S/N RCH00150 & After
S/N MLH00150 & After
S/N JJT00150 & After

TH336C, TH337C, TH406C, TH407C, TH414C, TH514C, TH417C
Hydraulic Schematic
31200831
UENR6257-02



TH336C, TH337C, TH406C, TH407C, TH414C, TH514C & TH417C

S/N MJR00150 & After
S/N DJB00150 & After
S/N GAT00150 & After
S/N MLH00150 & After
S/N KEK00150 & After
S/N MWC00150 & After
S/N RRJ00150 & After
S/N THM00150 & After
S/N SXJ00150 & After
S/N RCH00150 & After
S/N JJT00150 & After
S/N RWW00150 & After
S/N KKW00150 & After
S/N RRW00150 & After

TH336C, TH337C, TH406C, TH407C, TH414C, TH514C, TH417C
Electrical Schematic
31200832
UENR6256-03

CATERPILLAR®