SERVICE MANUAL

L213 Tier 3

200 Series Skid Steer Loader

PIN NEM459110 and above

L216 Tier 4B (final)

200 Series Skid Steer Loader

PIN NEM477964 and above

Part number 47711677
1st editon English
May 2014

NEW HOLLAND CONSTRUCTION

SERVICE MANUAL

L213 TIER 3 [NEM459110 -]
L216 TIER 4 [NEM477964 -]

Link Product / Engine

Product	Market Product	Engine
L213 TIER 3 [NEM459110 -]	Europe	N844L
L216 TIER 4 [NEM477964 -]	Europe	N844LT-F-45SL

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INTRODUCTION

(*) See content for specific models

Foreword - Important notice regarding equipment servicing

L213	WE
L216	WE

All repair and maintenance work listed in this manual must be carried out only by qualified dealership personnel, strictly complying with the instructions given, and using, whenever possible, the special tools.

Anyone who performs repair and maintenance operations without complying with the procedures provided herein shall be responsible for any subsequent damages.

The manufacturer and all the organizations of its distribution chain, including - without limitation - national, regional, or local dealers, reject any responsibility for damages caused by parts and/or components not approved by the manufacturer, including those used for the servicing or repair of the product manufactured or marketed by the manufacturer. In any case, no warranty is given or attributed on the product manufactured or marketed by the manufacturer in case of damages caused by parts and/or components not approved by the manufacturer.

The information in this manual is up-to-date at the date of the publication. It is the policy of the manufacturer for continuous improvement. Some information could not be updated due to modifications of a technical or commercial type, or changes to the laws and regulations of different countries.

In case of questions, refer to your NEW HOLLAND CONSTRUCTION Sales and Service Networks.

Safety rules

L213	WE
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Personal safety

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible death or injury.

Throughout this manual you will find the signal words DANGER, WARNING, and CAUTION followed by special instructions. These precautions are intended for the personal safety of you and those working with you.

Read and understand all the safety messages in this manual before you operate or service the machine.

DANGER indicates a hazardous situation that, if not avoided, will result in death or serious injury.

WARNING indicates a hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

FAILURE TO FOLLOW DANGER, WARNING, AND CAUTION MESSAGES COULD RESULT IN DEATH OR SERIOUS INJURY.

Machine safety

NOTICE: *Notice indicates a situation that, if not avoided, could result in machine or property damage.*

Throughout this manual you will find the signal word Notice followed by special instructions to prevent machine or property damage. The word Notice is used to address practices not related to personal safety.

Information

NOTE: *Note indicates additional information that clarifies steps, procedures, or other information in this manual.*

Throughout this manual you will find the word Note followed by additional information about a step, procedure, or other information in the manual. The word Note is not intended to address personal safety or property damage.

Safety rules - Personal safety

L213	WE
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Carefully study these precautions, and those included in the external attachment operators manual, and insist that they be followed by those working with and for you.

1. Thoroughly read and understand this manual and the attachment Operator's Manual before operating this or any other equipment.
2. Be sure all people and pets are clear of the machine before starting. Sound the horn, if equipped, three times before starting engine.
3. Only the operator should be on the machine when in operation. Never allow anyone to climb on to the machine while it is in motion. If the machine is equipped with an Instructors Seat, this must only be used for training purposes. Passengers must not be allowed to use the Instructors Seat.
4. Keep all shields in place. Never work around the machine or any of the attachments while wearing loose clothing that might catch on moving parts.
5. Observe the following precautions whenever lubricating the machine or making adjustments.

   - Disengage all clutching levers or switches.
   - Lower the attachment, if equipped, to the ground or raise the attachment completely and engage the cylinder safety locks. Completing these actions will prevent the attachment from lowering unexpectedly.
   - Engage the parking brake.
   - Shut off the engine and remove the key.
   - Wait for all machine movement to stop before leaving the operators platform.

6. Always keep the machine in gear while travelling downhill.
7. The machine should always be equipped with sufficient front or rear axle weight for safe operation.
8. Under some field conditions, more weight may be required at the front or rear axle for adequate stability. This is especially important when operating in hilly conditions or/when using heavy attachments.
9. Always lower the attachment, shut off the engine, set the parking brake, engage the transmission gears, remove the key and wait for all machine movement to stop before leaving the operators platform.
10. If the attachment or machine should become obstructed or plugged; set the parking brake, shut off the engine and remove the key, engage the transmission gears, wait for all machine or attachment motion to come to a stop, before leaving the operators platform to removing the obstruction or plug.
11. Never disconnect or make any adjustments to the hydraulic system unless the machine and/or the attachment is lowered to the ground or the safety lock(s) is in the engaged position.
12. Use of the flashing lights is highly recommended when operating on a public road.
13. When transporting on a road or highway, use accessory lights and devices for adequate warning to the operators of other vehicles. In this regard, check local government regulations. Various safety lights and devices are available from your NEW HOLLAND CONSTRUCTION dealer.
14. Practice safety 365 days a year.
15. Keep all your equipment in safe operating condition.
16. Keep all guards and safety devices in place.
17. Always set the parking brake, shut off the engine and remove the key, engage the transmission gears, wait for all machine or attachment motion to come to a stop, before leaving the operators platform to service the machine and attachment.
18. Remember: A careful operator is the best insurance against an accident.
19. Extreme care should be taken in keeping hands and clothing away from moving parts.

Safety rules - Ecology and the environment

L213	WE
L216	WE

Soil, air, and water are vital factors of agriculture and life in general. When legislation does not yet rule the treatment of some of the substances required by advanced technology, sound judgment should govern the use and disposal of products of a chemical and petrochemical nature.

NOTE: *The following are recommendations that may be of assistance:*

- Become acquainted with and ensure that you understand the relative legislation applicable to your country.
- Where no legislation exists, obtain information from suppliers of oils, filters, batteries, fuels, antifreeze, cleaning agents, etc., with regard to their effect on man and nature and how to safely store, use, and dispose of these substances.
- Agricultural consultants will, in many cases, be able to help you as well.

Helpful hints

- Avoid filling tanks using cans or inappropriate pressurized fuel delivery systems that may cause considerable spillage.
- In general, avoid skin contact with all fuels, oils, acids, solvents, etc. Most of them contain substances that may be harmful to your health.
- Modern oils contain additives. Do not burn contaminated fuels and or waste oils in ordinary heating systems.
- Avoid spillage when draining off used engine coolant mixtures, engine, gearbox and hydraulic oils, brake fluids, etc. Do not mix drained brake fluids or fuels with lubricants. Store them safely until they can be disposed of in a proper way to comply with local legislation and available resources.
- Modern coolant mixtures, i.e. antifreeze and other additives, should be replaced every two years. They should not be allowed to get into the soil, but should be collected and disposed of properly.
- Do not open the air-conditioning system yourself. It contains gases that should not be released into the atmosphere. Your NEW HOLLAND CONSTRUCTION dealer or air conditioning specialist has a special extractor for this purpose and will have to recharge the system properly.
- Repair any leaks or defects in the engine cooling or hydraulic system immediately.
- Do not increase the pressure in a pressurized circuit as this may lead to a component failure.
- Protect hoses during welding as penetrating weld splatter may burn a hole or weaken them, allowing the loss of oils, coolant, etc.

Torque - Minimum tightening torques for normal assembly

L213	WE
L216	WE

METRIC NON-FLANGED HARDWARE

NOM. SIZE	CLASS 8.8 BOLT and CLASS 8 NUT		CLASS 10.9 BOLT and CLASS 10 NUT		LOCKNUT CL.8 W/CL8.8 BOLT	LOCKNUT CL.10 W/CL10.9 BOLT
	UNPLATED	PLATED W/ZnCr	UNPLATED	PLATED W/ZnCr		
M4	2.2 N·m (19 lb in)	2.9 N·m (26 lb in)	3.2 N·m (28 lb in)	4.2 N·m (37 lb in)	2 N·m (18 lb in)	2.9 N·m (26 lb in)
M5	4.5 N·m (40 lb in)	5.9 N·m (52 lb in)	6.4 N·m (57 lb in)	8.5 N·m (75 lb in)	4 N·m (36 lb in)	5.8 N·m (51 lb in)
M6	7.5 N·m (66 lb in)	10 N·m (89 lb in)	11 N·m (96 lb in)	15 N·m (128 lb in)	6.8 N·m (60 lb in)	10 N·m (89 lb in)
M8	18 N·m (163 lb in)	25 N·m (217 lb in)	26 N·m (234 lb in)	35 N·m (311 lb in)	17 N·m (151 lb in)	24 N·m (212 lb in)
M10	37 N·m (27 lb ft)	49 N·m (36 lb ft)	52 N·m (38 lb ft)	70 N·m (51 lb ft)	33 N·m (25 lb ft)	48 N·m (35 lb ft)
M12	64 N·m (47 lb ft)	85 N·m (63 lb ft)	91 N·m (67 lb ft)	121 N·m (90 lb ft)	58 N·m (43 lb ft)	83 N·m (61 lb ft)
M16	158 N·m (116 lb ft)	210 N·m (155 lb ft)	225 N·m (166 lb ft)	301 N·m (222 lb ft)	143 N·m (106 lb ft)	205 N·m (151 lb ft)
M20	319 N·m (235 lb ft)	425 N·m (313 lb ft)	440 N·m (325 lb ft)	587 N·m (433 lb ft)	290 N·m (214 lb ft)	400 N·m (295 lb ft)
M24	551 N·m (410 lb ft)	735 N·m (500 lb ft)	762 N·m (560 lb ft)	1016 N·m (750 lb ft)	501 N·m (370 lb ft)	693 N·m (510 lb ft)

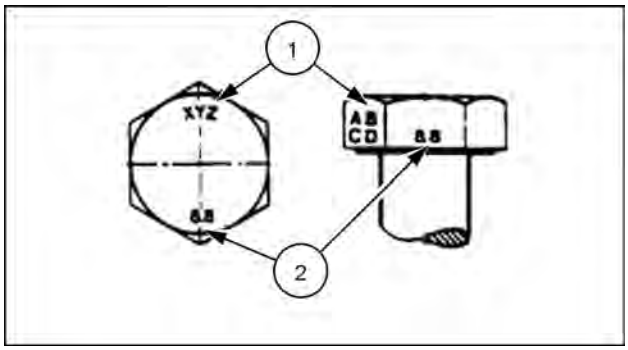
NOTE: *M4 through M8 hardware torque specifications are shown in pound-inches. M10 through M24 hardware torque specifications are shown in pound-feet.*

METRIC FLANGED HARDWARE

NOM. SIZE	CLASS 8.8 BOLT and CLASS 8 NUT		CLASS 10.9 BOLT and CLASS 10 NUT		LOCKNUT CL.8 W/CL8.8 BOLT	LOCKNUT CL.10 W/CL10.9 BOLT
	UNPLATED	PLATED W/ZnCr	UNPLATED	PLATED W/ZnCr		
M4	2.4 N·m (21 lb in)	3.2 N·m (28 lb in)	3.5 N·m (31 lb in)	4.6 N·m (41 lb in)	2.2 N·m (19 lb in)	3.1 N·m (27 lb in)
M5	4.9 N·m (43 lb in)	6.5 N·m (58 lb in)	7.0 N·m (62 lb in)	9.4 N·m (83 lb in)	4.4 N·m (39 lb in)	6.4 N·m (57 lb in)
M6	8.3 N·m (73 lb in)	11 N·m (96 lb in)	12 N·m (105 lb in)	16 N·m (141 lb in)	7.5 N·m (66 lb in)	11 N·m (96 lb in)
M8	20 N·m (179 lb in)	27 N·m (240 lb in)	29 N·m (257 lb in)	39 N·m (343 lb in)	18 N·m (163 lb in)	27 N·m (240 lb in)
M10	40 N·m (30 lb ft)	54 N·m (40 lb ft)	57 N·m (42 lb ft)	77 N·m (56 lb ft)	37 N·m (27 lb ft)	53 N·m (39 lb ft)
M12	70 N·m (52 lb ft)	93 N·m (69 lb ft)	100 N·m (74 lb ft)	134 N·m (98 lb ft)	63 N·m (47 lb ft)	91 N·m (67 lb ft)
M16	174 N·m (128 lb ft)	231 N·m (171 lb ft)	248 N·m (183 lb ft)	331 N·m (244 lb ft)	158 N·m (116 lb ft)	226 N·m (167 lb ft)
M20	350 N·m (259 lb ft)	467 N·m (345 lb ft)	484 N·m (357 lb ft)	645 N·m (476 lb ft)	318 N·m (235 lb ft)	440 N·m (325 lb ft)
M24	607 N·m (447 lb ft)	809 N·m (597 lb ft)	838 N·m (618 lb ft)	1118 N·m (824 lb ft)	552 N·m (407 lb ft)	

IDENTIFICATION

Metric Hex head and carriage bolts, classes 5.6 and up



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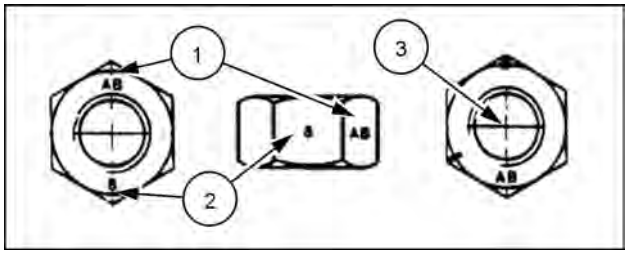
1. Manufacturer's Identification
2. Property Class

Metric Hex nuts and locknuts, classes 05 and up



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1. Manufacturer's Identification
2. Property Class
3. Clock Marking of Property Class and Manufacturer's Identification (Optional), i.e. marks **60 °** apart indicate Class 10 properties, and marks **120 °** apart indicate Class 8.

INCH NON-FLANGED HARDWARE

NOMINAL SIZE	SAE GRADE 5 BOLT and NUT		SAE GRADE 8 BOLT and NUT		LOCKNUT GrB W/ Gr5 BOLT	LOCKNUT GrC W/ Gr8 BOLT
	UN-PLATED or PLATED SILVER	PLATED W/ZnCr GOLD	UN-PLATED or PLATED SILVER	PLATED W/ZnCr GOLD		
1/4	**8 N·m (71 lb in)**	**11 N·m (97 lb in)**	**12 N·m (106 lb in)**	**16 N·m (142 lb in)**	**8.5 N·m (75 lb in)**	**12.2 N·m (109 lb in)**
5/16	**17 N·m (150 lb in)**	**23 N·m (204 lb in)**	**24 N·m (212 lb in)**	**32 N·m (283 lb in)**	**17.5 N·m (155 lb in)**	**25 N·m (220 lb in)**
3/8	**30 N·m (22 lb ft)**	**40 N·m (30 lb ft)**	**43 N·m (31 lb ft)**	**57 N·m (42 lb ft)**	**31 N·m (23 lb ft)**	**44 N·m (33 lb ft)**
7/16	**48 N·m (36 lb ft)**	**65 N·m (48 lb ft)**	**68 N·m (50 lb ft)**	**91 N·m (67 lb ft)**	**50 N·m (37 lb ft)**	**71 N·m (53 lb ft)**
1/2	**74 N·m (54 lb ft)**	**98 N·m (73 lb ft)**	**104 N·m (77 lb ft)**	**139 N·m (103 lb ft)**	**76 N·m (56 lb ft)**	**108 N·m (80 lb ft)**
9/16	**107 N·m (79 lb ft)**	**142 N·m (105 lb ft)**	**150 N·m (111 lb ft)**	**201 N·m (148 lb ft)**	**111 N·m (82 lb ft)**	**156 N·m (115 lb ft)**
5/8	**147 N·m (108 lb ft)**	**196 N·m (145 lb ft)**	**208 N·m (153 lb ft)**	**277 N·m (204 lb ft)**	**153 N·m (113 lb ft)**	**215 N·m (159 lb ft)**
3/4	**261 N·m (193 lb ft)**	**348 N·m (257 lb ft)**	**369 N·m (272 lb ft)**	**491 N·m (362 lb ft)**	**271 N·m (200 lb ft)**	**383 N·m (282 lb ft)**
7/8	**420 N·m (310 lb ft)**	**561 N·m (413 lb ft)**	**594 N·m (438 lb ft)**	**791 N·m (584 lb ft)**	**437 N·m (323 lb ft)**	**617 N·m (455 lb ft)**
1	**630 N·m (465 lb ft)**	**841 N·m (620 lb ft)**	**890 N·m (656 lb ft)**	**1187 N·m (875 lb ft)**	**654 N·m (483 lb ft)**	**924 N·m (681 lb ft)**

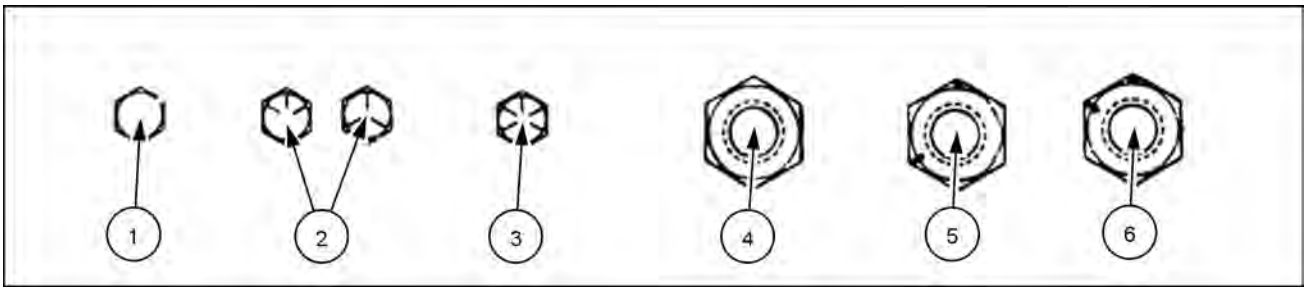
NOTE: *For Imperial Units,* ***1/4 in*** *and* ***5/16 in*** *hardware torque specifications are shown in pound-inches.* ***3/8 in*** *through* ***1 in*** *hardware torque specifications are shown in pound-feet.*

INCH FLANGED HARDWARE

NOM-INAL SIZE	SAE GRADE 5 BOLT and NUT		SAE GRADE 8 BOLT and NUT		LOCKNUT GrF W/ Gr5 BOLT	LOCKNUT GrG W/ Gr8 BOLT
	UNPLATED or PLATED SILVER	PLATED W/ZnCr GOLD	UNPLATED or PLATED SILVER	PLATED W/ZnCr GOLD		
1/4	**9 N·m (80 lb in)**	**12 N·m (106 lb in)**	**13 N·m (115 lb in)**	**17 N·m (150 lb in)**	**8 N·m (71 lb in)**	**12 N·m (106 lb in)**
5/16	**19 N·m (168 lb in)**	**25 N·m (221 lb in)**	**26 N·m (230 lb in)**	**35 N·m (310 lb in)**	**17 N·m (150 lb in)**	**24 N·m (212 lb in)**
3/8	**33 N·m (25 lb ft)**	**44 N·m (33 lb ft)**	**47 N·m (35 lb ft)**	**63 N·m (46 lb ft)**	**30 N·m (22 lb ft)**	**43 N·m (32 lb ft)**
7/16	**53 N·m (39 lb ft)**	**71 N·m (52 lb ft)**	**75 N·m (55 lb ft)**	**100 N·m (74 lb ft)**	**48 N·m (35 lb ft)**	**68 N·m (50 lb ft)**
1/2	**81 N·m (60 lb ft)**	**108 N·m (80 lb ft)**	**115 N·m (85 lb ft)**	**153 N·m (113 lb ft)**	**74 N·m (55 lb ft)**	**104 N·m (77 lb ft)**
9/16	**117 N·m (86 lb ft)**	**156 N·m (115 lb ft)**	**165 N·m (122 lb ft)**	**221 N·m (163 lb ft)**	**106 N·m (78 lb ft)**	**157 N·m (116 lb ft)**
5/8	**162 N·m (119 lb ft)**	**216 N·m (159 lb ft)**	**228 N·m (168 lb ft)**	**304 N·m (225 lb ft)**	**147 N·m (108 lb ft)**	**207 N·m (153 lb ft)**
3/4	**287 N·m (212 lb ft)**	**383 N·m (282 lb ft)**	**405 N·m (299 lb ft)**	**541 N·m (399 lb ft)**	**261 N·m (193 lb ft)**	**369 N·m (272 lb ft)**
7/8	**462 N·m (341 lb ft)**	**617 N·m (455 lb ft)**	**653 N·m (482 lb ft)**	**871 N·m (642 lb ft)**	**421 N·m (311 lb ft)**	**594 N·m (438 lb ft)**
1	**693 N·m (512 lb ft)**	**925 N·m (682 lb ft)**	**979 N·m (722 lb ft)**	**1305 N·m (963 lb ft)**	**631 N·m (465 lb ft)**	**890 N·m (656 lb ft)**

IDENTIFICATION

Inch Bolts and free-spinning nuts



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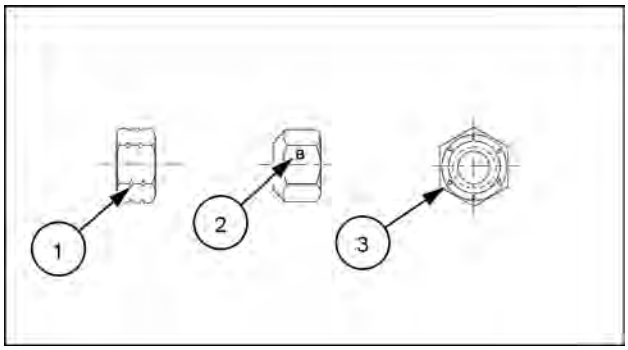
Grade Marking Examples

SAE Grade Identification			
1	Grade 2 - No Marks	4	Grade 2 Nut - No Marks
2	Grade 5 - Three Marks	5	Grade 5 Nut - Marks **120 °** Apart
3	Grade 8 - Five Marks	6	Grade 8 Nut - Marks **60 °** Apart

Inch Lock Nuts, All Metal (Three optional methods)



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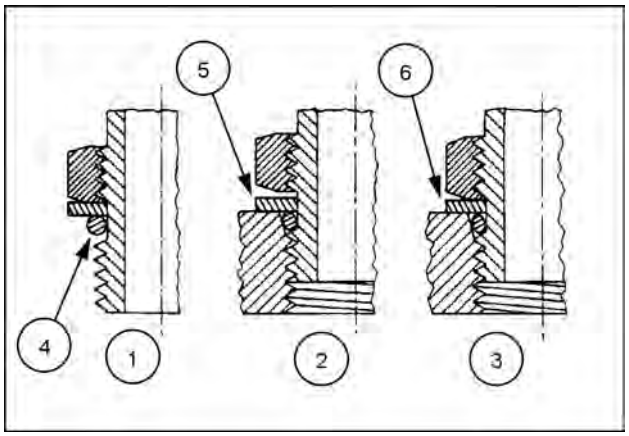
Grade Identification

Grade	Corner Marking Method (1)	Flats Marking Method (2)	Clock Marking Method (3)
Grade A	No Notches	No Mark	No Marks
Grade B	One Circumferential Notch	Letter B	Three Marks
Grade C	Two Circumferential Notches	Letter C	Six Marks

Torque - Standard torque data for hydraulics

L213	WE
L216	WE

INSTALLATION OF ADJUSTABLE FITTINGS IN STRAIGHT THREAD O RING BOSSES



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1. Lubricate the O-ring by coating it with a light oil or petroleum. Install the O-ring in the groove adjacent to the metal backup washer which is assembled at the extreme end of the groove **(4)**.
2. Install the fitting into the SAE straight thread boss until the metal backup washer contacts the face of the boss **(5)**.

   NOTE: *Do not over tighten and distort the metal backup washer.*
3. Position the fitting by turning out (counterclockwise) up to a maximum of one turn. Holding the pad of the fitting with a wrench, tighten the locknut and washer against the face of the boss **(6)**.

STANDARD TORQUE DATA FOR HYDRAULIC TUBES AND FITTINGS

TUBE NUTS FOR 37° FLARED FITTINGS				O-RING BOSS PLUGS ADJUSTABLE FITTING LOCKNUTS, SWIVEL JIC- 37° SEATS
SIZE	**TUBING OD**	**THREAD SIZE**	**TORQUE**	**TORQUE**
4	**6.4 mm** (**1/4 in**)	7/16-20	**12 - 16 N·m** (**9 - 12 lb ft**)	**8 - 14 N·m** (**6 - 10 lb ft**)
5	**7.9 mm** (**5/16 in**)	1/2-20	**16 - 20 N·m** (**12 - 15 lb ft**)	**14 - 20 N·m** (**10 - 15 lb ft**)
6	**9.5 mm** (**3/8 in**)	9/16-18	**29 - 33 N·m** (**21 - 24 lb ft**)	**20 - 27 N·m** (**15 - 20 lb ft**)
8	**12.7 mm** (**1/2 in**)	3/4-16	**47 - 54 N·m** (**35 - 40 lb ft**)	**34 - 41 N·m** (**25 - 30 lb ft**)
10	**15.9 mm** (**5/8 in**)	7/8-14	**72 - 79 N·m** (**53 - 58 lb ft**)	**47 - 54 N·m** (**35 - 40 lb ft**)
12	**19.1 mm** (**3/4 in**)	1-1/16-12	**104 - 111 N·m** (**77 - 82 lb ft**)	**81 - 95 N·m** (**60 - 70 lb ft**)
14	**22.2 mm** (**7/8 in**)	1-3/16-12	**122 - 136 N·m** (**90 - 100 lb ft**)	**95 - 109 N·m** (**70 - 80 lb ft**)
16	**25.4 mm** (**1 in**)	1-5/16-12	**149 - 163 N·m** (**110 - 120 lb ft**)	**108 - 122 N·m** (**80 - 90 lb ft**)
20	**31.8 mm** (**1-1/4 in**)	1-5/8-12	**190 - 204 N·m** (**140 - 150 lb ft**)	**129 - 158 N·m** (**95 - 115 lb ft**)
24	**38.1 mm** (**1-1/2 in**)	1-7/8-12	**217 - 237 N·m** (**160 - 175 lb ft**)	**163 - 190 N·m** (**120 - 140 lb ft**)
32	**50.8 mm** (**2 in**)	2-1/2-12	**305 - 325 N·m** (**225 - 240 lb ft**)	**339 - 407 N·m** (**250 - 300 lb ft**)

These torques are not recommended for tubes of **12.7 mm** (**1/2 in**) OD and larger with wall thickness of **0.889 mm** (**0.035 in**) or less. The torque is specified for **0.889 mm** (**0.035 in**) wall tubes on each application individually.

Before installing and torquing **37 °** flared fittings, clean the face of the flare and threads with a clean solvent or Loctite cleaner and apply hydraulic sealant **LOCTITE® 569** to the **37 °** flare and the threads.

Install fitting and torque to specified torque, loosen fitting and retorque to specifications.

PIPE THREAD FITTING TORQUE

Before installing and tightening pipe fittings, clean the threads with a clean solvent or Loctite cleaner and apply sealant **LOCTITE® 567 PST PIPE SEALANT** for all fittings including stainless steel or **LOCTITE® 565 PST** for most metal fittings. For high filtration/zero contamination systems use **LOCTITE® 545**.

PIPE THREAD FITTING	
Thread Size	**Torque (Maximum)**
1/8-27	**13 N·m** (**10 lb ft**)
1/4-18	**16 N·m** (**12 lb ft**)
3/8-18	**22 N·m** (**16 lb ft**)
1/2-14	**41 N·m** (**30 lb ft**)
3/4-14	**54 N·m** (**40 lb ft**)

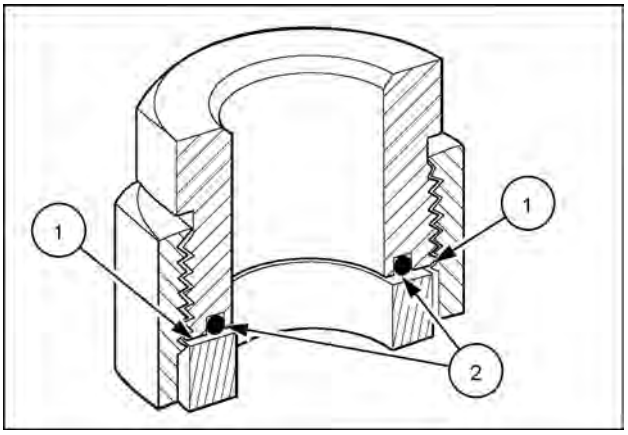
INSTALLATION OF ORFS (O-RING FLAT FACED) FITTINGS

When installing ORFS fittings thoroughly clean both flat surfaces of the fittings **(1)** and lubricate the O-ring **(2)** with light oil. Make sure both surfaces are aligned properly. Torque the fitting to specified torque listed throughout the repair manual.

NOTICE: *If the fitting surfaces are not properly cleaned, the O-ring will not seal properly. If the fitting surfaces are not properly aligned, the fittings may be damaged and will not seal properly.*

NOTICE: *Always use genuine factory replacement oils and filters to ensure proper lubrication and filtration of engine and hydraulic system oils.*

The use of proper oils, grease, and keeping the hydraulic system clean will extend machine and component life.



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Basic instructions - Shop and assembly

L213	WE
L216	WE

Shimming

For each adjustment operation, select adjusting shims and measure the adjusting shims individually using a micrometer, then add up the recorded values. Do not rely on measuring the entire shimming set, which may be incorrect, or the rated value shown on each shim.

Rotating shaft seals

For correct rotating shaft seal installation, proceed as follows:

1. Before assembly, allow the seal to soak in the oil it will be sealing for at least thirty minutes.
2. Thoroughly clean the shaft and check that the working surface on the shaft is not damaged.
3. Position the sealing lip facing the fluid.

   NOTE: *With hydrodynamic lips, take into consideration the shaft rotation direction and position the grooves so that they will move the fluid towards the inner side of the seal.*
4. Coat the sealing lip with a thin layer of lubricant (use oil rather than grease). Fill the gap between the sealing lip and the dust lip on double lip seals with grease.
5. Insert the seal in its seat and press down using a flat punch or seal installation tool. Do not tap the seal with a hammer or mallet.
6. While you insert the seal, check that the seal is perpendicular to the seat. When the seal settles, make sure that the seal makes contact with the thrust element, if required.
7. To prevent damage to the seal lip on the shaft, position a protective guard during installation operations.

O-ring seals

Lubricate the O-ring seals before you insert them in the seats. This will prevent the O-ring seals from overturning and twisting, which would jeopardize sealing efficiency.

Sealing compounds

Apply a sealing compound on the mating surfaces when specified by the procedure. Before you apply the sealing compound, prepare the surfaces as directed by the product container.

Spare parts

Only use CNH Original Parts or NEW HOLLAND CONSTRUCTION Original Parts.

Only genuine spare parts guarantee the same quality, duration, and safety as original parts, as they are the same parts that are assembled during standard production. Only CNH Original Parts or NEW HOLLAND CONSTRUCTION Original Parts can offer this guarantee.

When ordering spare parts, always provide the following information:

- Machine model (commercial name) and Product Identification Number (PIN)
- Part number of the ordered part, which can be found in the parts catalog

Protecting the electronic and/or electrical systems during charging and welding

To avoid damage to the electronic and/or electrical systems, always observe the following practices:

1. Never make or break any of the charging circuit connections when the engine is running, including the battery connections.
2. Never short any of the charging components to ground.
3. Always disconnect the ground cable from the battery before arc welding on the machine or on any machine attachment.
   - Position the welder ground clamp as close to the welding area as possible.
   - If you weld in close proximity to a computer module, then you should remove the module from the machine.
   - Never allow welding cables to lie on, near, or across any electrical wiring or electronic component while you weld.
4. Always disconnect the negative cable from the battery when charging the battery in the machine with a battery charger.

   NOTICE: *If you must weld on the unit, you must disconnect the battery ground cable from the machine battery. The electronic monitoring system and charging system will be damaged if this is not done.*
5. Remove the battery ground cable. Reconnect the cable when you complete welding.

⚠ WARNING

Battery acid causes burns. Batteries contain sulfuric acid.
Avoid contact with skin, eyes or clothing. Antidote (external): Flush with water. Antidote (eyes): flush with water for 15 minutes and seek medical attention immediately. Antidote (internal): Drink large quantities of water or milk. Do not induce vomiting. Seek medical attention immediately.
Failure to comply could result in death or serious injury.

W0111A

Special tools

The special tools that NEW HOLLAND CONSTRUCTION suggests and illustrate in this manual have been specifically researched and designed for use with NEW HOLLAND CONSTRUCTION machines. The special tools are essential for reliable repair operations. The special tools are accurately built and rigorously tested to offer efficient and long-lasting operation.

By using these tools, repair personnel will benefit from:

- Operating in optimal technical conditions
- Obtaining the best results
- Saving time and effort
- Working in safe conditions

Hydraulic contamination – Contamination

L213	WE
L216	WE

Contamination in the hydraulic system is a major cause of the malfunction of hydraulic components. Contamination is any foreign material in the hydraulic oil. Contamination can enter the hydraulic system in several ways.

1. When you drain the oil or disconnect any line.
2. When you disassemble a component.
3. From normal wear of the hydraulic components.
4. From damaged or worn seals.
5. From a damaged component in the hydraulic system.

All hydraulic systems operate with some contamination. The design of the components in this hydraulic system permits efficient operation with a small amount of contamination. An increase in this amount of contamination can cause problems in the hydraulic system. The following list includes some of these problems.

1. Cylinder rod seals leak.
2. Control valve spools do not return to neutral.
3. Movement of control valve spools is difficult.
4. Hydraulic oil becomes too hot.
5. Pump gears, housing, and other parts wear rapidly.
6. Relief valves or check valves held open by dirt.
7. Quick failure of components that have been repaired.
8. Cycle times are slow; machine does not have enough power.

If your machine has any of these problems, check the hydraulic oil for contamination. See types of contamination below. If you find contamination, use the Portable Filter to clean the hydraulic system.

NOTE: *There are two types of contamination, microscopic and visible.*

Microscopic contamination occurs when very fine particles of foreign material are in suspension in the hydraulic oil.

These particles are too small to see or feel. Microscopic contamination can be found by identification of the following problems or by testing in a laboratory. Examples of the problems:

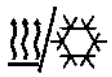
1. Cylinder rod seal leak.
2. Control valve spools do not return to NEUTRAL.
3. The hydraulic system has a high operating temperature.

Visible contamination is foreign material that can be found by sight, touch, or odor. Visible contamination can cause a sudden failure of components. Examples of visible contamination:

1. Particles of metal or dirt in the oil.
2. Air in the oil.
3. The oil is dark and thick.
4. The oil has an odor of burned oil.
5. Water in the oil.

General specification - Left-hand instrument cluster

L213	WE
L216	WE

(1)	HVAC DIAL
	Rotate this dial to adjust temperature.

(2)	FAN SWITCH
	Rotate this dial to activate the fan.

(3)	AIR CONDITIONING SWITCH
	The lamp will illuminate, to confirm the system is operational, once the fan switch has been activated.

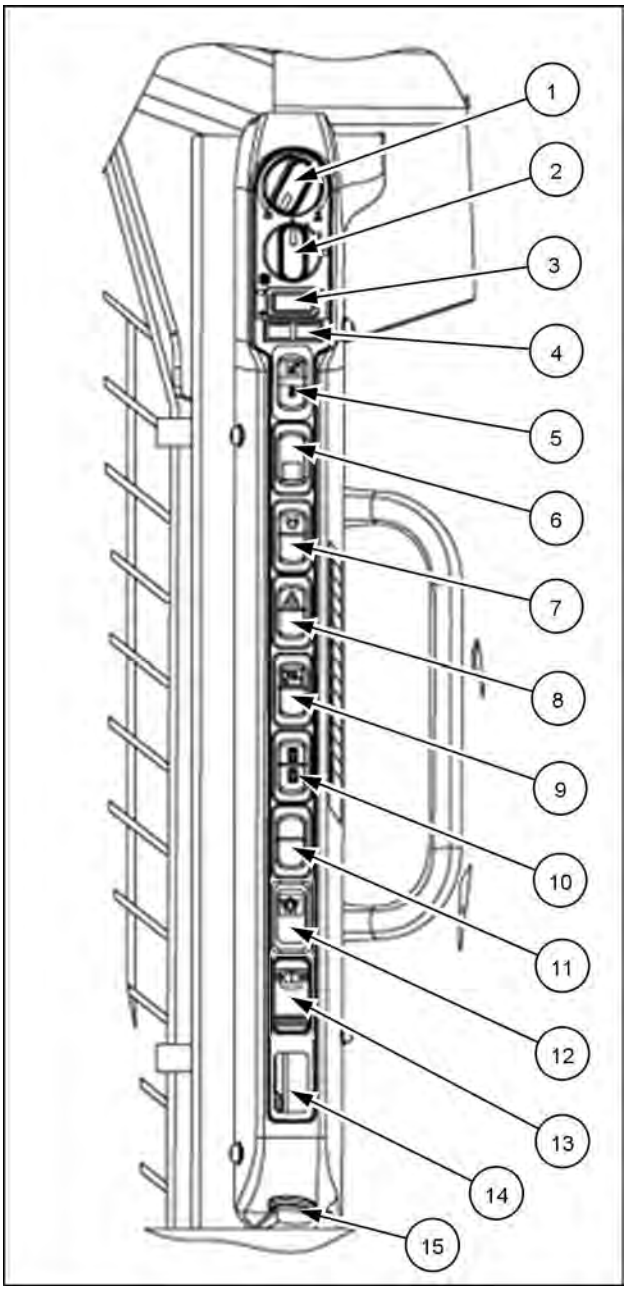
(4)	TURN SIGNAL INDICATOR
	Indicates directional turn signal operation when flashing.

(5)	HYDRAULIC ATTACHMENT COUPLER SWITCH
	Push the unlock side of this switch to unlock the coupler from the attachment. This switch must be used in conjunction with hydraulic pressure from the lift arm down, attachment curl in or auxiliary. To Lock: with the coupler properly inserted in the attachment, apply hydraulic pressure from the lift arm down, attachment curl in or auxiliary making sure that the hydraulic system goes over system relief to set lock pins.

(6)	2 SPEED INDICATOR
	Indicates 2 speed system is in use.

(7)	ROTATING BEACON SWITCH
	If equipped, push the switch to activate the rotating beacon.

(8)	HAZARD FLASHER SWITCH
	If equipped, push the switch to activate the 4-way flashers.



RAPH12SSL0031DA 1

(9)	SELF LEVELING SWITCH
	If equipped, use this switch to activate the self leveling feature.

(10)	AUXILIARY HYDRAULIC SWITCH
	Push the switch to the upper (HF) position to engage the high flow auxiliary hydraulic mode that produces **207 bar** (**3000 psi**). Push the switch into the lower (HP) position to engage the enhanced high flow mode to produce **276 bar** (**4000 psi**) if equipped with approved attachment. The lamp will illuminate when activated. Keep the switch in the neutral position to disable high flow.

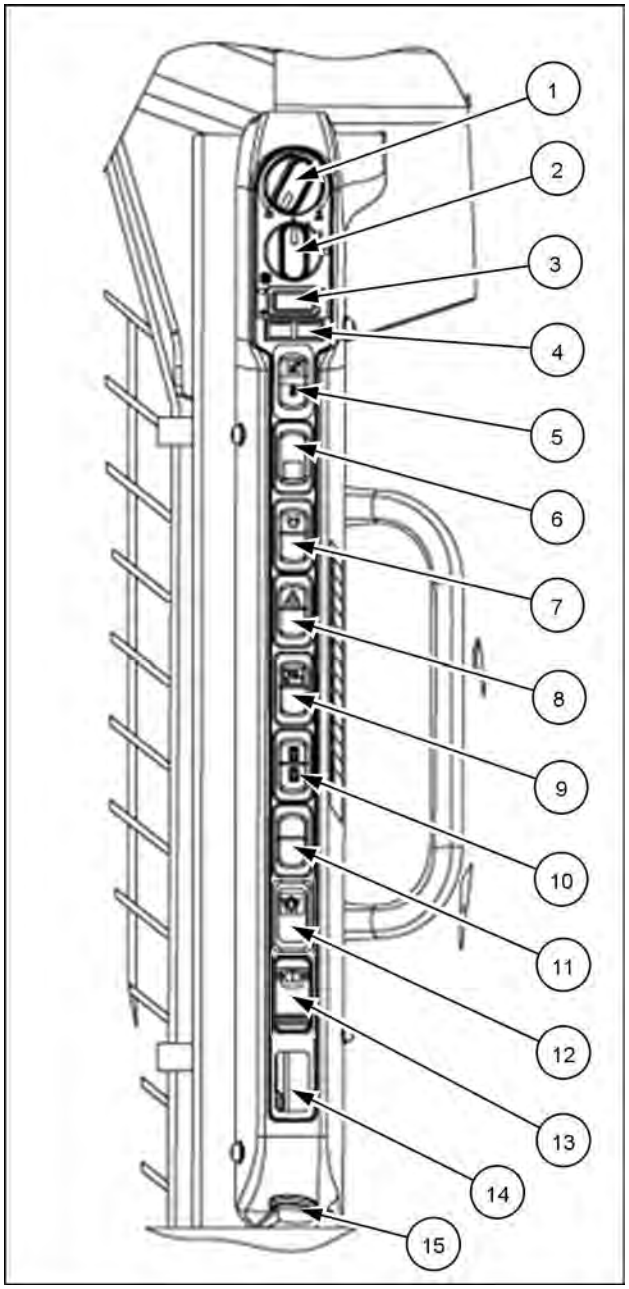
(11)	AUXILIARY ELECTRIC SWITCH #2
	If equipped, this switch is for the front electric connector.

(12)	LOADER LOCKOUT
	If equipped, push to disable loader control while roading the unit. The bucket and loader arm will be locked in the position they are in when the loader lockout switch is pressed to the ON position. This prevents the operator from inadvertently lowering or raising the loader arm or bucket while driving the machine on roads. NOTE: A mechanical machine with the loader lockout activated will result in DTC 4952 being displayed along with an amber lamp and buzzer. The auxiliary override button (lower left) on the instrument cluster can be pressed to clear the display and silence the buzzer. The amber lamp will remain illuminated.

(13)	WINDSHIELD WIPER SWITCH
	If equipped, this three position switch turns the wiper ON/OFF and operates the washer fluid spray.

(14)	BLANK
	This location is left open for any options you may add in the future.

(15)	**12 V** POWER PORT
	Supplies **12 V** of power for accessories.



RAPH12SSL0031DA 2

General specification - Electronic Instrument Cluster (EIC)

L213	WE
L216	WE

The EIC is located on the right hand cab post.

Once in the seat, the alarm sounds and selected lamps illuminate briefly. Monitor these lamps on a daily basis to confirm that they will function in the event of a system alarm. The fuel gauge and hour meter will remain illuminated for operator monitoring.

When started, the machine will be in park with the **PARK BRAKE** lamp illuminated. The **PARK BRAKE** lamp is located on the instrument cluster. The **PARK BRAKE** button switch is located on the right-hand control handle.
The operator must be in the seat with the seat belt fastened and the restraint bar lowered. The operator must push the **OPERATE** button to activate the loader arms and ground drive, after the loader is started.
A semi-hidden **SETUP** menu allows the user to view, select, change and customize a number of machine settings. A security code may be entered into the Instrument Cluster. Once the security code has been entered, each user will have to enter the code before the machine will start. Contact your dealer for detailed information on the **SETUP** menu and security feature activation.

NOTE: *Fault code definitions are located in the troubleshooting section. The updated fault code is visible to the operator on the display on the right-hand column.*

NOTICE: *Low hydraulic charge pressure will cause engagement of the park brake. With an Electro Hydraulic (EH) control unit, the* ***PARK BRAKE*** *lamp will flash and an audible alarm will sound, if this condition exists.*

(1)	KEY SWITCH
	This four position key switch has **AUX**, **OFF**, **RUN** and **START** operations.

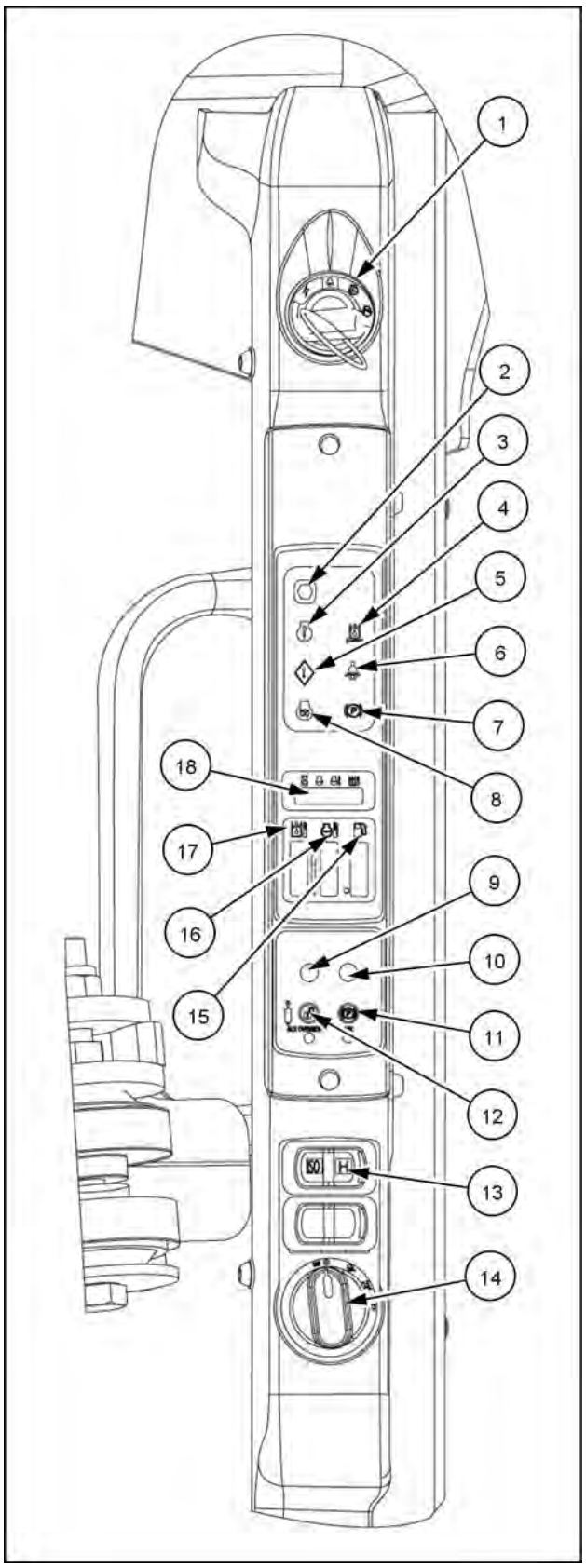
(2)	STOP
	Severe warning requiring immediate shut down, RED lamp will flash and audible alarm will sound.

(3)	ENGINE MALFUNCTION
	Yellow lamp will flash when an engine fault is detected. Use the fault code that appeared in text display and reference it in the trouble shooting section of this manual.

(4)	HYDRAULIC SYSTEM MALFUNCTION
	Yellow Lamp will flash when a hydraulic fault is detected. Use the fault code that appeared in text display and reference it in the trouble shooting section of this manual.

(5)	ELECTRONIC SYSTEM MALFUNCTION
	This yellow lamp will flash and the alarm will sound. Use the fault code that appeared in text display and reference it in the troubleshooting section of this manual.

(6)	SEAT BELT
	RED lamp will illuminate when the restraint bar is raised. RED lamp will also illuminate when the operator lifts his body off of the operator's seat.



93109329A 1

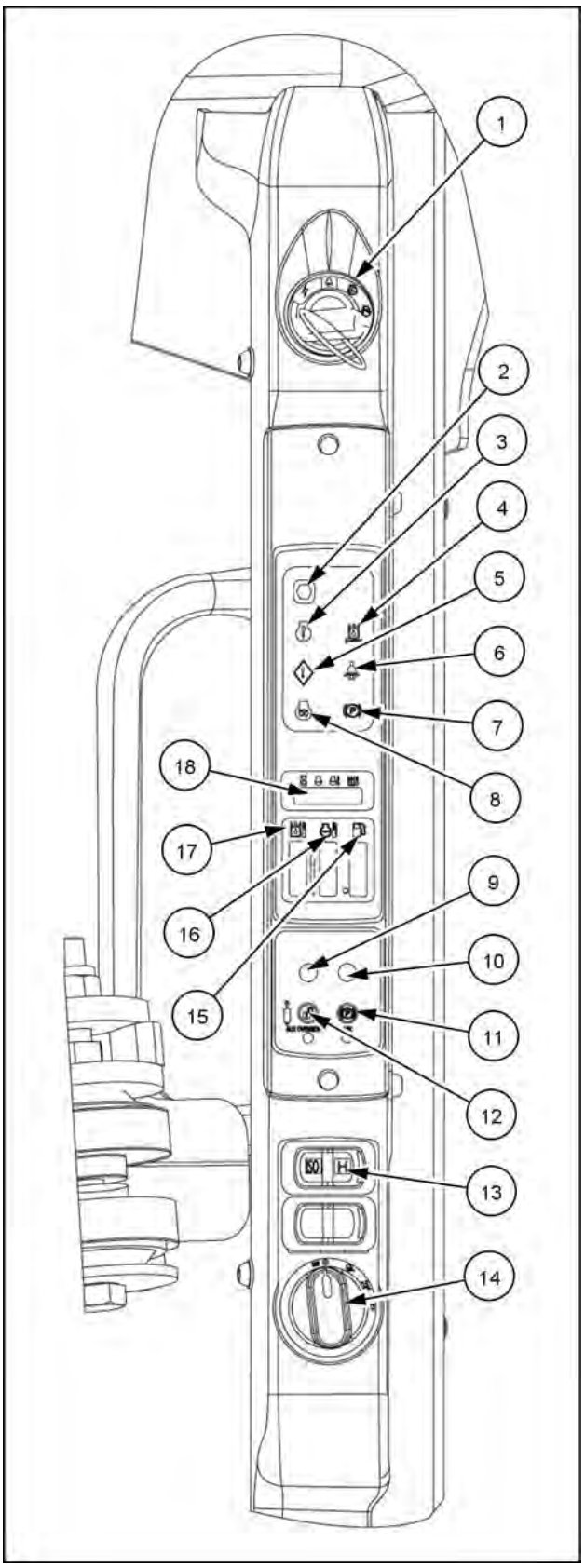
(7)	PARK BRAKE LAMP:
	This Red lamp illuminates to indicate the park brake is engaged. Under normal conditions the park brake will be set when: • The **PARK BRAKE** button switch is activated (located on the right-hand control handle) • The **OPERATE** button is activated • The engine is shut off • The engine is running and the restraint bar is raised • The operator leaves the seat

(8)	ENGINE PREHEATING LAMP:
	In cold climate starting conditions, after turning the **KEY** switch to **RUN**, this yellow engine pre-heating lamp will illuminate, instructing the operator that incoming air is being preconditioned for smoother starting. The operator must wait until the lamp goes out before attempting to start the engine.

(9)	FUNCTION BUTTON
	Use this, when in the **SETUP** menu, as the "enter" data key **NOTE:** This button is used for user code lock and unlock.

(10)	FUNCTION BUTTON
	Use this when in the **SETUP** menu, also used to scroll within the setup menu. **NOTE:** This button is used for user code lock and unlock.

(11)	**OPERATE**
	This button activates and deactivates the hydraulic system when engine is running. **NOTE:** This button is used for user code lock and unlock.



93109329A 2

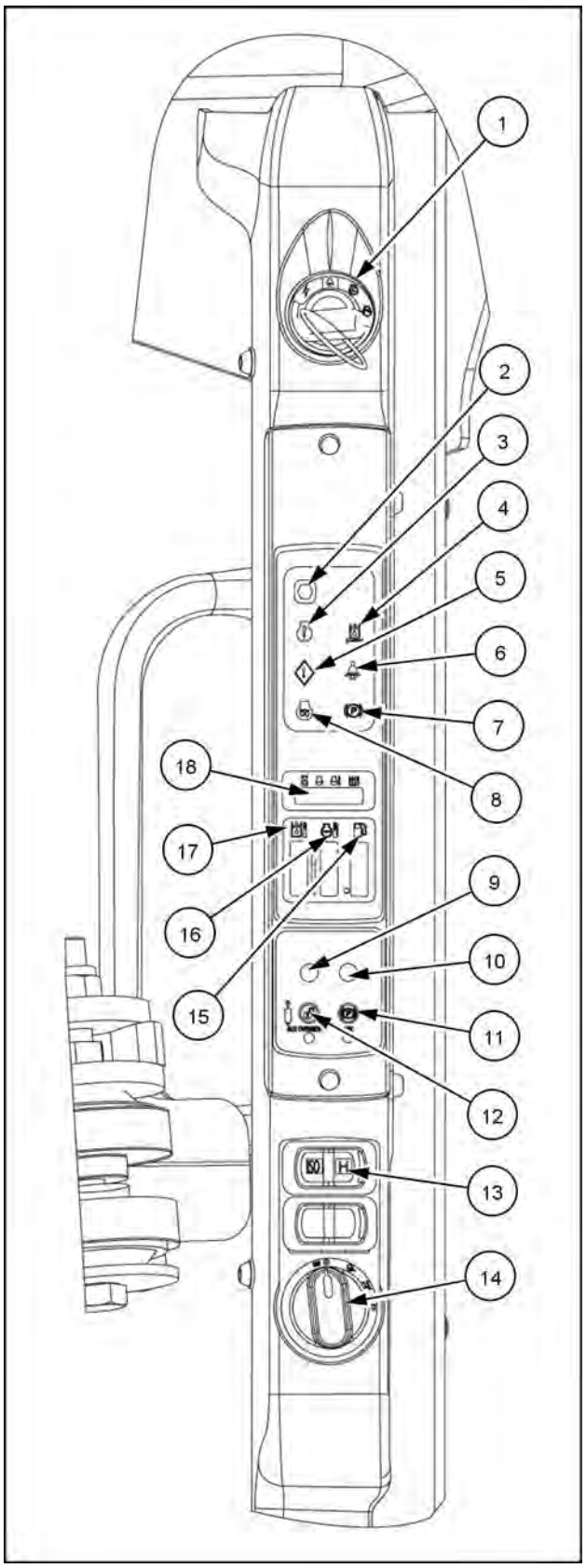
(12)	AUXILIARY HYDRAULIC INTERLOCK OVERRIDE:
	When an operator leaves the seat, oil flow to an attachment will normally be halted via direct hydraulic flow cutoff. Depress this button and leave the seat within 30 seconds to defeat this interlock. Small red indicator lamp below the switch illuminates when the interlock is defeated. **NOTE:** This button is used for user code lock and unlock.

(13)	**H / ISO** control pattern selector, if equipped`
	This selects the drive pattern type of hand control operation. Read the proper steps listed in this chapter to activate.

(14)	WORK LIGHTS
	This knob controls the external working lights and road lights.

(15)	FUEL GAUGE:
	The fuel gauge consists of a series of bars that indicate the level of fuel in the fuel tank. When all 8 bars are visible the fuel tank is full. Bottom bar flashing indicates approximately 1 gal of fuel remaining.

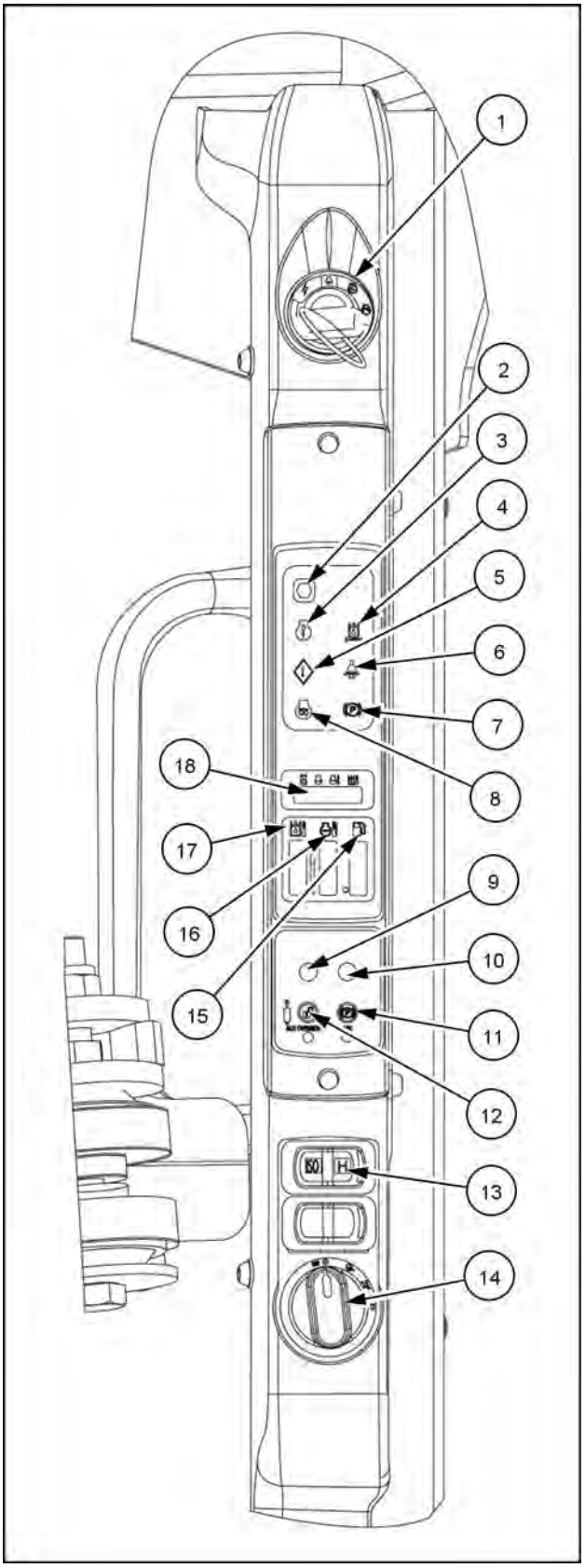
(16)	ENGINE COOLANT TEMPERATURE BAR GRAPH:
	This bar graph indicates the relative temperature of the engine coolant from **0 - 110 °C** (**32 - 230 °F**). If the coolant temperature goes above **110 °C** (**230 °F**), all 8 bars will display, the backlighting will flash, and the audible alarm will sound.



93109329A 3

(17)	HYDRAULIC FLUID TEMPERATURE BAR GRAPH:
	This hydraulic oil temperature bar graph indicates the relative temperature of the hydraulic oil from **0 - 110 °C** (**32 - 230 °F**). If the temperature exceeds **110 °C** (**230 °F**), all 8 graph segments will display, backlighting will flash, and the audible alarm will sound.

(18)	TEXT DISPLAY:
	This display will show the following during normal operation, as selected by the operator. • Engine hours: Engine hours will always be displayed momentarily when the operator initially sits in the seat. The operator may choose to leave engine hours on display continuously or select one of the following. • Engine RPM • Engine coolant temperature (degrees F or C) • Hydraulic oil temperature (degrees F or C) • Cycle: If this display option is chosen, the display will continuously cycle through all four of the above items The text display will also help the operator or technician with information as the **SETUP** menu is utilized. **NOTE:** To change display mode "on the go" hold the **AUX OVERRIDE (3)** until the current option name is displayed, push the **AUX OVERRIDE** button repeatedly until desired option name is displayed. This display mode value will continue to be shown until another selection is made.



93109329A 4

General specification - Advanced Instrument Cluster (AIC)

L213	WE
L216	WE

The AIC is located on the right hand cab post.

Once in the seat, the alarm sounds and selected lamps illuminate briefly. Monitor these lamps on a daily basis to confirm that they will function in the event of a system alarm. The fuel gauge and hour meter will remain illuminated for operator monitoring.

When started, the machine will be in park with the **PARK BRAKE** lamp illuminated. This lamp and the **PARK BRAKE** switch will be covered in the following pages.

The operator must be in the seat with the seat belt fastened. The operator must push the **OPERATE** button to activate the loader arms and ground drive, after the loader is started.

A semi-hidden **SETUP** menu allows the user to view, select, change and customize a number of machine settings. A security code may be entered into the Instrument Cluster. Once the security code has been entered, each user will have to enter the code before the machine will start. Contact your dealer for detailed information on the **SETUP** menu and security feature activation.

NOTE: *Fault code definitions are located in the troubleshooting Section. The updated fault code is visible to the operator on the display on the right-hand column.*

NOTICE: *Low hydraulic charge pressure will cause engagement of the park brake. With an Electro Hydraulic (EH) control unit, the* ***PARK BRAKE*** *lamp will flash and an audible alarm will sound, if this condition exists.*

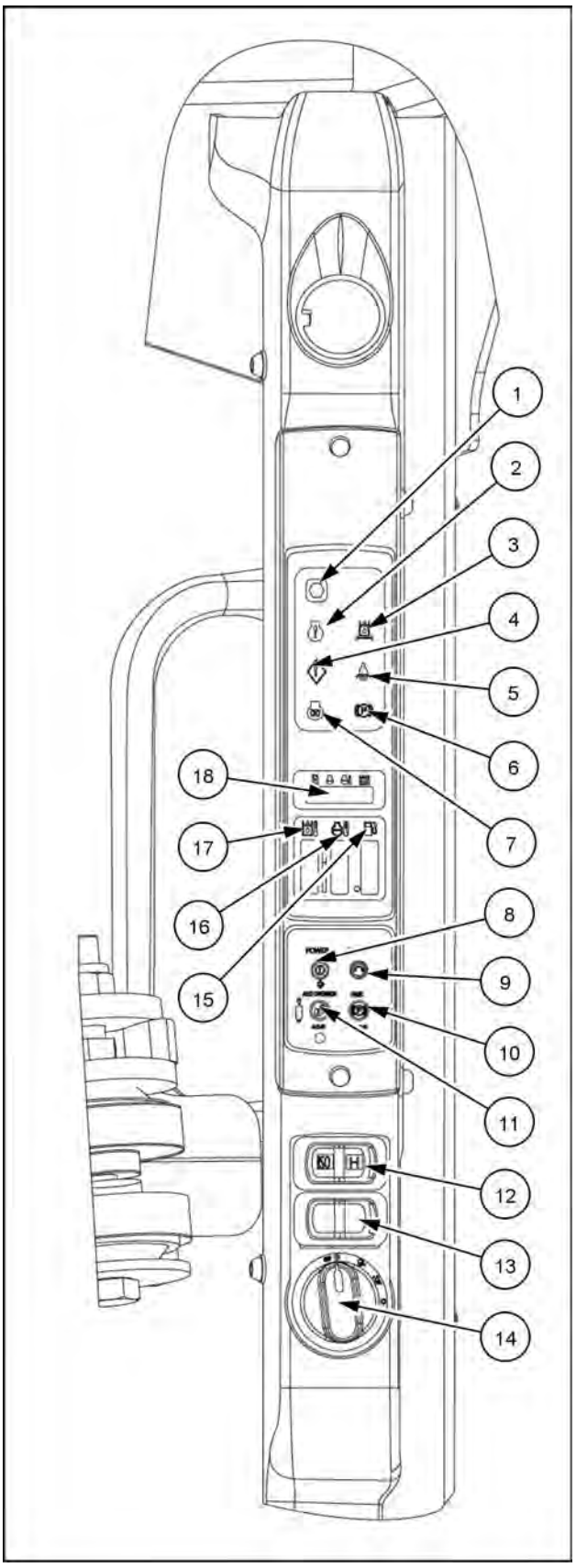
(1)	STOP
	Severe warning requiring immediate shut down, RED lamp will flash and audible alarm will sound.

(2)	ENGINE MALFUNCTION
	Yellow Lamp will flash when an engine fault is detected. Use the fault code that appeared in text display and reference it in the troubleshooting section of this manual.

(3)	HYDRAULIC SYSTEM MALFUNCTION
	Yellow Lamp will flash when a Hydraulic fault is detected. Use the fault code that appeared in the text display and reference it in the troubleshooting section of this manual.

(4)	ELECTRONIC SYSTEM MALFUNCTION
	This yellow lamp will flash and the alarm will sound. Use the fault code that appeared in the text display and reference it in the troubleshooting section of this manual.

(5)	SEAT BELT
	RED lamp will illuminate when the seat belt is not latched. RED lamp will also illuminate when the operator lifts his body off of the operator's seat.



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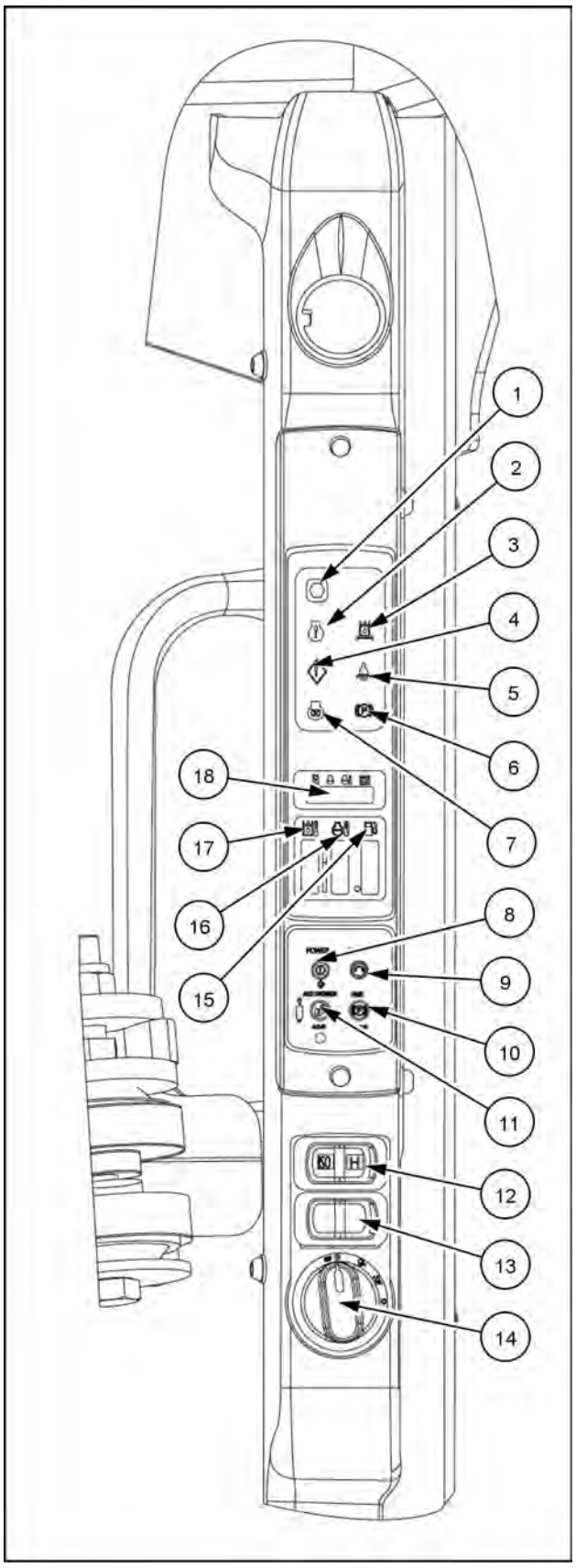
(6)	PARK BRAKE LAMP:
	This Red lamp illuminates to indicate the park brake is engaged. Under normal conditions the Park Brake will be set when: • The **PARK BRAKE** switch is activated • The **OPERATE** button is activated • The engine is shut off • The engine is running and the seat belt is not latched • The operator leaves the seat

(7)	ENGINE PREHEATING LAMP:
	In cold climate starting conditions, after turning the **KEY** switch to **RUN**, this yellow Engine Pre-Heating Lamp will illuminate, instructing the operator that incoming air is being preconditioned for smoother starting. The operator must wait until the lamp goes out before attempting to start the engine.

(8)	SYSTEM POWER:
	Push for Start-up power and Engine shut down power. Use this, when in the **SETUP** menu, as the "enter" Data Key. **NOTE:** This button is used for user code lock and unlock.

(9)	START:
	Push to actuate the starter motor and start the engine. Use this when in the **SETUP** menu, Also used to scroll within the setup menu. **NOTE:** This button is used for user code lock and unlock.



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(10)	**OPERATE**
	This button activates and deactivates the hydraulic system when engine is running. **NOTE:** This button is used for user code lock and unlock.

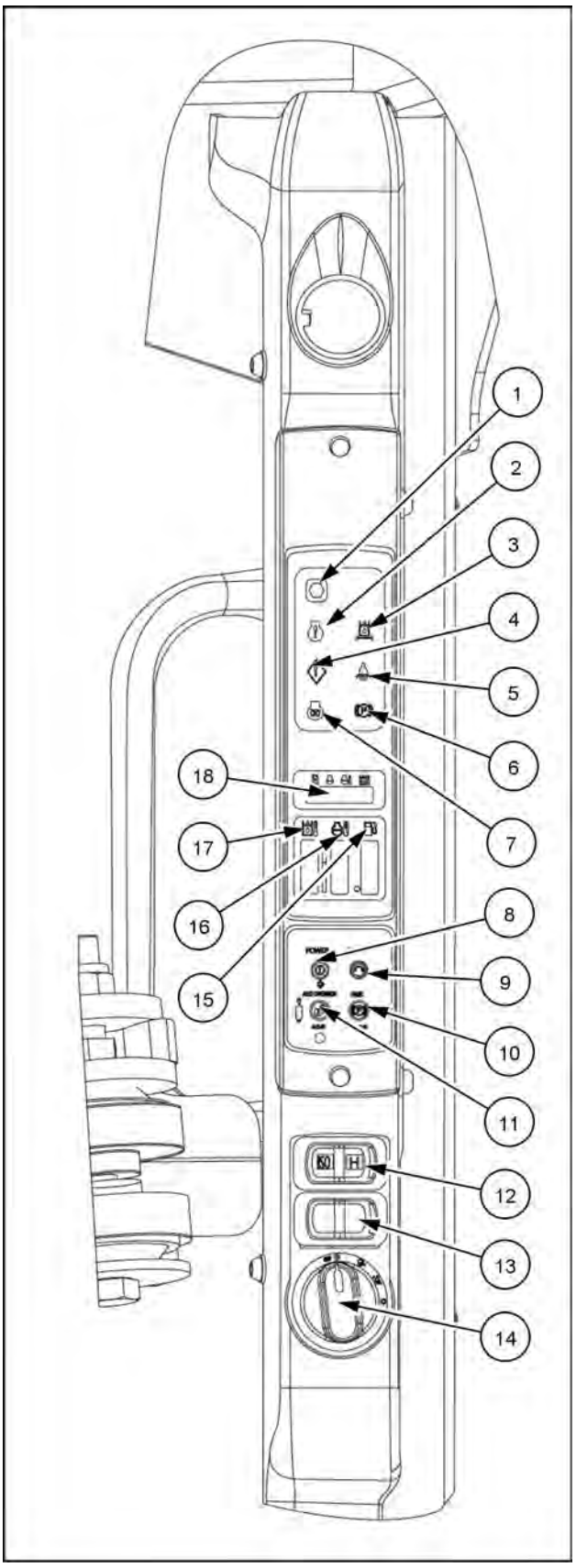
(11)	AUXILIARY HYDRAULIC INTERLOCK OVERRIDE:
	When an operator leaves the seat, oil flow to an attachment will normally be halted via direct hydraulic flow cutoff. Depress this button and leave the seat within 30 seconds to defeat this interlock. Small red indicator lamp below the switch illuminates when the interlock is defeated. **NOTE:** This button is used for user code lock and unlock.

(12)	**H / ISO** Control Pattern Selector, if equipped
	This selects the drive pattern type of hand control operation. Read the proper steps listed in this chapter to activate.

(13)	PARK BRAKE SWITCH
	Press the **PARK BRAKE** switch to activate or deactivate the parking brake. The park symbol on the instrument panel will illuminate red when the parking brake is on. The other hydraulic functions remain active when the parking brake is on.

(14)	WORK LIGHTS
	This knob controls the external working lights and road lights.

(15)	FUEL GAUGE:
	The fuel gauge consists of a series of bars that indicate the level of fuel in the fuel tank. When all 8 bars are visible the fuel tank is full. Bottom bar flashing indicates approximately 1 gal of fuel remaining.



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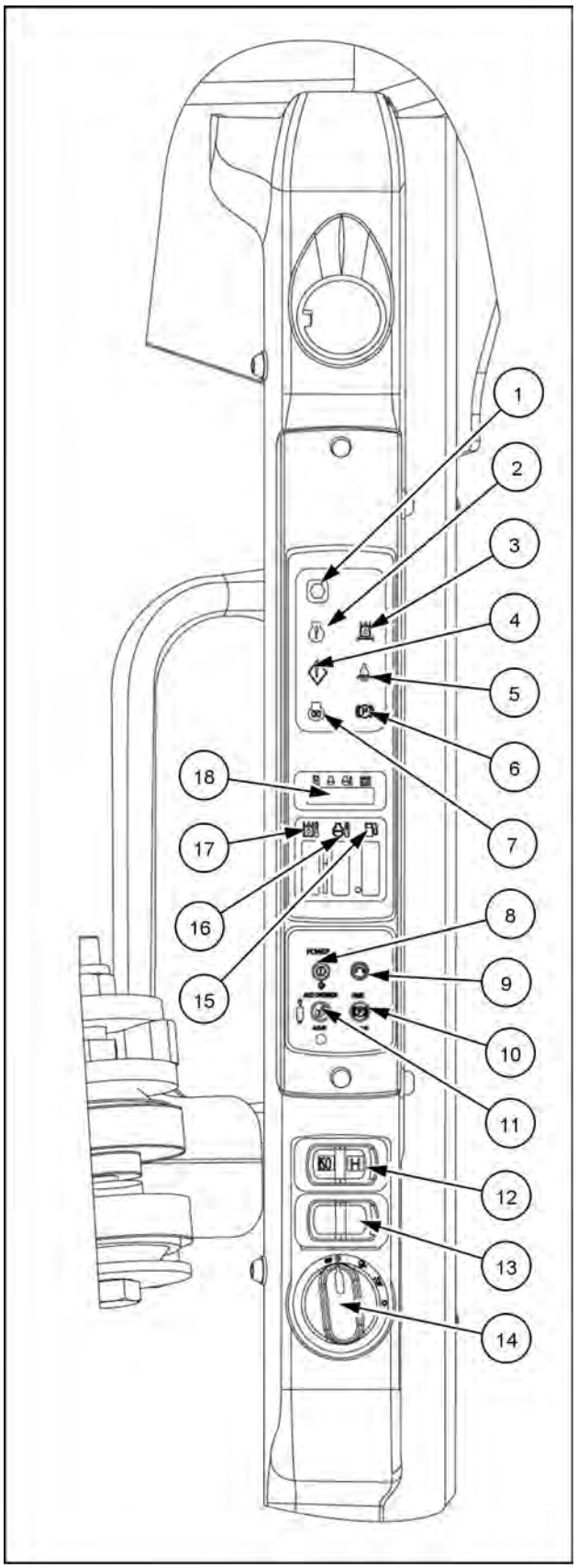
(16)	ENGINE COOLANT TEMPERATURE BAR GRAPH:
	This bar graph indicates the relative temperature of the engine coolant from **0 - 110 °C** (**32 - 230 °F**). If the coolant temperature goes above **110 °C** (**230 °F**), all 8 bars will display, the backlighting will flash, and the audible alarm will sound.

(17)	HYDRAULIC FLUID TEMPERATURE BAR GRAPH:
	This Hydraulic Oil Temperature Bar Graph indicates the relative temperature of the hydraulic oil from **0 - 110 °C** (**32 - 230 °F**). If the temperature exceeds **110 °C** (**230 °F**), all 8 graph segments will display, backlighting will flash, and the audible alarm will sound.

(18)	TEXT DISPLAY:
	This display will show the following during normal operation, as selected by the operator. • Engine Hours: Engine hours will always be displayed momentarily when the operator initially sits in the seat. The operator may choose to leave engine hours on display continuously or select one of the following. • Engine RPM • Engine Coolant Temperature (degrees F or C) • Hydraulic Oil Temperature (degrees F or C) • Cycle: If this display option is chosen, the display will continuously cycle through all four of the above items The text display will also help the operator or technician with information as the **SETUP** menu is utilized. **NOTE:** To change display mode "on the go" hold the **AUX OVERRIDE** button **(3)** until the current option name is displayed, push the **AUX OVERRIDE** button repeatedly until desired option name is displayed. This display mode value will continue to be shown until another selection is made.



93109330 4

General specification - Biodiesel fuels

L213	WE
L216	WE

Biodiesel usage in NEW HOLLAND CONSTRUCTION products

Introduction to Fatty Acid Methyl Ester (FAME) biodiesel

FAME biodiesel, called biodiesel fuel in the following section, consists of a family of fuels derived from vegetable oils treated with methyl esters.

There are two main biodiesel fuel types: Rapeseed Methyl Ester (RME) and Soybean Methyl Ester (SME). RME is a blend of rapeseed and sunflower methyl ester, and is the preferred crop in Europe. SME is the preferred crop in the United States.

Biodiesel fuel is a renewable alternative fuel source. Its use and development is promoted worldwide, especially in Europe and in the United States.

NOTICE: *Your Selective Catalytic Reduction (SCR) system is compatible with up to* ***20 %*** *biodiesel fuel (B20). Be aware that the use of biodiesel fuel that does not comply with the standards mentioned in this section could lead to severe damage to the engine, fuel system or aftertreatment system of your machine. The use of non-approved fuels may void NEW HOLLAND CONSTRUCTION Warranty coverage.*

Biodiesel fuel can be used to run diesel engines as pure biodiesel fuel or when blended with standard diesel fuel:

- B5: indicates the blend of **5 %** biodiesel and **95 %** diesel fuels.
- B7: indicates the blend of **7 %** biodiesel and **93 %** diesel fuels.
- B20: indicates the blend of **20 %** biodiesel and **80 %** diesel fuels.
- B100: indicates pure biodiesel, or **100 %** biodiesel fuel. Do not use.

Biodiesel fuel has several positive features in comparison with diesel fuel:

- Biodiesel fuel adds lubricity to the fuel, which is beneficial in many circumstances, particularly as sulfur and aromatics are removed from the fuel.
- Biodiesel has a greater cetane number and burns cleaner.
- Biodiesel produces less particulate matter and reduces smoke emissions.
- Biodiesel is fully biodegradable and non-toxic.

Diesel and biodiesel fuel specifications

Tier 4a diesel fuel specifications are covered by the following:

- **ASTM D975-10**, Standard Specification for Diesel Fuel Oils. (15 ppm sulfur maximum.)

Biodiesel blends are covered by:

- United States Diesel Fuel Specification **ASTM D6751-09A** allows up to **5 %** biodiesel since 2009. United States fuel suppliers are allowed to use up to **5 %** biodiesel fuel (B5) to supply the network.
- United States Biodiesel Fuel Specification **ASTM D7467-09A** provides specifications for diesel and biodiesel blends from B5 to B20.

Pure biodiesel (B100) specification is covered by the following requirements:

- **ASTM D6751-09A** - Standard specification for biodiesel fuel blend stock (B100) for middle distillate fuels.

  NOTE: ASTM D6751 *specification has been updated to improve the quality of biodiesel in the market place.*

Before raw oil can be converted into usable biodiesel fuel, it must undergo transesterification to remove glycerides. During the transesterification process, the oil reacts with an alcohol to separate the glycerine from the fat or vegetable oil. This process leaves behind two products: methyl ester (the chemical name for biodiesel) and glycerine (a byproduct usually sold for use in soaps or other products).

NOTICE: *Biodiesel fuels approved for use in the NEW HOLLAND CONSTRUCTION equipment must be transesterified and comply with the North America Standard* ***ASTM D6751****.*

NOTICE: *Cold Pressed Biodiesel, Cold Pressed Oil, Straight Vegetable Oil (SVO), or more generally unrefined vegetable oils used as motor fuel, are fuels that are normally made from Rapeseed oil or similar high oil content crops. These kinds of fuel are not transesterified, so they do not fulfil the* ***ASTM D6751*** *requirements. There is no recognized quality standard available for these types of fuel. Therefore the use of Cold Pressed Biodiesel, Cold Pressed Oil, Straight Vegetable Oil (SVO), or more generally unrefined vegetable oils used as motor fuel are NOT APPROVED at any blend in any NEW HOLLAND CONSTRUCTION product.*

NOTICE: *Any engine and fuel injection equipment fitted to a NEW HOLLAND CONSTRUCTION vehicle found to have run with any blend of NON-APPROVED fuel (fuel not fulfilling the specification described in the requirement* ***ASTM D6751****) will no longer be covered for Warranty by NEW HOLLAND CONSTRUCTION.*

Biodiesel fuel usage conditions

You must stringently follow the biodiesel fuel usage conditions. Incorrect application of the biodiesel fuel usage conditions could lead to severe damage to the engine, fuel injection equipment and aftertreatment system.

The main concerns related to operation with biodiesel fuels are:

- Filters and injector blockage caused by poor fuel quality.
- Wear and corrosion of internal components due to water content, which affects lubricity.
- Deterioration of some rubber sealing compounds in the fuel system.
- Biodiesel oxidation, which can lead to the formation of deposits that can harm the fuel injection system.

NOTICE: *Any problem in the engine fuel injection equipment associated with non-compliance to the following conditions for biodiesel fuel handling and maintenance will not be covered for Warranty by NEW HOLLAND CONSTRUCTION.*

Purchase biodiesel fuel from a trusted supplier who understands the product and maintains acceptable fuel quality. It is highly recommended that you use biodiesel from BQ 9000 accredited suppliers to maintain the quality and consistency of the fuel. The BQ 9000 Quality Management Program is accredited by the National Biodiesel Board for producers and marketers of biodiesel fuel. See the National Biodiesel Board website at www.biodiesel.org for more information.

The use of biodiesel blends above B5 through B20 will not void the NEW HOLLAND CONSTRUCTION warranty as long as the following conditions for biodiesel fuel handling and maintenance are stringently followed:

Biodiesel fuel must be pre-blended by the supplier. Mixing biodiesel fuels on-site can result in an incorrect mixture that could damage the engine and/or fuel system.

For machines using Tier 4a engines with SCR aftertreatment:

1. If the biodiesel blend stock to **ASTM D6751-09A** is used, special precautions need to be taken to insure that it fully complies with the following special requirements:
   - Group I Metals content (Sodium + Potassium) is ≤ **5 mg/kg** per **EN14538** as specified in the biodiesel spec.
   - Group II Metals content (Calcium + Magnesium) is ≤ **5 mg/kg** per **EN14538** as specified in the biodiesel spec.
   - Phosphorus content lower than specified is a mandatory requirement. Phosphorus must not exceed **4 mg/kg** per **ASTM D4951**.
2. The resulting greater than B5 through B20 blend must not exceed **1 mg/kg** for Group I Metals (Sodium + Potassium) and for Group II Metals (Calcium + Magnesium).

NOTICE: For machines using Tier 4a engines with SCR aftertreatment in regions where the biodiesel blend stock is supplied to the ASTM D6751-09A standard, it is essential that evidence of compliance to the special limits for Group I Metals, Group II Metals and the reduced phosphorus content specified above be obtained on every delivery of fuel from the fuel supplier. Failure to comply with this requirement can result in damage to the SCR system which will not be covered under warranty.

NOTICE: *NEW HOLLAND CONSTRUCTION may void your warranty if the problem is associated with poor fuel quality due to improper blending. It is the responsibility of the fuel supplier and/or yourself to ensure the right type of fuel and blend is delivered and used.*

Maintenance intervals

For machines using the all electronic engines with a high pressure common rail fuel system, the engine oil and filter change interval is reduced down to 50% of the standard value when using biodiesel blends greater than B5 up to B20. Please refer to the maintenance intervals specified in the Operator Manual for all engines.

Check all hoses, connections and gaskets to ensure integrity and cleanliness every 3 months or 150 hours of operation, whichever comes first.

Regular oil sampling is highly recommended to monitor for oil and engine deterioration.

NOTE: *Oil sampling kits are available from your authorized NEW HOLLAND CONSTRUCTION dealer.*

When switching back from biodiesel to regular #2 diesel, all fuel filter, oil and oil filter should be changed even if this falls between routine service intervals.

Storage

The machine should not be stored for more than three months with biodiesel in the fuel system. For longer storage time, it is strongly suggested that only regular #2 diesel fuel is used.

NOTE: *If storage for longer than 3 months is necessary, the engine must be run on regular #2 diesel for a minimum of* ***20 h*** *to flush the biodiesel fuel out of the fuel system prior to storage.*

Biodiesel is highly hygroscopic and tends to collect water more than diesel fuel. This increases the risk of algae and bacteria growth which can cause severe damage to the fuel injection system. Keep the machine fuel tanks and on-site storage tanks as full as possible to limit the amount of air and water vapors inside the tank. Drain water from the tanks at least once a week.

NOTICE: *Do not use biocide additives on Tier 4a engines with an exhaust aftertreatment system.*

Capacities

L216 TIER 4 [NEM477964 -]	WE

Fuel tank

Capacity	
L213 and L216	**60.5 l** (**16.0 US gal**)
L218 and L220	**75.5 l** (**20.0 US gal**)
L230 and C238	**95.5 l** (**25.5 US gal**)
Specifications	#1 or #2 Diesel ultra low sulfur

Cooling system

Capacity	
L213	**15.0 l** (**4.0 US gal**)
L218, L220, and L216	**15.6 l** (**4.2 US gal**)
L230 and C238	**19 l** (**5 US gal**)
Specifications	**50 %** distilled water and **50 %** ethylene glycol

Hydraulic system

Reservoir capacity	**15.0 l** (**3.96 US gal**)
System capacity:	
L213 and L216	**29.2 l** (**7.7 US gal**)
L218 and L220	**38.1 l** (**10.0 US gal**)
L230 and C238	**45.4 l** (**12.0 US gal**)
Specifications	**NEW HOLLAND AMBRA SUPER GOLD 10W-30**

Chain compartments

Capacity - each side	
L213 and L216	**6.25 l** (**6.6 US qt**)
L218 and L220	**7.4 l** (**7.9 US qt**)
L230	**22.2 l** (**23.5 US qt**)
Specifications	**NEW HOLLAND AMBRA SUPER GOLD 10W-30**

Grease fittings

Quantity	As required
Specifications	Molydisulfide grease

Engine crank case oil

Capacity - with filter change	
L213, L216, L218, and L220,	**7 l** (**7.5 US qt**)
L230 and C238	**8.5 l** (**8.9 US qt**)
Specifications	**NEW HOLLAND AMBRA UNITEK MASTERGOLD SBL CJ-4**

Final track drive

Capacity - each side	**1.0 l** (**1.06 US qt**) +/- **0.1 l** (**0.1 US qt**)
Specifications	**NEW HOLLAND GEAR 135 EP**

Capacities

L213 TIER 3 [NEM459110 -]	WE

Fuel tank

Capacity	
L213, L215	**60.5 l** (**16.0 US gal**)
L218, L220, L223, L225, L230	**75.5 l** (**20.0 US gal**)
C227, C232, C238	**95.5 l** (**25.5 US gal**)
Specifications	#2 Diesel

Cooling system

Capacity	
L213	**15 l** (**4.0 US gal**)
L215, L218, L220	**15.6 l** (**4.2 US gal**)
L223, L225, L230, C232, C238	**19 l** (**5 US gal**)
C227	**17 l** (**4.5 US gal**)
Specifications	**50 %** distilled water and **50 %** ethylene glycol

Hydraulic system

Reservoir capacity	**15.0 l** (**3.96 US gal**)
System capacity:	
L213, L215	**29.2 l** (**7.7 US gal**)
L218, L220, C227	**38.1 l** (**10.0 US gal**)
L223, L225, L230, C232, C238	**45.4 l** (**12.0 US gal**)
Specifications	10W-30 Engine Oil

Chain compartments

Capacity - each side	
L213, L215	**6.25 l** (**6.6 US qt**)
L218, L220	**7.4 l** (**7.9 US qt**)
L223, L225, L230	**22.2 l** (**23.5 US qt**)
Specifications	10W-30 Engine Oil

Grease fittings

Quantity	As required
Specifications	Molydisulfide grease

Engine crank case oil

Capacity - with filter change	
L213, L215, L218, L220	**7.0 l** (**7.5 US qt**)
L223, L225, L230, C227, C232, C238	**9.5 l** (**10 US qt**)
Specifications	10W-30 Engine Oil **Engine - Check (10)**

Final track drive

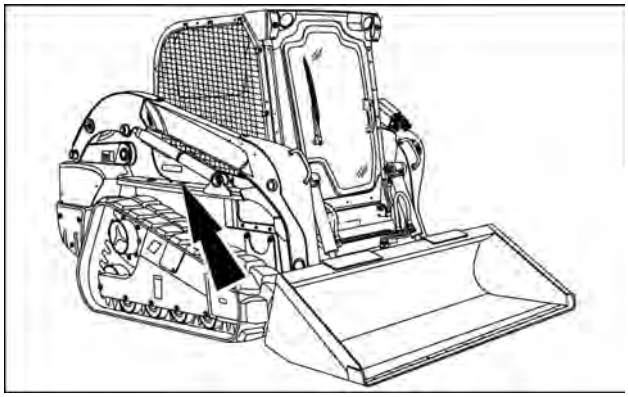
Capacity - each side	**1.0 l** (**1.06 US qt**) +/- **0.1 l** (**0.1 US qt**)
Specifications	**NEW HOLLAND GEAR 135 EP**

Product identification

L216	WE

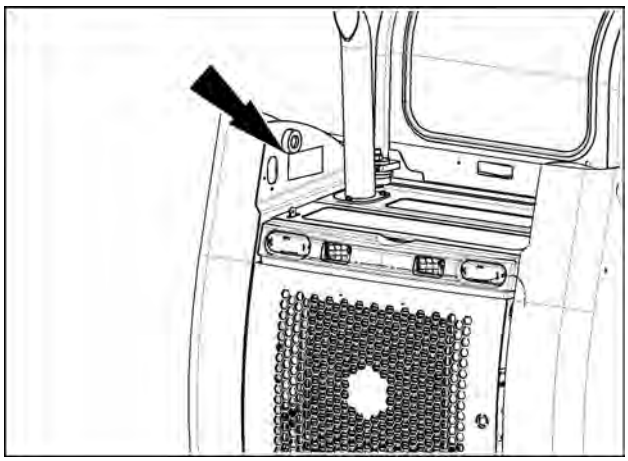
Product Identification Number (PIN).

- Outside right side of chassis - vertical lift



9310748611 1

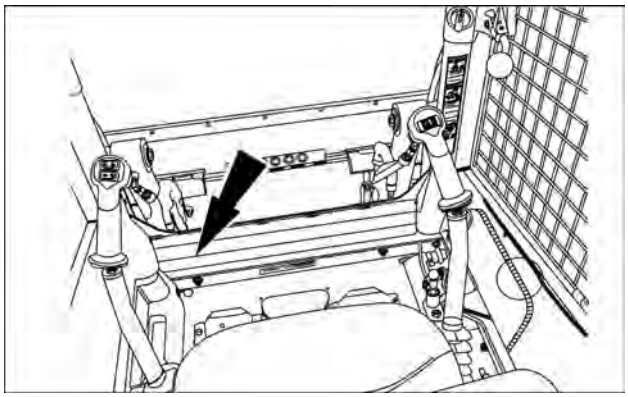
- Inside left side lift arm tower - radial lift



931002296A 2

Roll Over Protective Structure (ROPS) certification plate.

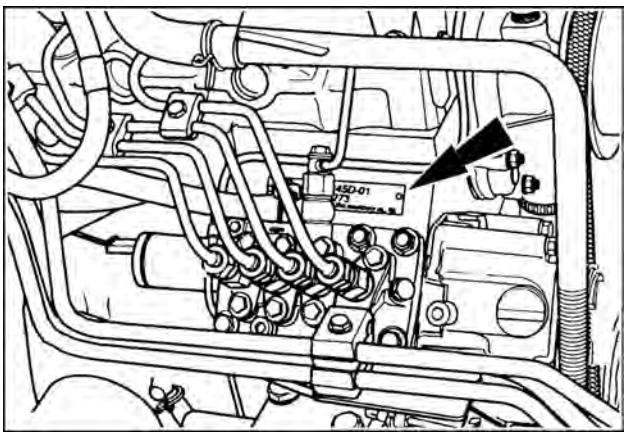
- Front edge (lower) inside cab.



931007505A 3

Engine serial number plate location for Models L213 and L216

- On the fuel injection pump.



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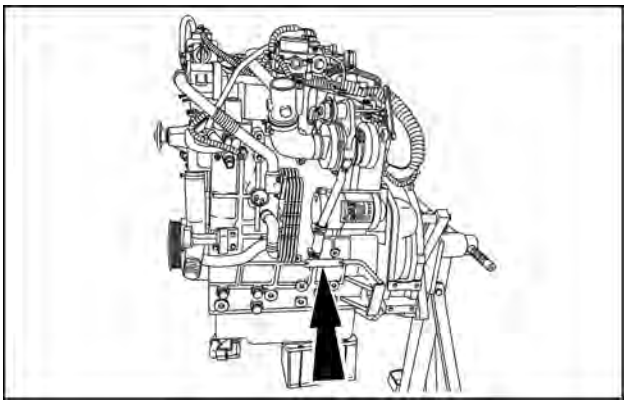
Engine serial number plate location for Models L218 and L220

- On the right-hand side of the engine.



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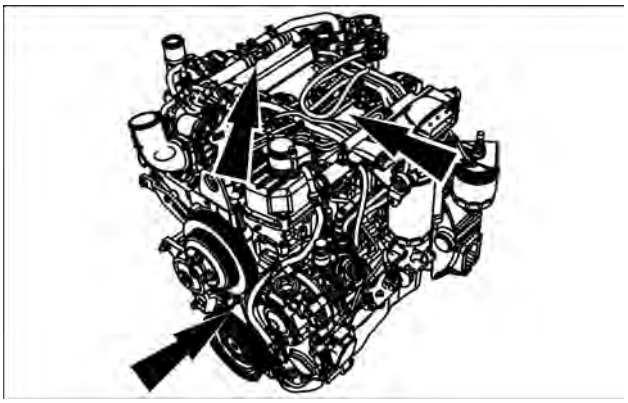
Engine serial number plate location for Models L221, L223, L225, L230, L232, L238, C227, C232, and C238

- On top of the Exhaust Gas Recirculation (EGR) cooler.
- On top of the valve cover.
- The serial number is also stamped on the engine front cover.



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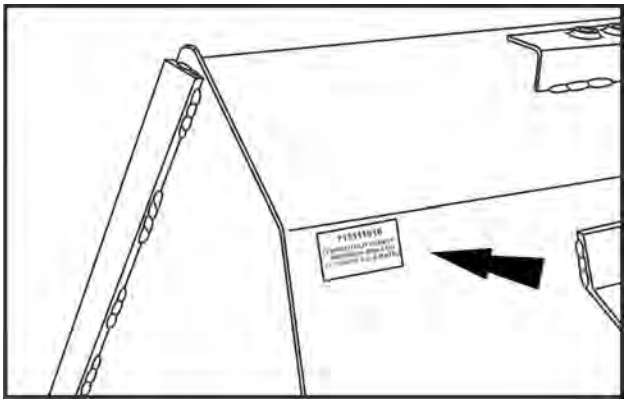
Bucket identification plate



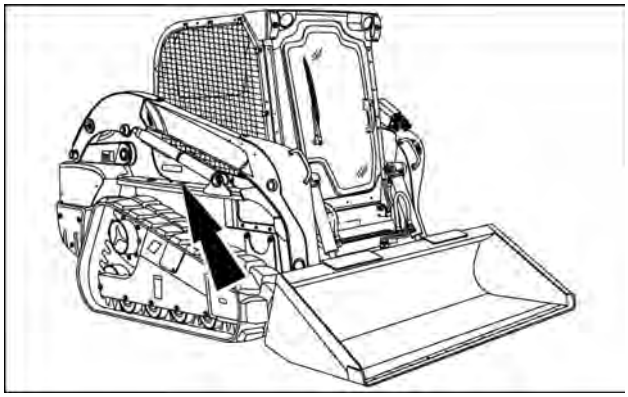
BT04F026-01 7

Product identification

L213 TIER 3 [NEM459110 -]	WE

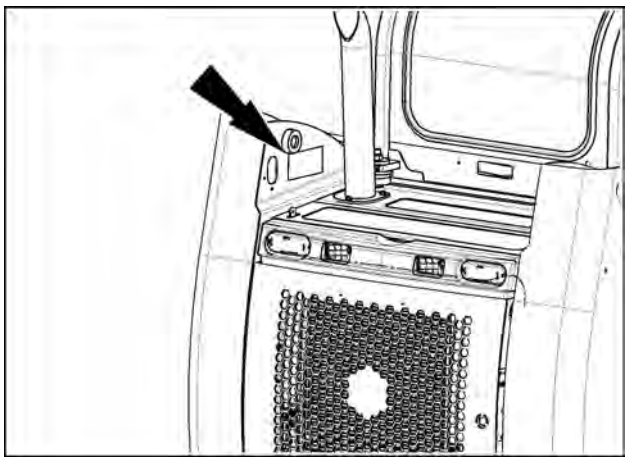
Product Identification Number (PIN).

- Outside right side of chassis - vertical lift



9310748611 1

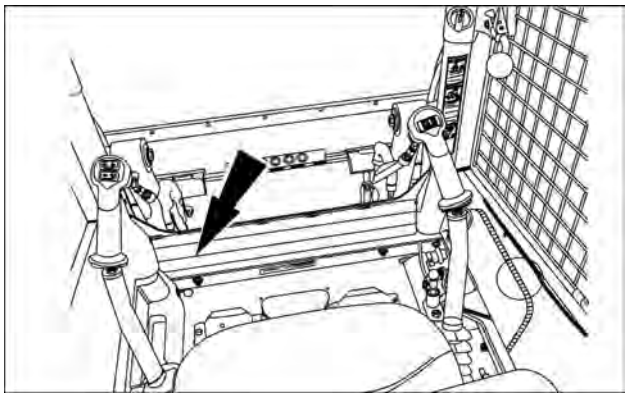
- Inside left side lift arm tower - radial lift



931002296A 2

Roll Over Protective Structure (ROPS) certification plate.

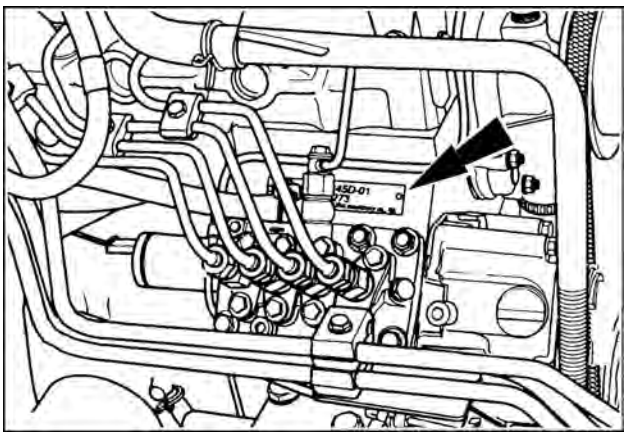
- Front edge (lower) inside cab.



931007505A 3

Engine serial number plate

Located on the fuel injection - ISM engines.	
L213	ISM engine
L215	
L218	
L220	



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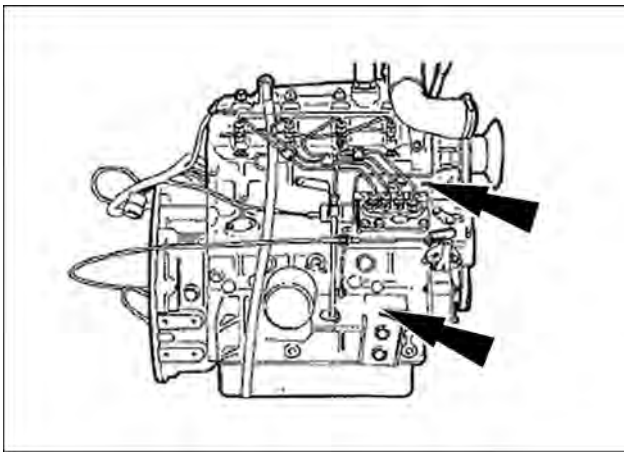

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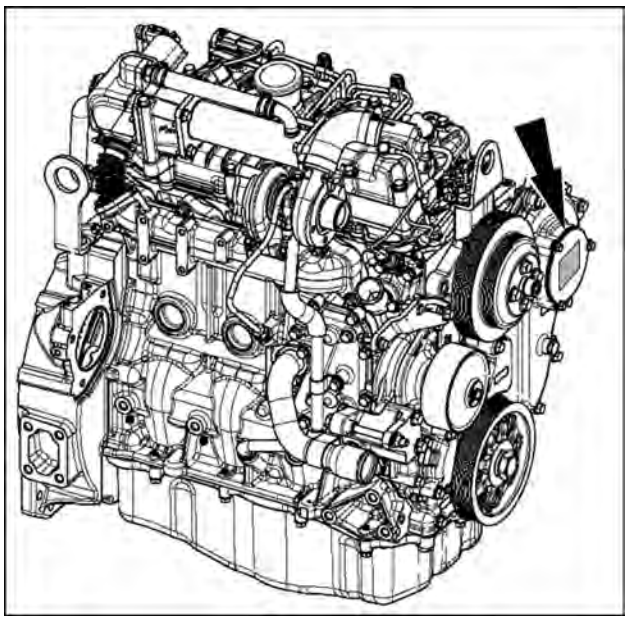
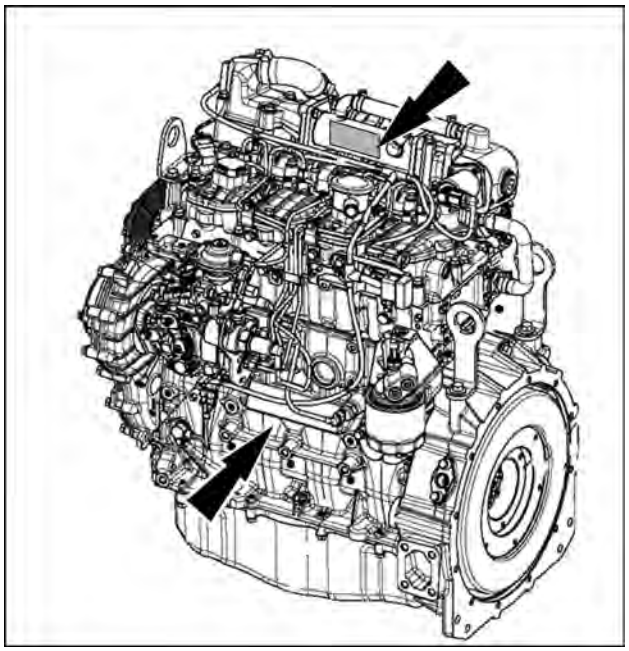
Located at the end of the engine that is facing rearward	
L223	F5C engines
L225	
L230	
C227	
C232	
C238	

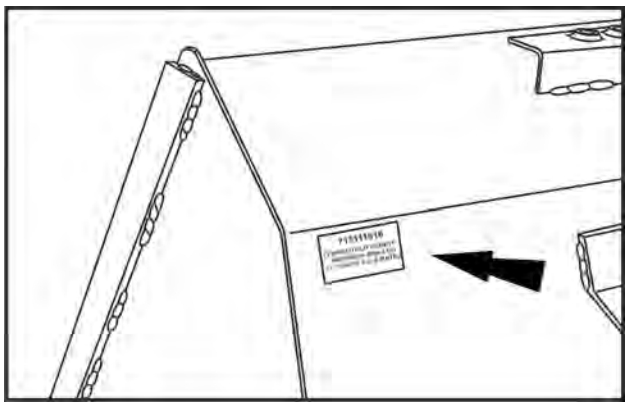


931002236 6



931002237 7

Bucket identification plate



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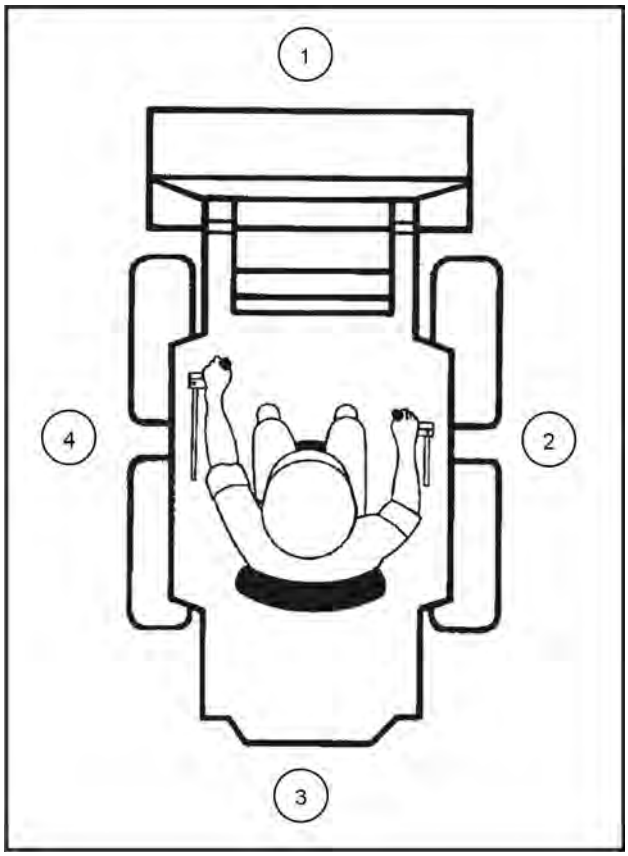
Product identification

L213	WE
L216	WE



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The terms front (1), right (2), rear (3), and left (4) are used in this manual to indicate the direction as seen from the operator's seat.

SERVICE MANUAL

Engine

L213 TIER 3 [NEM459110 -]
L216 TIER 4 [NEM477964 -]

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L213 TIER 3 [NEM459110 -]
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