



EN

Operation & Maintenance Manual

Telescopic Handler



TL25.60RB S/N: B5PY11001 & Above



OPERATOR SAFETY WARNINGS



- Never operate without instructions. See machine signs (decals), Operation & Maintenance Manual.
- Operator must have instructions before operating the machine. Untrained operators can cause injury or death.

SAFETY EQUIPMENT

The Bobcat machine must be equipped with safety items necessary for each job. Ask your Bobcat dealer for information on the availability and safe use of attachments and accessories.

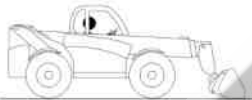
- **SEAT BELT:** Check belt fasteners and check for damaged webbing or buckle.
- **OPERATOR CAB (Roll-Over Protective Structure (ROPS) AND Falling-Object Protective Structure (FOPS):** It must be on the telescopic handler with all fasteners tight. Never operate without right window.
- **OPERATOR'S HANDBOOK:** Must be in the cab.
- **SAFETY SIGNS (DECALS):** Replace if damaged.
- **SAFETY TREADS:** Replace if damaged.
- **GRAB HANDLES:** Replace if damaged.
- **BOOM STOP:** Replace if damaged.
- **PARKING BRAKE:** Check for function.
- **WINDOWS AND MIRRORS:** Clean and check for broken glass or mirrors. Replace if damaged.



This check mark means: "Follow instructions for proper operations." Carefully read the message that follows.



- Always fasten seat belt snugly.
- Always keep your feet and arms inside the cab.



- Never use telescopic handler without operator cab with ROPS and FOPS approval.

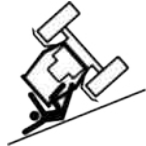
OPERATOR SAFETY WARNINGS



This Safety Alert Symbol means: "Attention! Be Alert! Your Safety is Involved!" Carefully read the message that follows.



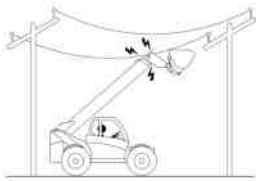
- Never carry riders.



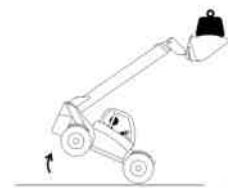
- Never use telescopic handler without operator cab with ROPS AND FOPS approval.
- Fasten your seat belt.



- Do not use machine in atmosphere with explosive dust, explosive gas, or where exhaust can contact flammable material.



- Check for overhead or underground power lines before operating.
- Keep boom, attachment, and load a minimum of 3 m (10 ft) away from electrical power lines.



- Never exceed Rated Load Capacity.
- Read and understand the Load Capacity Charts.
- Always carry buckets or attachments as low as possible.
- Do not travel or turn with boom up.
- Load, unload, and turn on flat level ground.



- Never exit the machine with engine running or with boom raised.
- To park, put transmission in NEUTRAL, engage parking brake, put attachment flat on the ground and stop the engine.



- Never modify equipment.
- Use only attachments approved by Bobcat Company for this machine model.



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FOREWORD	7
EC DECLARATION OF CONFORMITY	7
UK DECLARATION OF CONFORMITY	8
DECLARATION OF CONFORMITY (RADIO)	9
EC DECLARATION OF CONFORMITY (JIB)	11
UK DECLARATION OF CONFORMITY (JIB)	12
DECLARATION OF CONFORMITY (HYDROFLUOROCARBON)	13
INTRODUCTION	14
Bobcat Company Is ISO 9001 Certified	14
MANUFACTURER	14
France	14
SERIAL NUMBER LOCATION	15
Telescopic Handler Serial Number	15
Engine Serial Number	15
Other Serial Numbers	15
DELIVERY REPORT	16
TELESCOPIC HANDLER IDENTIFICATION	16
Front View	16
Rear View	17
FEATURES, ACCESSORIES, AND ATTACHMENTS	17
Standard Items	17
Options And Accessories	18
Available Tyres	18
Available Rims	19
Front And Roof Window Guard	19
Front And Roof Window Guard Inspection And Maintenance	19
Attachments	19
SAFETY AND TRAINING RESOURCES	21
SAFETY INSTRUCTIONS	21
Before Operation	21
Safe Operation Is The Operator's Responsibility	21
Safe Operation Needs A Qualified Operator	21
A Qualified Operator Must Do The Following	21
Silica Dust Exposure	22
Dismantling And Disposal	22
FIRE PREVENTION	22
Maintenance	22
Operation	22
Electrical	22
Hydraulic System	22
Fuelling	23
Starting	23
Welding And Grinding	23
Fire Extinguishers	23
PUBLICATIONS AND TRAINING RESOURCES	23
PICTORIAL ONLY SAFETY SIGNS	24
MACHINE SIGNS (DECALS)	25
LOAD CHARTS	38
CHARTS FOR THE MACHINE WITH PALLET FORKS INSTALLED	38
Chart for the machine TL25.60RB on R1 tyres with Pallet Forks (1.0 m):	38
Chart for the machine TL25.60RB on R2 tyres with Pallet Forks (1.0 m):	38
Chart for the machine TL25.60RB with Pallet Forks (1.5 m):	38
CHART FOR THE MACHINE WITH PALLET FORKS WITH SIDE SHIFT INSTALLED	39

OPERATING INSTRUCTIONS	41
INTENDED USE	41
OPERATOR CONTROLS IDENTIFICATION	42
Operator Components	42
Travel Direction	42
Steering Wheel	43
Multi-function Lever	43
Wiper Lever	44
Adjusting The Steering Wheel	44
Centre Panel	45
Centre Console Panel	45
Right Console Panel	46
Longitudinal Load Moment Indicator (LLMI)	49
Standard Display	51
USB Port	53
Accelerator Pedal	53
Service Brake Pedal And Inching Control	53
Sight Level Gauge	53
REAR VIEW CAMERA SYSTEM	54
Rear View Camera System Description	54
Maintaining Rear View Camera System	54
Adjusting Rear View Camera System	54
OPERATOR CAB	55
Operator Cab Description	55
Cab Door	55
Cab Door Window	56
Rear Cab Window	57
Cab Light	57
STEERING MODE	58
Selecting The Steering Mode	58
Aligning Modes	59
Selecting Steering Aligning Modes	59
Semi-Automatic Aligning Procedure	59
Manual Aligning Mode Procedure	59
Quick Wheel Realignment	60
DIESEL PARTICULATE FILTER (DPF) SYSTEM	61
DPF Description	61
DPF Regeneration Status Icons	61
DPF Regeneration Tables	61
Automatic Regeneration Operation	62
Forced Parked Regeneration Operation	64
Inhibit Mode Operation	65
PARKING BRAKE	67
Operating The Parking Brake	67
EMERGENCY EXIT	67
Rear Window	67
BACK-UP ALARM SYSTEM	68
Back-Up Alarm System Description	68
Back-Up Alarm System Operation	68
DRIVING AND STEERING THE MACHINE	68
Driving And Steering The Machine Procedure	68
Stopping The Machine	69
FLEX DRIVE	69
Setting Engine Speed In Flex Drive Mode	69
BOOM SUSPENSION	70
Boom Suspension Description	70

Operating The Boom Suspension	70
SPEED MANAGEMENT	71
Operating Speed Management	71
Changing Speed Management Default Setting (Standard Display)	72
HYDRAULIC CONTROLS	74
Hydraulic Control Lever (Joystick)	74
Changing The Maximum Auxiliary Flow (Standard Display)	75
Auxiliary Hydraulics At Startup	76
Operating The Front Auxiliary Hydraulics	77
Quick Couplers	78
Auxiliary Hydraulic Release	79
SMART HANDLING SYSTEM (SHS)	80
Smart Handling System (SHS) Operation	80
AUTO REVERSE COOLING FAN	81
DUAL F-N-R	82
Dual F-N-R Operation	82
ATTACHMENT CONTROL CONNECTOR	83
ON-THE-FLY SETTINGS	83
On-The-Fly Settings Description	83
Selecting On-The-Fly Settings (Standard Display)	83
DAILY INSPECTION	85
Daily Inspection And Maintenance	85
Cleaning The Operator Cab	86
PRE-STARTING PROCEDURE	86
Entering The Machine	86
Operation & Maintenance Manual And Operator's Handbook Locations	86
Adjusting The Seat	87
Adjusting The Seat Belt	88
Adjusting And Cleaning The Mirrors	88
STARTING THE ENGINE	89
Standard Key Panel	89
Cold Temperature Starting	90
Warming The Hydraulic / Hydrostatic System	90
ECO MODE	91
ECO Mode Operation	91
MONITORING THE STANDARD DISPLAY DURING OPERATION	91
Derate And Shutdown Conditions	92
STOPPING THE ENGINE AND LEAVING THE MACHINE	92
Stopping The Engine And Leaving the Machine Procedure	92
OBJECT HANDLING (WITH LIFT EYE LINK)	93
Object Handling (with Lift Eye Link) Procedure	93
Suspended Loads	93
Static Test	93
Lift Eye Link Inspection Before Use	94
Secondary Lifting Devices	94
Secondary Lifting Devices (for Travel)	94
Lift Eye Link Load Chart	94
Load Handling	95
During Travelling	95
Picking Up a Load from the Ground	95
Placing a Raised Load	96
Picking Up a Raised Load	96
ATTACHMENTS	97
Serial Plate	97
Attachment Operation & Maintenance Manual	97
Attachment Declaration Of Conformity	97
Travel Speed Restrictions With Solid Tyres	97

Adjusting The Attachment Angle Gauge	98
Buckets	98
Pallet Fork	101
Round Bale Spike	102
Jib	103
Installing And Removing Attachments (Manual Bob-Tach System)	106
Installing And Removing Attachments (Power Bob-Tach System)	109
Installing And Removing Attachments (Manual Quick-Tach Or Mani-Tach System)	113
Installing And Removing Attachments (Power Quick-Tach Or Mani-Tach System)	115
OPERATING PROCEDURE	118
Longitudinal Load Moment Controller (LLMC)	118
Longitudinal Load Moment Controller (LLMC) Override Switch	118
Inspecting The Work Area	118
Basic Operating Instructions	118
Towing the Machine	129
Lifting the Machine	131
Transporting the Machine On a Trailer	132
Towing a Trailer with the Machine	133
MAINTENANCE SAFETY WARNINGS	136
MAINTENANCE SAFETY WARNINGS	137
PREVENTIVE MAINTENANCE	138
SERVICE SCHEDULE	138
Maintenance Intervals	138
Inspection Checkbook	142
SEAT BELT	143
Inspection And Maintenance	143
LLMC CALIBRATION TEST	144
LLMC Calibration Test Procedure	144
APPROVED BOOM STOP	146
Installing The Approved Boom Stop	146
Removing The Approved Boom Stop	146
BACK-UP ALARM SYSTEM	147
Back-up Alarm System Description	147
Inspecting The Back-up Alarm System	147
ENGINE COVER	147
Opening And Closing The Engine Cover	147
REAR DOOR	148
Opening And Closing The Rear Door	148
HEATING, VENTILATION AND AIR CONDITIONING SYSTEM (HVAC)	148
Cleaning And Maintenance	148
Cab Filter	148
Cleaning The Condenser	149
Air Conditioning Lubrication	149
Air Conditioning Troubleshooting	149
AIR CLEANER SERVICE	150
Replacing Filter Elements	150
Cleaning The Dust Extractor	150
DIESEL PARTICULATE FILTER (DPF) SYSTEM	151
DPF Service Description	151
DPF Service Regeneration	151
DPF Cleaning	151
FUEL SYSTEM	152
Fuel Specifications	152
Filling The Fuel Tank	153
Replacing The Fuel Tank Breather	153
Fuel Pre-Filter	154

Fuel Filter	154
Removing Air From The Fuel System	156
ENGINE LUBRICATION SYSTEM	157
Checking And Adding Engine Oil	157
Engine Oil Chart	157
Removing And Replacing Oil And Filter	157
COOLING SYSTEM	159
Cleaning The Cooling System	159
Checking Coolant Level	160
Removing And Replacing The Coolant	160
ELECTRICAL SYSTEM	162
Electrical System Description	162
Fuses And Relays Location / Identification	162
Battery Maintenance	168
Using A Booster Battery (Jump Starting)	169
Removing And Installing The Battery	170
HYDRAULIC / HYDROSTATIC SYSTEM	171
Checking And Adding Fluid	171
Hydraulic Fluid Chart	172
Removing And Replacing Hydraulic Fluid	172
Removing And Replacing Hydraulic / Hydrostatic Filters	174
Removing And Installing The Fill / Breather Cap	175
AXLES (FRONT AND REAR)	175
Checking And Adding Oil (Planetary Carrier)	175
Removing And Replacing Oil (Planetary Carrier)	175
Checking And Adding Oil (Rear Differential)	176
Removing And Replacing Oil (Rear Differential)	176
Checking And Adding Oil (Front Differential)	177
Removing And Replacing Oil (Front Differential)	177
Checking And Adding Oil (Reduction Box)	178
Removing And Replacing Oil (Reduction Box)	178
ALTERNATOR BELT	179
Adjusting The Alternator Belt	179
Checking The Alternator Belt	179
Replacing The Alternator Belt	179
AIR CONDITIONING BELT	180
Adjusting The Air Conditioning Belt	180
Replacing The Air Conditioning Belt	180
TYRE MAINTENANCE	181
Wheel Nuts	181
Rotating	181
Replacing The Wheels	181
Mounting	182
Tyre Pressure	183
LUBRICATING THE MACHINE	183
Lubrication Locations	183
Lubricating The Front Wear Pads	185
Lubricating The Rear Wear Pads	186
ATTACHMENT CARRIER	186
Inspecting And Maintaining The Manual Bob-Tach	186
Inspecting And Maintaining The Power Bob-Tach	187
Inspecting And Maintaining The Manual Quick-Tach Or Mani-Tach	188
Inspecting And Maintaining The Power Quick-Tach Or Mani-Tach	189
MACHINE STORAGE AND RETURN TO SERVICE	190
Storage	190
Return To Service	190

SYSTEM SETUP AND ANALYSIS	191
NAVIGATION (STANDARD DISPLAY)	191
Navigation Bar	191
Viewing Active Shortcuts	191
VITALS (STANDARD DISPLAY)	192
Vital Detail And Machine Performance	192
SERVICE (STANDARD DISPLAY)	193
Record A Service	193
View Service Codes	193
SETTINGS (STANDARD DISPLAY)	194
Display Settings	194
Machine Settings	195
Security Settings	196
Security Settings (Manage Operators)	197
Language Settings	198
Units	199
Software	199
DIAGNOSTIC SERVICE CODES	201
Service Codes List - Engine Controller	201
Service Codes List - Gateway Controller	281
Service Codes List - Drive Controller	285
Service Codes List - Workgroup Controller	292
Service Codes List - LLMl controller	301
Service Codes List - LLMC Controller	302
Service Codes List - Cab Controller	303
SPECIFICATIONS	305
MACHINE DIMENSIONS	305
TELESCOPIC HANDLER SPECIFICATIONS	307
Performance	307
Weights	307
Engine	308
Controls	308
Drive System	309
Traction	309
Steering	309
Brakes	309
Fluid Capacities	309
Hydraulic System	310
Electrical System	310
Temperature Range	310
Altitude	310
Instrument Panel	310
Environmental	311
Lifting	312
Tie Down	313
VISIBILITY DIAGRAMS	315
Handling Suspended Loads	315
Loading The Trailer	316
Bucket	317
Light Material Bucket	318
BOBCAT® TELESCOPIC HANDLERS WARRANTY	319

EC DECLARATION OF CONFORMITY

Contents of EC Declaration of Conformity					
This information is provided in the operators manual to comply with clause 1.7.4.2(c) of Annex I of Machinery Directive 2006/42/EC. The official EC Declaration of Conformity is supplied in a separate document.					
Manufacturer  Bobcat Bobcat France S.A.S. 55 Rue du Chêne Vert 44160 Pontchâteau FRANCE	Directive 2000/14/EC: Noise Emission in the Environment by Equipment For Use Outdoors Notified Body Laboratoire National d'Essais (LNE) France Notified Body Number: 0071 EC Certificate No. 2000-14/P221689/1				
Technical Documentation Homologation Manager Doosan Bobcat EMEA s.r.o U Kodetky 1810 263 12 Dobříš CZECH REPUBLIC	Conformity Assessment Procedure(s) 2000/14/EC, Annex VI Sound Power Levels [Lw(A)] <table> <tr> <td>Measured Sound Power</td> <td>102 dBA</td> </tr> <tr> <td>Guaranteed Sound Power</td> <td>104 dBA</td> </tr> </table>	Measured Sound Power	102 dBA	Guaranteed Sound Power	104 dBA
Measured Sound Power	102 dBA				
Guaranteed Sound Power	104 dBA				
Description of Equipment Type of Equipment: Telescopic Handler Model Name: TL25.60RB Model Code: B5PY Engine Manufacturer: Doosan Infracore Engine Model: DM02VB DM02-MFV00 Engine Power: 54.6 kW @ 2400 RPM	Equipment conforms to CE Directive(s) Listed Below 2006/42/EC: Machinery Directive 2014/30/EU: Electromagnetic Compatibility Directive				
Declaration of Conformance This equipment conforms to the requirements specified in all the EC Directives listed in this declaration.					
Effective From: 20 September 2022					

UK DECLARATION OF CONFORMITY

Contents of UK Declaration of Conformity

This information is provided in the operators manual to comply with clause 1.7.4.2(c) of Schedule 2, Part 1 of The Supply of Machinery (Safety) Regulations 2008.

The official UK Declaration of Conformity is supplied in a separate document.

Manufacturer  Bobcat France S.A.S. 55 Rue du Chêne Vert 44160 Pontchâteau FRANCE	Noise Emission in the Environment by Equipment for Use Outdoors Regulations 2001 Notified Body Laboratoire National d'Essais (LNE) France Notified Body Number: 0071 CE Certificate No. 2000-14/P221689/1 Conformity Assessment Procedure(s) 2000/14/EC, Annex VI Sound Power Levels [Lw(A)] <table border="0"> <tr> <td>Measured Sound Power</td><td>102 dBA</td></tr> <tr> <td>Guaranteed Sound Power</td><td>104 dBA</td></tr> </table>	Measured Sound Power	102 dBA	Guaranteed Sound Power	104 dBA
Measured Sound Power	102 dBA				
Guaranteed Sound Power	104 dBA				
Technical Documentation Homologation Manager Doosan Bobcat EMEA s.r.o U Kodetky 1810 263 12 Dobříš CZECH REPUBLIC					
Description of Equipment Type of Equipment: Telescopic Handler Model Name: TL25.60RB Model Code: B5PY Engine Manufacturer: Doosan Infracore Engine Model: DM02VB DM02-MFV00 Engine Power: 54.6 kW @ 2400 RPM	Equipment conforms to UK Regulations(s) Listed Below Supply of Machinery (Safety) Regulations 2008 Electromagnetic Compatibility Regulations 2016				
Declaration of Conformance This equipment conforms to the requirements specified in all the UK Regulations listed in this declaration.					
Effective From: 20 September 2022					

DECLARATION OF CONFORMITY (RADIO)



EU Declaration of Conformity under the terms of Directive No. 2014/53/EU (RED directive)

1. No ... (unique identification of the product)
Bobcat Radio
Hardware Version: A2C 399933
2. Name and address of the manufacturer or his authorised representative:
Continental Automotive GmbH
Heinrich-Hertz-Str. 45
78052 Villingen-Schwenningen
Germany
3. This declaration of conformity is issued under the sole responsibility of the manufacturer (or installer):
Continental Automotive GmbH declares as a manufacturer that the above-mentioned product complies with the necessary requirements of Directive 2014/53/EU (RED Directive) when used for its intended purpose.
4. Object of the declaration (identification of product allowing traceability. It may include a colour image of sufficient clarity to enable the identification of the product, where appropriate.)
Not applicable.
5. The object of the declaration described in point 4 is in conformity with the relevant Union harmonisation legislation:
Directive 2014/53/EU

Additional relevant Union harmonisation legislation:
None.
6. References to the relevant harmonised standards used, or references to the specifications in relation to which conformity is declared:
 - **EN 62368-1:2014/AC:2015/A11:2017/AC:2017**
 - **EN 62479:2010**
 - **Draft EN 301 489-1 V2.2.0**
 - **Draft EN 301 489-17 V3.2.0**
 - **EN 300 328 V2.1.1**
 - **Draft EN 303 345 v.1.1.7**
 - **EN 303 345-2 V1.1.1**
7. The notified body **CTC advanced, 0682** has performed Tests and has issued the EC approval certificate **T818837N-01-TEC**.
8. If available, a description of the accessories and the components, including the software that enables the operation of the radio system and which is covered by the EU Declaration of Conformity:
Not applicable.
9. Additional information:
None.

Signed for and on behalf of:
Continental Automotive GmbH
Heinrich-Hertz-Str. 45
78052 Villingen-Schwenningen
Germany

Place and date of issue:
Villingen-Schwenningen, 11 February 2021

Dr. Marion Grüner (Homologation)
(Name, function)



RENTWAY

EC DECLARATION OF CONFORMITY (JIB)

Declaration of Conformity for Interchangeable Equipment Directive 2006/42/EC of the European Parliament and of The Council "Machinery Directive Article 1(1)(b)"				
Manufacturer  Bobcat France S.A.S 55, rue du Chêne Vert 44160 Pontchateau FRANCE	Equipment Also Compliant to Other EC Directive(s) or Standard(s) Listed Below:			
Technical Documentation Homologation Manager Doosan Bobcat EMEA s.r.o U Kodetky 1810 263 12 Dobříš CZECH REPUBLIC				
Description of Equipment				
Type of Interchangeable Equipment	Jib			
Model Name:	JIB 0.7M 4300KG MT	JIB 0.7M 4300KG QT	JIB 0.7M 2500KG BT	LONG JIB 3.7M 386KG BT
Model Code:				
Lot Series:	ATSR00101 & above	B38F00101 & above	B5PT00101 & above	A85S00101 & above
Declaration of Conformance This equipment conforms to the requirements of an interchangeable equipment as specified in Machinery Directive 2006/42/EC Article 1(1)(b) and any other directives listed. This declaration applies exclusively to the interchangeable equipment and does not include any hydraulic, electrical or mechanical adaptation done by the installer. Installation shall be done in accordance with instructions and specifications included in this manual.				
Authorised Signatory and Place of Declaration Date: 23 September 2022 Place: Pontchateau, France				

UK DECLARATION OF CONFORMITY (JIB)

UK Declaration of Conformity for Interchangeable Equipment Supply of Machinery (Safety) Regulations 2008 Paragraph 3(b)				
Manufacturer  Bobcat France S.A.S 55, rue du Chêne Vert 44160 Pontchateau FRANCE	Equipment Also Compliant to Other UK Regulations(s) or Standard(s) Listed Below:			
Technical Documentation Homologation Manager Doosan Bobcat EMEA s.r.o U Kodetky 1810 263 12 Dobříš CZECH REPUBLIC				
Description of Equipment				
Type of Interchangeable Equipment	Jib			
Model Name:	JIB 0.7M 4300KG MT	JIB 0.7M 4300KG QT	JIB 0.7M 2500KG BT	LONG JIB 3.7M 386KG BT
Model Code:				
Lot Series:	ATSR00101 & above	B38F00101 & above	B5PT00101 & above	A85S00101 & above
Declaration of Conformance This equipment conforms to the requirements of an interchangeable equipment as specified in Supply of Machinery (Safety) Regulations 2008, paragraph 3(b), and any other regulations listed. This declaration applies exclusively to the interchangeable equipment and does not include any hydraulic, electrical or mechanical adaptation done by the installer. Installation shall be done in accordance with instructions and specifications included in this manual.				
Authorised Signatory and Place of Declaration Date: 23 September 2022 Place: Pontchateau, France				

DECLARATION OF CONFORMITY (HYDROFLUOROCARBON)



DOOSAN BOBCAT S.A.S.
55, rue du Chêne Vert
44160 Pont-Château, France
Tel +33 (0) 2 40 00 73 50
Fax +33 (0) 2 40 00 73 60

**Declaration of conformity with Article 14 of Regulation (EU) No 517/2014 of the
European Parliament and of the Council**

We Bobcat France S.A.S. with VAT number FR63332690908 declare under our sole responsibility that when placing on the market pre-charged equipment, which we manufacture in the Union, the hydrofluorocarbons contained in that equipment are accounted for within the quota system referred to in Chapter IV of Regulation (EU) No 517/2014 as:

☐ A. we hold authorisation(s) issued in accordance with Article 18(2) of Regulation (EU) No 517/2014 and registered in the registry referred to in Article 17 of that Regulation, at the time of release for free circulation to use the quota of a producer or importer of hydrofluorocarbons subject to Article 15 of Regulation (EU) No 517/2014 that cover(s) the quantity of hydrofluorocarbons contained in the equipment.

☐ B. *[for importers of equipment only]* the hydrofluorocarbons contained in the equipment have been placed on the market in the Union, subsequently exported and charged into the equipment outside the Union, and the undertaking that placed the hydrofluorocarbons on the market made a declaration stating that the quantity of hydrofluorocarbons has been or will be reported as placed on the market in the Union and that it has not been and will not be reported as direct supply for export in the meaning of Article 15(2)(c) of Regulation (EU) No 517/2014 pursuant to Article 19 of Regulation (EU) No 517/2014 and Section 5C of the Annex to Commission Implementing Regulation (EU) No 1191/2014 (2).

☒ C. *[for equipment manufactured in the Union only]* the hydrofluorocarbons charged into the equipment were placed on the market by a producer or importer of hydrofluorocarbons subject to Article 15 of Regulation (EU) No 517/2014.

Pavel Urban

9th June, 2021

S.A.S. au capital de 14 747 250 € - RCS Saint-Nazaire B 332 690 908 – N° Siret 332 690 908 00022
N° TVA CEE FR 63 332 690 908
Banque : J.P. Morgan n° 00609000169 09 CHASFRPPXXX – Naf 2822 Z



INTRODUCTION

This Operation & Maintenance Manual was written to give the owner / operator instructions on the safe operation and maintenance of the Bobcat machine. Read and understand this Operation & Maintenance Manual before operating your Bobcat machine. If you have any questions, see your Bobcat dealer. This manual may illustrate options and accessories not installed on your machine.

Bobcat Company Is ISO 9001 Certified



ISO 9001 is an international standard that specifies requirements for a quality management system that controls the processes and procedures that we use to design, develop, manufacture, and distribute Bobcat products.

British Standards Institute (BSI) is the Certified Registrar that Bobcat Company chose to assess the company's compliance with ISO 9001 at Bobcat's manufacturing facilities in Gwinner, North Dakota (U.S.A.), Pontchâteau (France), and the Bobcat corporate offices (Gwinner, Bismarck, and West Fargo) in North Dakota. TÜV Rheinland is the Certified Registrar that Bobcat Company chose to assess the company's compliance with ISO 9001 at Bobcat's manufacturing facility in Dobříš (Czech Republic). Only certified assessors, like BSI and TÜV Rheinland, can grant registrations.

ISO 9001 means that as a company we say what we do and do what we say. In other words, we have established procedures and policies, and we provide evidence that the procedures and policies are followed.

MANUFACTURER

France

Bobcat France S.A.S.
55 Rue du Chêne Vert
44160 Pontchâteau
FRANCE

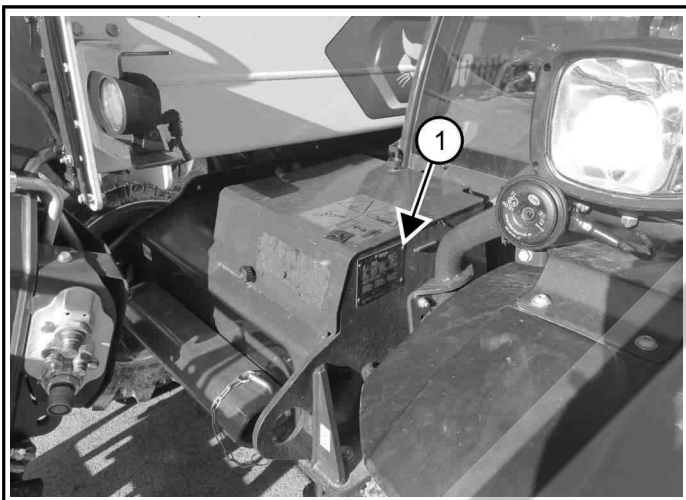
SERIAL NUMBER LOCATION

Always use the serial number of the Telescopic Handler when requesting service information or when ordering parts.

If any serial number plate is damaged, contact your Bobcat dealer.

Telescopic Handler Serial Number

Figure 1

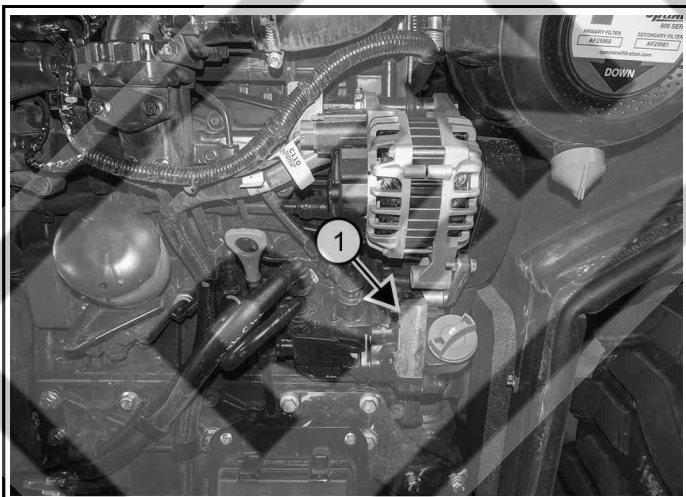


EM11490a

The telescopic handler serial number plate (Item 1) [Figure 1] is located on the left side of the chassis in front.

Engine Serial Number

Figure 2

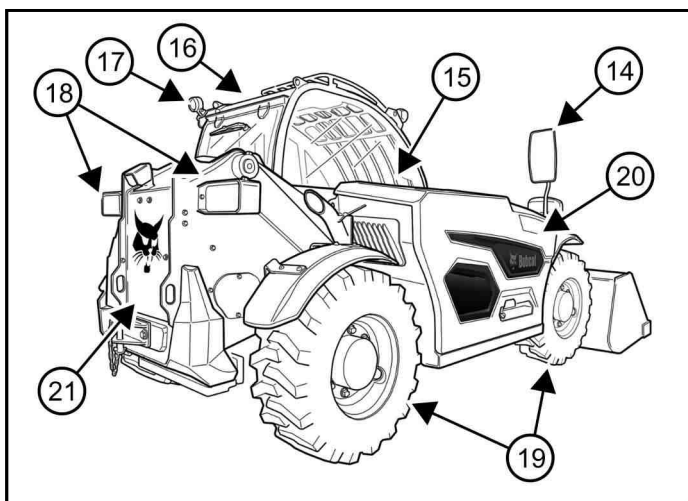


C215938a

The engine serial number can be found on the front of the engine (Item 1) [Figure 2]. Always use the full number (type + number) when ordering replacement parts.

Rear View

Figure 5



NA24029C

REF	DESCRIPTION
14	Mirror
15	Load Capacity Charts
16	Rotating Beacon
17	Rear Work Light
18	Tail Lights and Directional Lights
19	Tyres [C]
20	Engine Cover
21	Rear Door

[C] TYRES - Standard tyres are shown. Several different tyre styles and sizes are available for the Bobcat Telescopic Handler.

FEATURES, ACCESSORIES, AND ATTACHMENTS

Standard Items

Model TL25.60 Bobcat Telescopic Handler is equipped with the following standard items:

- 4 equal-size drive wheels with tyres CAMSO 12-16.5 PR12 SKS 532
- Automatic parking brake
- Auxiliary Flow Management (AFM) for continuous hydraulic flow
- Back-up alarm
- Bob-Tach® attachment mounting system
- Cab heating, de-misting and ventilation
- Counterweight
- Cushion lift (up and down)
- Display, standard, 5"
- Diesel Oxidation Catalyst (DOC) and Diesel Particulate Filter (DPF)
- Dynamic drive function
- ECO mode
- Electronic Battery Disconnect (EBD)
- Fixed steering column
- Forward / Neutral / Reverse button on joystick
- Front and rear washer / wipers
- Gear pump, 80 L/min (21.1 U.S. gpm)
- Hydrostatic transmission, 25 - 30 km/h (15.5 - 18.6 mph)
- Inching function
- Left and right side mirrors
- Lifting eye on boom head
- Longitudinal Load Moment Indicator / Controller (LLMIC) system with override feature compliant with EN15000
- Manual locking of attachments
- Mudguards
- Navigation jog shuttle
- Rear document storage net
- Road lights (front and rear)
- Roof window wiper
- Rotating beacon (foldable or magnetic)
- Seat sensor
- Semi-automatic realignment of the wheels
- Sight level gauge
- Smart Handling System (SHS)
- Speed management
- Standard proportional joystick
- Steel door on cab
- Suspension seat (fabric)

- Three steering modes (2WS / 4WS / CRAB)
- Turbo-charged engine, 54,6 kW (73 hp)
- Turn signals
- Two speeds
- USB plug
- Work lights on roof (2 front + 1 rear) (halogen)
- Wrench for transmission disengagement

Specifications subject to change without notice.

Options And Accessories

Below is a list of some equipment available from your Bobcat dealer as Dealer and / or Factory Installed Accessories and Factory Installed Options. See your Bobcat dealer for other available options, accessories and attachments.

- 12V power outlet
- Additional lights (LED)
- Adjustable steering column (tilt and height)
- Air suspension seat
- Armrest
- Attachment angle gauge
- Attachment carrier
 - ▷ Mani-Tach
 - ▷ Quick-Tach
- Attachment Control Device (ACD)
- Back-up alarm (white noise)
- Basic tow hitch
- Blue work lights
- Bluetooth radio
- Boom float
- Boom stop
- Boom suspension and boom float
- Cab air conditioning
- Carrier locking bar holder for Quick-Tach and Mani-Tach
- Cushion retract
- Deluxe steering wheel
- Dual F-N-R
- Dust protection on boom
- Easy greasing
- Electrical socket (tractor type)
- Electric right hand side mirror with de-icing
- Fan inverter
- Fire extinguisher
- Flex control by hand lever
- Four steering modes (2WS / 4WS / CRAB / SEMI-CRAB)
- Front Auxiliary

- Front window guard
- Glass door on cab
- Hose guide for Bob-Tach attachment mounting system
- Hydraulic locking of attachments:
 - ▷ Bob-Tach attachment mounting system
 - ▷ Mani-tach
 - ▷ Quick-tach
- Light for registration plate
- Lockable fuel cap
- Phone holder
- Protective zinc coat
- Radio ready (speakers and antenna, no radio)
- Rear flat mirror
- Rear-view camera
- Roll sun visor
- Rotating beacon LED (compact and removable)
- Rotating tow hitch with electrical socket (7-Pin)
- Smart joystick
- Smart keypad and utility keypad
- Solid rear document compartment
- Special colour cab
- Special colour frame, boom and rims
- Suspension seat (vinyl)
- Telematics
- Tilting steering column
- Tool box
- Wheel wedge
- Work lights on boom (halogen)
- Work lights on boom (LED)
- Work lights on roof (2 front + 1 rear) (LED)

Specifications subject to change without notice

Available Tyres

Standard tyres:

- CAMSO 12-16.5 PR12 SKS 532

Optional tyres:

- CAMSO 14-17,5 PR14 SKS 532
- TRELLEBORG 36x14-20 BRAWLER HPS SOLIDFLEX TRACTION
- MICHELIN 300/70 R16,5 137A8/137B BIBSTEEL
- ALLIANCE 400/55-17,5 16PR 149A8 A328
- MICHELIN 280/80 R18 132A8/132B IND TL XMCL
- ALLIANCE 300/75 R18 IND 142A8/142B A580

- MICHELIN 280/80 R20 133A8/133B IND TL XMCL

See your Bobcat dealer for more information on optional tyres and the corresponding steering angle adjustment.

Available Rims

Standard rims:

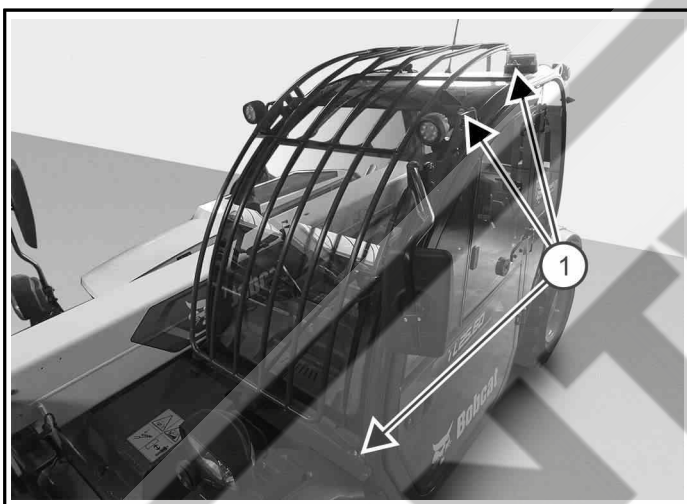
- RIM 9,75*16,5" +15

Optional rims:

- RIM 10,5*17,5" +15
- RIM 11,75*17,5" +15
- RIM 9*18" -20
- RIM 9*20" -20

Front And Roof Window Guard

Figure 6



Available for special applications to restrict material from entering cab openings [Figure 6].

The front and roof window guard is mounted to the cab at three mounting points (Item 1) [Figure 6], on both sides of the cab.

Do not use an unapproved front and roof window guard. A front and roof window guard not manufactured by Bobcat cannot be approved.

See your Bobcat dealer for availability.

Front And Roof Window Guard Inspection And Maintenance

The front and roof window guard must be regularly inspected and maintained. Inspect the screen and the six mounting points (Item 1) for damage. Replace parts as necessary.

Attachments

These attachments are approved for use on the Bobcat Telescopic Handler.

Do not use unapproved attachments. Attachments not manufactured by Bobcat cannot be approved.

The versatile Bobcat Telescopic Handler quickly turns into a multi-job machine with a tight-fit attachment hook-up from bucket to grapple to pallet fork and a variety of other attachments.

See your Bobcat dealer for more details on these and other attachments and field accessories.

Increase the versatility of your Bobcat Telescopic Handler with a variety of bucket styles and sizes.

- Bob-Tach:
 - ▷ Angle Broom
 - ▷ Augers
 - ▷ Bale Spikes
 - ▷ Blades (Box, Dozer, Snow, V-Blades)
 - ▷ Boom Truss
 - ▷ Brushcat™ rotary cutter
 - ▷ Buckets (Combination, Digging, Light Material, Rock, Snow)
 - ▷ Flail Cutter
 - ▷ Jibs
 - ▷ Land Plane
 - ▷ Landscape Rake
 - ▷ Mixing buckets
 - ▷ Pallet Forks (Floating, Positioner, Rigid, with Side-Shift)
 - ▷ Salt & Sand Spreader
 - ▷ Seeder
 - ▷ Snow Blower
 - ▷ Snow Pushers
 - ▷ Soil Conditioner
 - ▷ Sweepers (Bucket, Multi-Purpose, Open)
 - ▷ Tiller
 - ▷ Trencher
 - ▷ Vibratory Roller
- Quick-Tach:
 - ▷ Adapter Quick-Tach to Bob-Tach attachment mounting system
 - ▷ Buckets (Digging, Light Material)
 - ▷ Jib
 - ▷ Mixing Bucket
 - ▷ Pallet forks (Floating, Rigid, Side-Shift)
- Mani-Tach:
 - ▷ Bucket (Digging)
 - ▷ Jib

- ▷ Pallet forks (Floating, Rigid)

RENTWAY

SAFETY INSTRUCTIONS

Before Operation

WARNING

INSUFFICIENT INSTRUCTIONS HAZARD

Untrained operators or failure to follow instructions can cause serious injury or death.

Operators must have adequate training and instruction before operating. ◀

W-2001

Carefully follow the operating and maintenance instructions in this manual.

The Bobcat machine is highly manoeuvrable and compact. It is rugged and useful under a wide variety of conditions. This presents an operator with hazards associated with off highway, rough terrain applications, common with Bobcat machine usage.

The Bobcat machine has an internal combustion engine with resultant heat and exhaust. All exhaust gases can kill or cause illness so use the machine with adequate ventilation.

The dealer explains the capabilities and restrictions of the Bobcat machine and attachment for each application. The dealer demonstrates the safe operation according to Bobcat instructional materials, which are also available to operators. The dealer can also identify unsafe modifications or use of unapproved attachments. The attachments and buckets are designed for a Rated Load Capacity. They are designed for secure fastening to the machine. The user must check with the dealer, or Bobcat literature, to determine safe loads of materials of specified densities for the machine - attachment combination.

The following publications and training materials provide information on the safe use and maintenance of the Bobcat machine and attachments:

- The Delivery Report is used to assure that complete instructions have been given to the new owner and that the machine and attachment are in safe operating condition.
- The Operation & Maintenance Manual delivered with the machine or attachment gives operating information as well as routine maintenance and service procedures. It is a part of the machine and can be stored in a container provided on the machine. Replacement Operation & Maintenance Manuals can be ordered from your Bobcat dealer.
- Machine signs (decals) instruct on the safe operation and care of your Bobcat machine or attachment. The signs and their locations are shown in the Operation & Maintenance Manual. Replacement signs are available from your Bobcat dealer.
- An Operator's Handbook is fastened to the operator cab of the machine. Its brief instructions are convenient for the operator. See your Bobcat dealer for more information on translated versions.

The dealer and owner / operator review the recommended uses of the product when delivered. If the owner / operator will be using the machine for a different application(s) he or she must ask the dealer for recommendations on the new use.

Safe Operation Is The Operator's Responsibility

Safety Alert Symbol

This symbol with a warning statement means: "Warning, be alert! Your safety is involved!" Carefully read the message that follows.

DANGER

The signal word DANGER on machine signs and in the manuals indicates a hazardous situation which, if not avoided, will result in serious injury or death. ◀

D-1002

WARNING

The signal word WARNING on the machine and in the manuals indicates a potentially hazardous situation which, if not avoided, could result in serious injury or death. ◀

W-2044

IMPORTANT

This notice identifies procedures which must be followed to avoid damage to the machine. ◀

I-2019

The machine and attachment must be in good operating condition before use.

Check all of the items on the Service Schedule decal (if equipped) in the Every 10 Hours section or as shown in the Operation & Maintenance Manual.

Safe Operation Needs A Qualified Operator

For an operator to be qualified, he or she must not use drugs or alcoholic drinks which impair alertness or co-ordination while working. An operator who is taking prescription drugs must get medical advice to determine if he or she can safely operate a machine.

A Qualified Operator Must Do The Following

- Understand the written instructions, rules, and regulations.
 - ▷ The written instructions from Bobcat Company include the Delivery Report, Operation & Maintenance Manual, Operator's Handbook, and machine signs (decals).
 - ▷ Check the rules and regulations at your location. The rules may include an employer's work safety requirements. For driving on public roads, the machine must be equipped as stipulated by the local regulations authorising operation on public

roads in your specific country. Regulations may identify a hazard such as a utility line.

- Have training with actual operation.
 - ▷ Operator training must consist of a demonstration and verbal instruction. This training is given by your Bobcat dealer before the product is delivered.
 - ▷ The new operator must start in an area without bystanders and use all the controls until he or she can operate the machine and attachment safely under all conditions of the work area. Always fasten seat belt before operating.
- Know the work conditions.
 - ▷ Know the weight of the materials being handled. Avoid exceeding the Rated Load Capacity of the machine. Material that is very dense will be heavier than the same volume of less dense material. Reduce the size of load if handling dense material.
 - ▷ The operator must know any prohibited uses or work areas, for example, he or she needs to know about excessive slopes.
 - ▷ Know the location of any underground lines.
 - ▷ Wear tight fitting clothing. Always wear safety glasses when doing maintenance or service. Safety glasses, respiratory equipment, hearing protection, or Special Applications Kits are required for some work. See your Bobcat dealer about Bobcat safety equipment for your model.

Silica Dust Exposure



Cutting or drilling concrete containing sand or rock containing quartz may result in exposure to silica dust. Use a respirator, water spray, or other means to control dust.

Dismantling And Disposal

On the completion of its useful life, the machine and its parts shall be disposed of in an environmental friendly manner. Please contact your local dealer. Parts of the machine can be remanufactured like the engine depending on its age and condition, or recycled like metals, plastics, rubbers and glasses. Respect the environment and dispose of waste properly. Worn or damaged parts shall not be left in the environment. Oils, brake fluid, cooling refrigerants, batteries and cells shall be disposed of in a proper manner through your local dealer or recycling center.

FIRE PREVENTION



Maintenance

The machine and some attachments have components that are at high temperatures under normal operating conditions. The primary source of high temperatures is the engine and exhaust system. The electrical system, if damaged or incorrectly maintained, can be a source of arcs or sparks.

Flammable debris (leaves, straw, etc.) must be removed regularly. If flammable debris is allowed to accumulate, it can cause a fire hazard. Clean often to avoid this accumulation. Flammable debris in the engine compartment is a potential fire hazard.

The operator's area, engine compartment, and engine cooling system must be inspected every day and cleaned if necessary to prevent fire hazards and overheating.

All fuels, most lubricants, and some coolant mixtures are flammable. Flammable fluids that are leaking or spilled onto hot surfaces or onto electrical components can cause a fire.

Operation

Do not use the machine where exhaust, arcs, sparks, or hot components can contact flammable material, explosive dust, or gases.

Electrical



P200082

Check all electrical wiring and connections for damage. Keep the battery terminals clean and tight. Repair or replace any damaged part or wires that are loose or frayed.

Battery gas can explode and cause serious injury. Use the procedure in the Operation & Maintenance Manual for connecting the battery and for jump starting. Do not jump start or charge a frozen or damaged battery. Keep any open flames or sparks away from batteries. Do not smoke in battery charging area.

Hydraulic System

Check hydraulic tubes, hoses and fittings for damage and leakage. Never use open flame or bare skin to check for leaks. Hydraulic tubes and hoses must be properly routed and have adequate support and secure clamps. Tighten or replace any parts that show leakage.

Always clean fluid spills. Do not use petrol or diesel fuel for cleaning parts. Use commercial non-flammable solvents.

Fuelling



P200084

Stop the engine and let it cool before adding fuel. No smoking! Do not refuel a machine near open flames or sparks. Fill the fuel tank outdoors.

Ultra Low Sulfur Diesel (ULSD) poses a greater static ignition hazard than earlier diesel formulations with higher sulfur content. Avoid death or serious injury from fire or explosion. Consult with your fuel or fuel system supplier to ensure the delivery system is in compliance with fuelling standards for proper earthing and bonding practices.

Starting

Do not use ether or starting fluids on any engine that has glow plugs or an air intake heater. These starting aids can cause explosion and injure you or bystanders.

Use the procedure in the Operation & Maintenance Manual for connecting the battery and for jump starting.

Welding And Grinding

Always clean the machine and attachment, disconnect the battery, and disconnect the wiring from the Bobcat controllers before welding. Cover rubber hoses, battery, and all other flammable parts. Keep a fire extinguisher near the machine when welding.

Have good ventilation when grinding or welding painted parts. Wear a dust mask when grinding painted parts. Toxic dust or gas can be produced.

Dust generated from repairing nonmetallic parts such as hoods, fenders, or covers can be flammable or explosive. Repair such components in a well-ventilated area away from open flames or sparks.

Fire Extinguishers



P200083

Know where fire extinguishers and first aid kits are located and how to use them. Inspect the fire extinguisher and service the fire extinguisher regularly. Obey the recommendations on the instructions plate.

PUBLICATIONS AND TRAINING RESOURCES

The following publications are also available for your Bobcat machine. You can order them from your Bobcat dealer.



C211854

Operation & Maintenance Manual

Complete instructions on the correct operation and the routine maintenance of your Bobcat machine.

7473166



NA3147

Operator's Handbook

Gives basic safety procedures and warning for your Bobcat machine.

7497586



C211855

Service Manual

Complete maintenance instructions for your Bobcat machine.

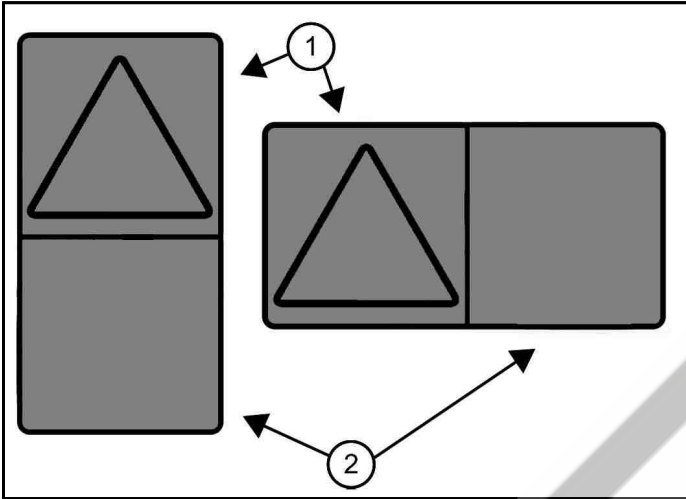
7473167

For the latest information on Bobcat products and the Bobcat Company, visit our website at Bobcat.com/training or Bobcat.com

PICTORIAL ONLY SAFETY SIGNS

Safety signs are used to alert the equipment operator or maintenance person to hazards that may be encountered in the use and maintenance of the equipment. The location and description of the safety signs are detailed in this section. Please become familiarised with all safety signs installed on the machine / attachment.

Figure 7



The format consists of the hazard panel(s) (Item 1) [Figure 7] and the avoidance panel(s) (Item 2) [Figure 7].

Hazard Panels: Depict a potential hazard enclosed in a safety alert triangle.

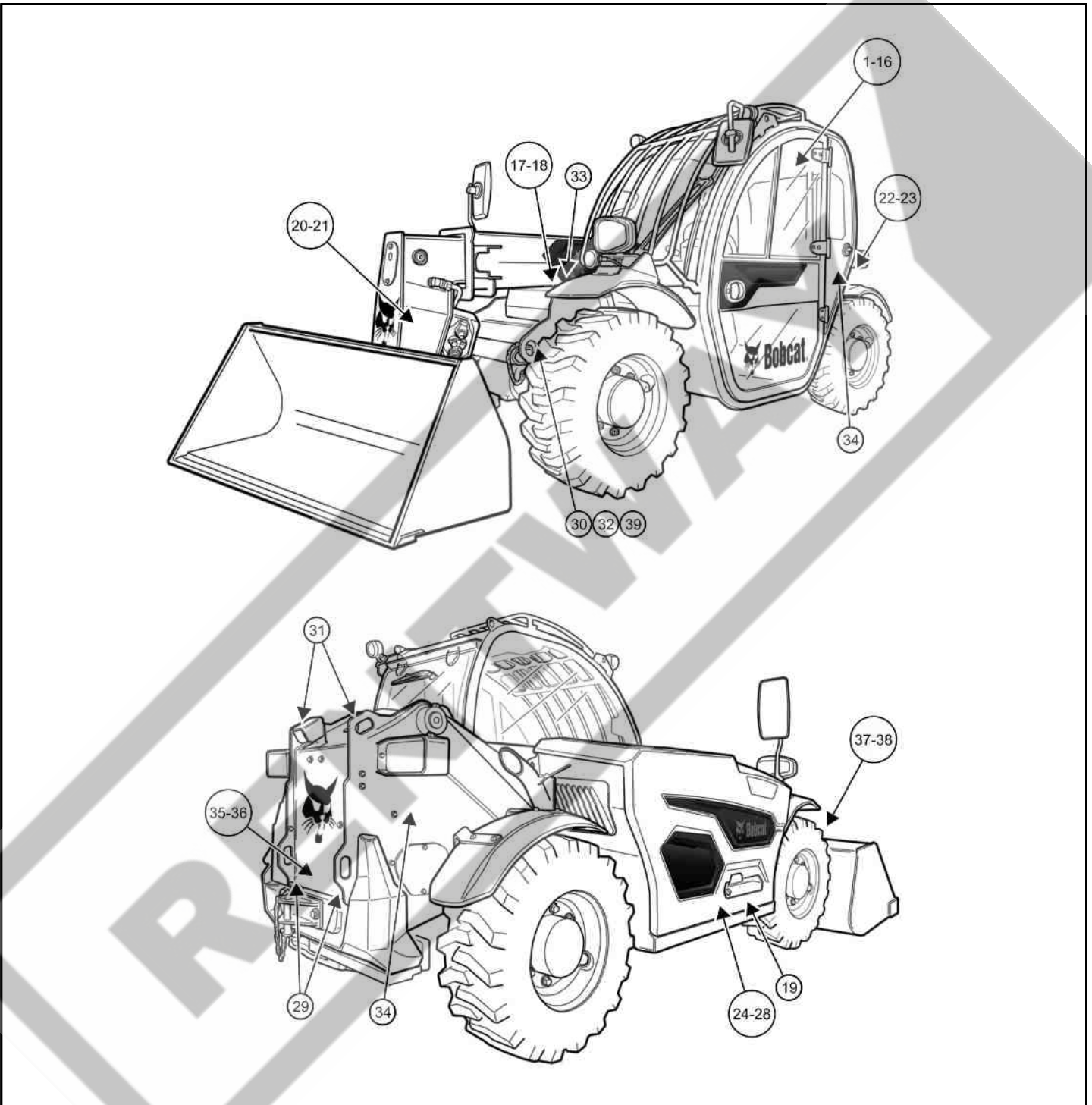
Avoidance Panels: Depict actions required to avoid the hazards.

A safety sign may contain more than one hazard panel and more than one avoidance panel.

MACHINE SIGNS (DECALS)

Follow the instructions on all the Machine Signs (Decals) that are on the Telescopic Handler. Replace any damaged machine signs and be sure they are in the correct locations. Machine signs are available from your Bobcat dealer.

Figure 8



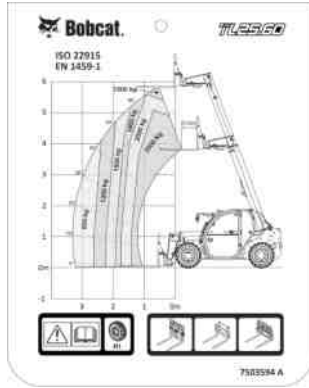
EM11319e

REF	DECAL	WARNING (IF APPLICABLE)
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Load Charts

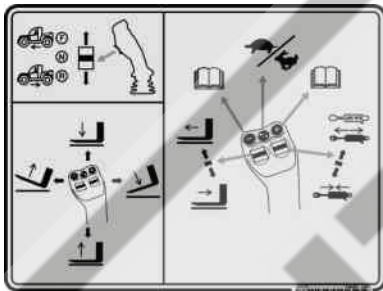
The load charts are located inside the operator cab on the right side of the operator seat.

1

Simple Joystick (7434491)
[A]

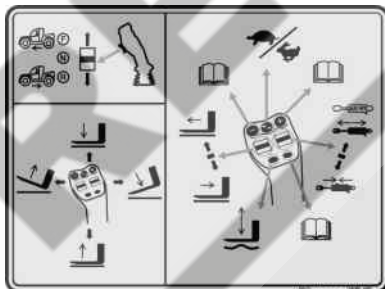
This safety sign is located inside the operator cab on the right cab window.

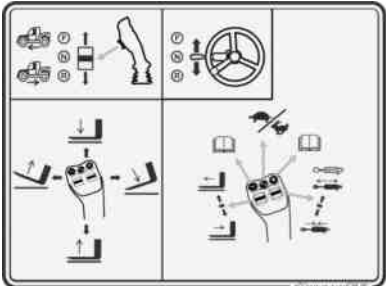
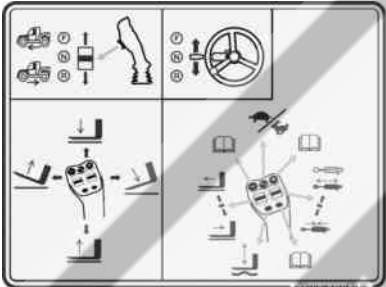
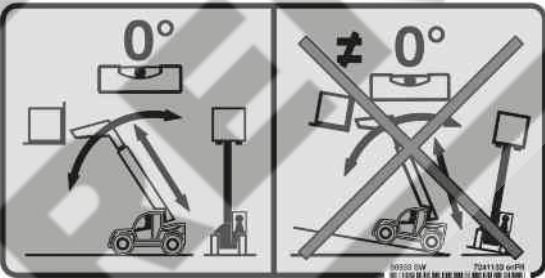
2

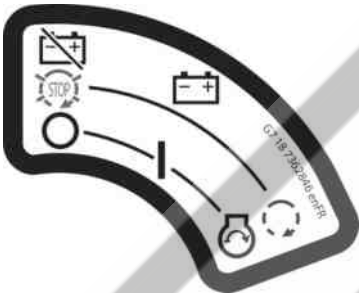
Smart Joystick (7434490)
[A]

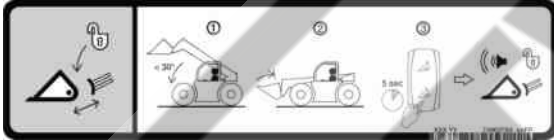
This safety sign is located inside the operator cab on the right cab window.

3



REF	DECAL	WARNING (IF APPLICABLE)
4	Simple Joystick with F-N-R (7475146) [A] This safety sign is located inside the operator cab on the right cab window. 	
5	Smart Joystick with F-N-R (7474081) [A] This safety sign is located inside the operator cab on the right cab window. 	
6	Horizontal Machine (7241133) This safety sign is located inside the operator cab on the right cab window. 	

REF	DECAL	WARNING (IF APPLICABLE)
7	Four Wheel Steering (7339764) This safety sign is located inside the operator cab on the right cab window. 	
8	Ignition Key (7362846) This safety sign is located inside the operator cab on the right instrument panel. 	
9	Longitudinal Load Moment Indicator (LLMI) Override Switch (7444479) 	
10	Tyres (7501842) These safety signs are located inside the operator cab on the door. 	

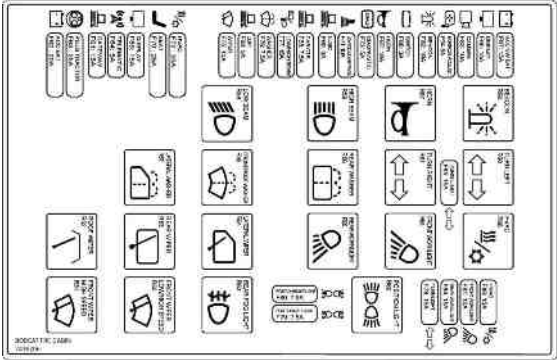
REF	DECAL	WARNING (IF APPLICABLE)
11	Solid Tyres (7501088) These safety signs are located inside the operator cab on the door. 	
12	Emergency Door Exit (7169014) This safety sign is located inside the operator cab on the rear window. 	
13	Power Bob-Tach attachment mounting system (7496078) [A] This safety sign is located inside the operator cab on the right cab window. 	
14	Sound Power (7301095) This safety sign is located on the left side of the operator cab. 	

REF	DECAL	WARNING (IF APPLICABLE)
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Cab Fuse And Relay Centre (7436206)

This safety sign is located inside the fuse and relay box behind the right console cover.

15



Fuse F63 (7446379)

This safety sign is located inside the fuse and relay box behind the right console cover.

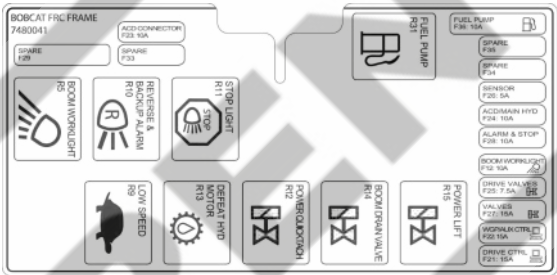
16



Frame Fuse And Relay Centre (7480041)

This safety sign is located inside the fuse and relay box in the front of the frame.

17



REF

DECAL

WARNING
(IF APPLICABLE)Options Fuse And Relay Centre (7435752)
[A]

This safety sign is located inside the small fuse and relay box in the front of the frame.

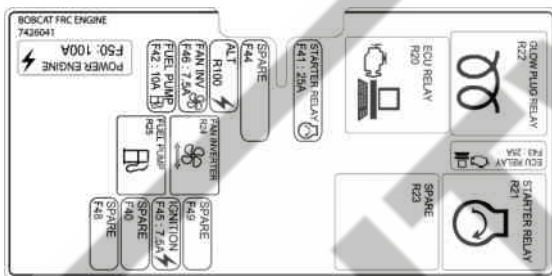
18



Engine Fuse And Relay Centre (7426041)

This safety sign is located in the engine compartment inside the engine fuse and relay box.

19



Falling And Crush Hazards (7251955)

This safety sign is located on both sides of the boom head.

20



! WARNING

CRUSHING HAZARD

Lowering of attachment / implement, falling loads or falling off attachment / implement can cause serious injury or death.

- Do not use as a manlift or work platform.
- No riders.
- Keep away from raised boom and attachment / implement.
- Keep bystanders away.

W-2905

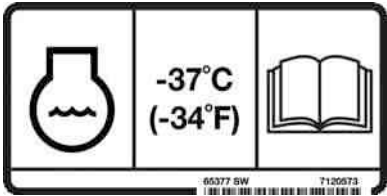
REF	DECAL	WARNING (IF APPLICABLE)
21	Lift Eye Link Rated Load Capacity (7505300) This safety sign is located on the left side of the boom head. 	
22	Hydraulic Fluid Sight Gauge (7203744) This safety sign is located on the hydraulic fluid tank next to the hydraulic fluid sight gauge. 	
23	Hot Pressurised Fluid (7185935) This safety sign is located on the hydraulic fluid tank. 	! WARNING INJECTION HAZARD Pressurised hydraulic fluid can penetrate skin or eyes, causing serious injury or death. If fluid enters skin or eyes, get immediate medical attention from a doctor familiar with this injury. ◀ W-2145
24	Hot Pressurised Fluid (7169699) This safety sign is located on the engine coolant tank cap. 	! WARNING BURN HAZARD Hot fluid can cause serious burns • Never open hot. • Open slowly to release pressure. ◀ W-2755

REF	DECAL	WARNING (IF APPLICABLE)
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Engine Coolant (7120573)

This safety sign is located inside the engine compartment next to the engine coolant tank.

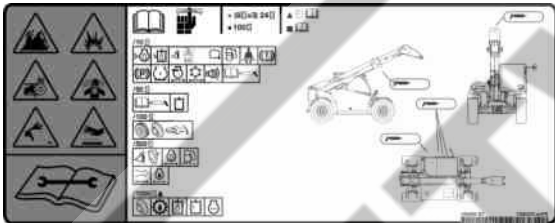
25



Service Checklist and Schedule (7300375)

This safety sign is located inside the engine compartment on the engine cover.

26



! WARNING

- GENERAL HAZARD**
Failure to follow instructions can cause serious injury or death.
- Keep door / cover closed except for service.
 - Keep engine clean of flammable material.
 - Keep body, loose objects, and clothing away from electrical contacts, moving parts, hot parts, and exhaust.
 - Do not use the machine in space with explosive dusts or gases or with flammable material near exhaust.
 - Never use ether or starting fluid on diesel engine with glow plugs or air intake heater. Use only starting aids as approved by engine manufacturer.
 - Leaking fluids under pressure can enter skin and cause serious injury.
 - Battery acid causes severe burns; wear goggles. If acid contacts eyes, skin, or clothing, flush with water. For contact with eyes, flush and get medical attention.
 - Battery makes flammable and explosive gas. Keep arcs, sparks, flames, and lighted tobacco away.
 - For jump start, connect negative cable to the machine engine last (never at the battery). After jump start, remove negative connection at the engine first.
 - Exhaust gases can kill. Always ventilate. ◀

VI-2782

Crushing Hazard (7493617)

This safety sign is located inside the engine compartment next to the alternator belt.

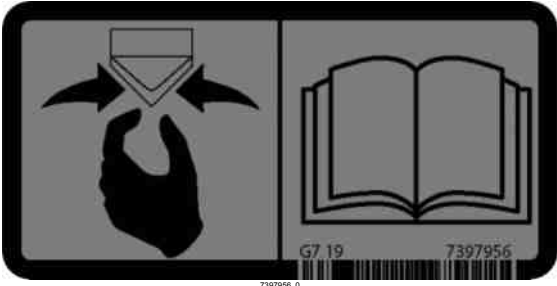
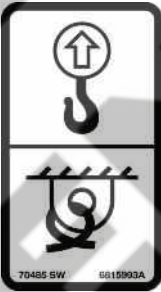
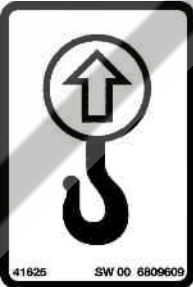
27



! WARNING

- CRUSHING HAZARD**
Failure to follow instructions can cause serious injury or death.
Keep hands and loose clothing away. ◀

VI-3105

REF	DECAL	WARNING (IF APPLICABLE)
	Dust Extractor (7397956)	
	This safety sign is located inside the engine compartment next to the air cleaner.	
28		
	Tie-Down (6595014) (2)	
	This safety sign is located next to the rear tie-down locations.	
29		
	Lift And Tie-Down (6815993) (2)	
	This safety sign is located next to the front tie-down locations.	
30		
	Hook (6809609) (2)	
	This safety sign is located on both sides of the frame next to the lift locations.	
31		

REF	DECAL	WARNING (IF APPLICABLE)
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Retrieval (7350278)

This safety sign is located next to the retrieval point on the front of the frame.

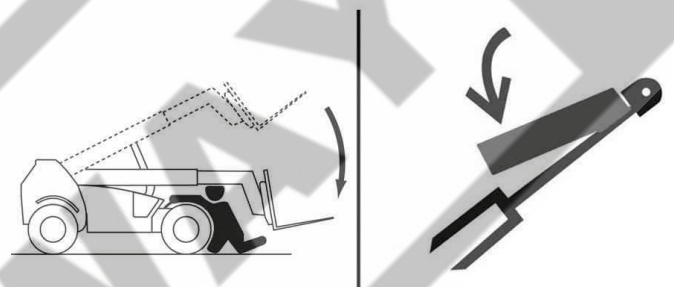
32



Crushing Hazard (7197650)

This safety sign is located on the front of the frame.

33



CRUSHING HAZARD

Avoid death due to boom movement. Disconnecting or loosening any hydraulic tubeline, hose, fitting, component or part failure can cause boom to drop. Keep out of this area when boom is raised unless supported by an approved boom stop. Replace if damaged. ◀

D-1030

Unexpected Machine Movement (7197517) (2)

This safety sign is located on each side of the rear of the frame.

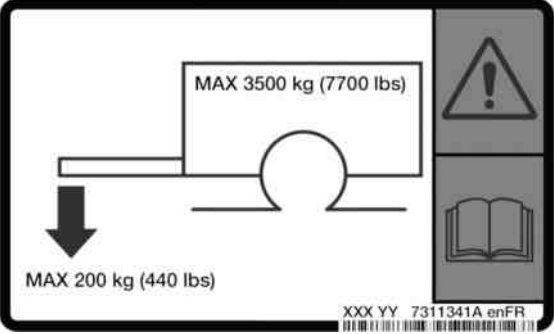
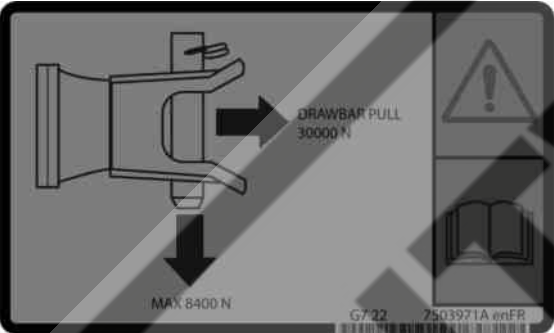
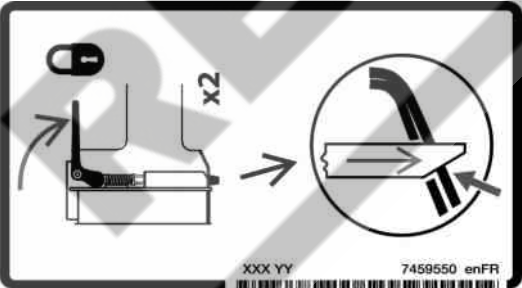
34



UNINTENDED MOVEMENT HAZARD

Failure to follow instructions can cause serious injury or death. Start engine only from operator seat with transmission lever in neutral and parking brake engaged. Do not attempt to start the engine by shorting across the starter terminals. ◀

W-2804

REF	DECAL	WARNING (IF APPLICABLE)
35	Trailer Hook Maximum Capacity (7311341) [A] This safety sign is located above or on the hitch. 	WARNING GENERAL HAZARD Failure to follow the safety precautions could result in serious injury or death. Read, understand and follow all the precautions in this manual and on safety signs (decals). ◀ W-2815
36	Trailer Hook Maximum Capacity (7311340) [A] This safety sign is located above or on the hitch. 	WARNING GENERAL HAZARD Failure to follow the safety precautions could result in serious injury or death. Read, understand and follow all the precautions in this manual and on safety signs (decals). ◀ W-2815
37	Bob-Tach attachment mounting system (7459550) This safety sign is located on the Bob-Tach attachment mounting system. 	

REF	DECAL	WARNING (IF APPLICABLE)
-----	-------	----------------------------

Bob-Tach attachment mounting system
Locking (7496137)
[A]

This safety sign is located on the Bob-Tach
attachment mounting system hydraulic
cylinder.

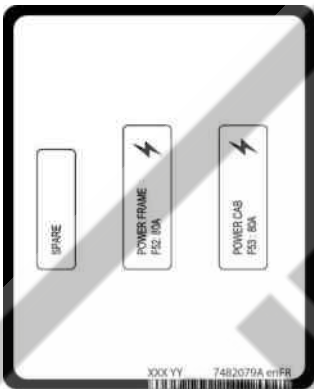
38



Power Distribution Unit (7482079)

This safety sign is located next to the front
tiedown locations.

39

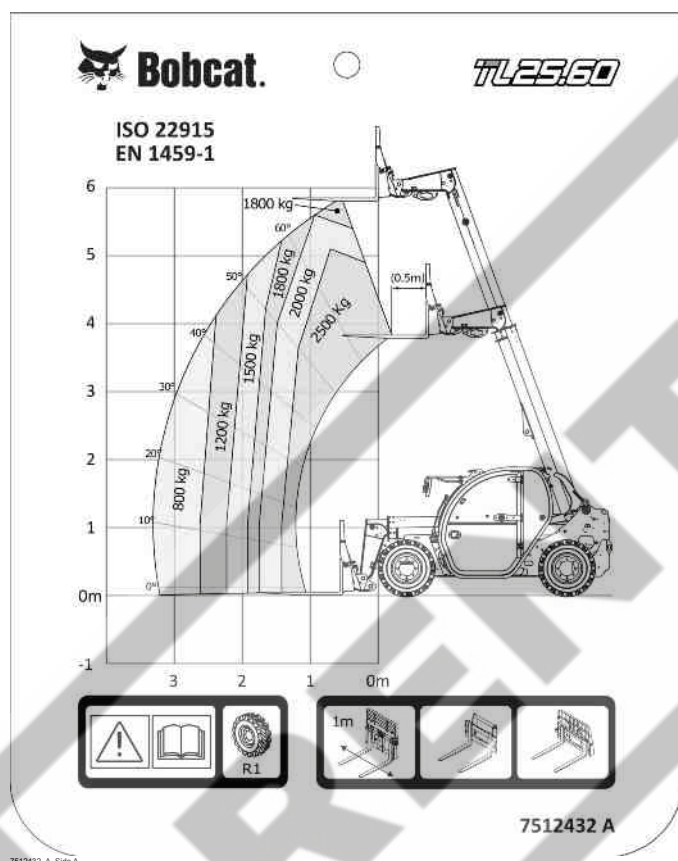


[A] Optional or field accessory (not standard equipment)

CHARTS FOR THE MACHINE WITH PALLET FORKS INSTALLED

Chart for the machine TL25.60RB on R1 tyres with Pallet Forks (1.0 m):

- CAMSO 12-16.5 PR12 SKS 532
 - ▷ With inflation pressure of 550 kPa (5,50 bar) (80 psi).
 - ▷ With pallet forks.
- CAMSO 14-17,5 PR14 SKS 532
 - ▷ With inflation pressure of 550 kPa (5,50 bar) (80 psi).
 - ▷ With pallet forks.
- TRELLEBORG 36x14-20 BRAWLER HPS SOLIDFLEX TRACTION
 - ▷ With pallet forks.

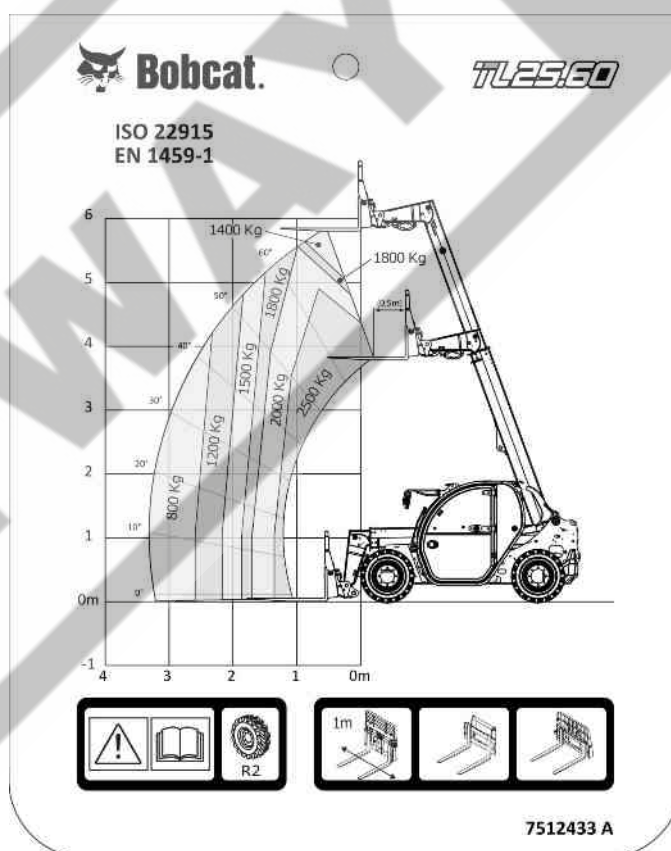


Complies with stability tests of the relevant parts of ISO 22915.

Chart for the machine TL25.60RB on R2 tyres with Pallet Forks (1.0 m):

- MICHELIN 300/70 R16,5 137A8/137B BIBSTEEL
 - ▷ With inflation pressure of 500 kPa (5,00 bar) (73 psi).
 - ▷ With pallet forks.
- ALLIANCE 400/55-17,5 16PR 149A8 A328

- ▷ With inflation pressure of 400 kPa (4,00 bar) (58 psi).
- ▷ With pallet forks.
- MICHELIN 280/80 R18 132A8/132B IND TL XMCL
 - ▷ With inflation pressure of 440 kPa (4,40 bar) (64 psi).
 - ▷ With pallet forks.
- ALLIANCE 300/75 R18 IND 142A8/142B A580
 - ▷ With inflation pressure of 400 kPa (4,00 bar) (58 psi).
 - ▷ With pallet forks.
- MICHELIN 280/80 R20 133A8/133B IND TL XMCL
 - ▷ With inflation pressure of 440 kPa (4,40 bar) (64 psi).
 - ▷ With pallet forks.



Complies with stability tests of the relevant parts of ISO 22915.

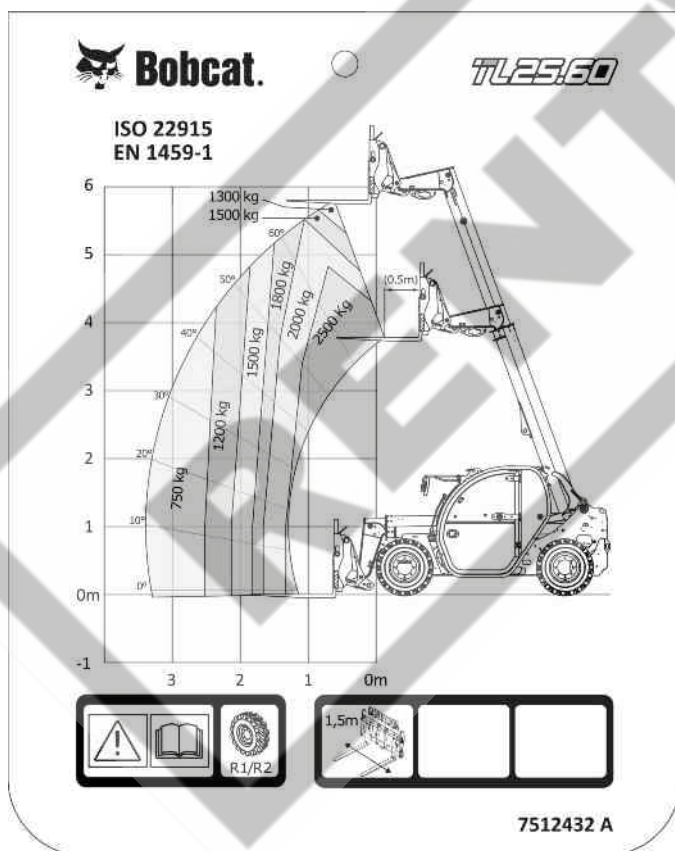
Chart for the machine TL25.60RB with Pallet Forks (1.5 m):

- CAMSO 12-16.5 PR12 SKS 532
 - ▷ With inflation pressure of 550 kPa (5,50 bar) (80 psi).
 - ▷ With pallet forks with side shift.
- CAMSO 14-17,5 PR14 SKS 532
 - ▷ With inflation pressure of 550 kPa (5,50 bar) (80 psi).

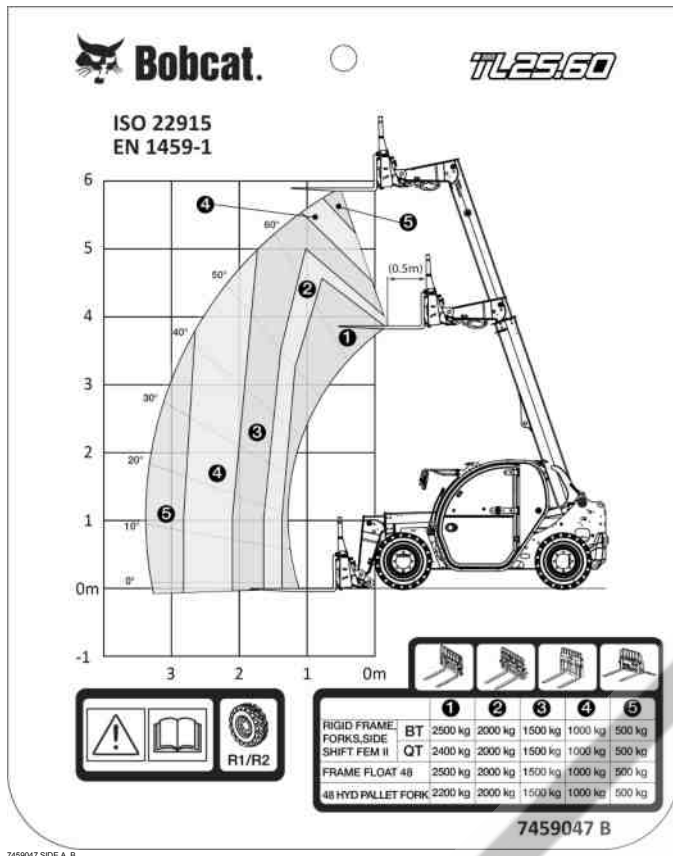
- ▷ With pallet forks with side shift.
- TRELLEBORG 36x14-20 BRAWLER HPS SOLIDFLEX TRACTION
 - ▷ With pallet forks with side shift.
- MICHELIN 300/70 R16,5 137A8/137B BIBSTEEL
 - ▷ With inflation pressure of 500 kPa (5,00 bar) (73 psi).
 - ▷ With pallet forks with side shift.
- ALLIANCE 400/55-17,5 16PR 149A8 A328
 - ▷ With inflation pressure of 400 kPa (4,00 bar) (58 psi).
 - ▷ With pallet forks with side shift.
- MICHELIN 280/80 R18 132A8/132B IND TL XMCL
 - ▷ With inflation pressure of 440 kPa (4,40 bar) (64 psi).
 - ▷ With pallet forks with side shift.
- ALLIANCE 300/75 R18 IND 142A8/142B A580
 - ▷ With inflation pressure of 400 kPa (4,00 bar) (58 psi).
 - ▷ With pallet forks with side shift.
- MICHELIN 280/80 R20 133A8/133B IND TL XMCL
 - ▷ With inflation pressure of 440 kPa (4,40 bar) (64 psi).
 - ▷ With pallet forks with side shift.

CHART FOR THE MACHINE WITH PALLET FORKS WITH SIDE SHIFT INSTALLED

- CAMSO 12-16.5 PR12 SKS 532
 - ▷ With inflation pressure of 550 kPa (5,50 bar) (80 psi).
 - ▷ With pallet forks with side shift.
- CAMSO 14-17,5 PR14 SKS 532
 - ▷ With inflation pressure of 550 kPa (5,50 bar) (80 psi).
 - ▷ With pallet forks with side shift.
- TRELLEBORG 36x14-20 BRAWLER HPS SOLIDFLEX TRACTION
 - ▷ With pallet forks with side shift.
- MICHELIN 300/70 R16,5 137A8/137B BIBSTEEL
 - ▷ With inflation pressure of 500 kPa (5,00 bar) (73 psi).
 - ▷ With pallet forks with side shift.
- ALLIANCE 400/55-17,5 16PR 149A8 A328
 - ▷ With inflation pressure of 400 kPa (4,00 bar) (58 psi).
 - ▷ With pallet forks with side shift.
- MICHELIN 280/80 R18 132A8/132B IND TL XMCL
 - ▷ With inflation pressure of 440 kPa (4,40 bar) (64 psi).
 - ▷ With pallet forks with side shift.
- ALLIANCE 300/75 R18 IND 142A8/142B A580
 - ▷ With inflation pressure of 400 kPa (4,00 bar) (58 psi).
 - ▷ With pallet forks with side shift.
- MICHELIN 280/80 R20 133A8/133B IND TL XMCL
 - ▷ With inflation pressure of 440 kPa (4,40 bar) (64 psi).
 - ▷ With pallet forks with side shift.



Complies with stability tests of the relevant parts of ISO 22915.



Complies with stability tests of the relevant parts of ISO 22915.

INTENDED USE

This machine is classified as a Rough-Terrain Variable-Reach Truck as defined in ISO 5053-1. This machine is intended to transport loads and place them on elevated work areas and can be driven on unimproved or disturbed terrain.

It can also be equipped with a variety of attachments (e.g. bucket) for earthmoving application.

Additional Bobcat approved attachments allow this machine to perform other tasks described in the attachment Operation & Maintenance Manuals.

Examples of intended use include:

Digging



NA24095

Backfilling



NA24096

Levelling



NA24097

Piling Materials



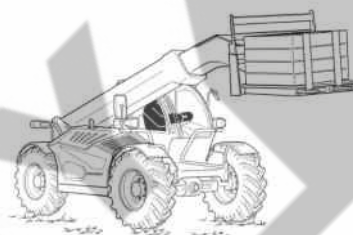
NA24098

Loading Materials



NA24099

Moving Palletised Materials



NA24100

⚠ WARNING

INSTABILITY HAZARD

Machine tipping or rollover can cause serious injury or death.

Load, unload and turn on flat level ground. DO NOT exceed Rated Operating Capacity (ROC) shown on load charts in cab. ◀

W-3176

⚠ IMPORTANT

MACHINE DAMAGE HAZARD

Damage to lift arms or hydraulics can occur. Never drive forward when the hydraulic control for lift arms is in float position. ◀

I-2005

OPERATOR CONTROLS IDENTIFICATION

Operator Components

WARNING

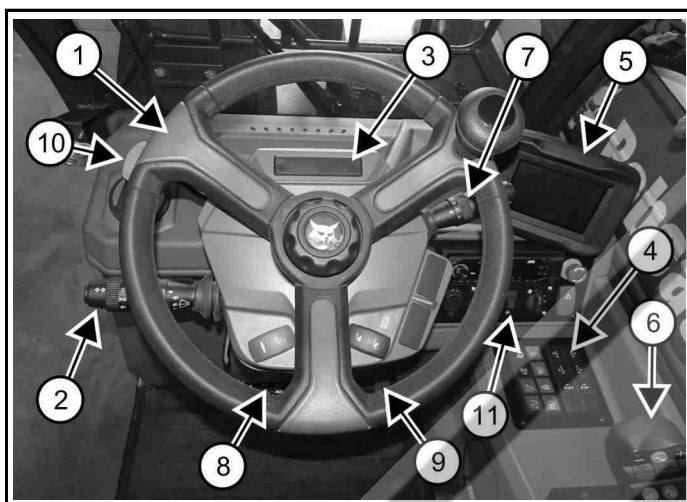
GENERAL HAZARD

Failure to follow instructions can cause serious injury or death.

Operate only from operator's seat with seat belt securely fastened. Never carry riders or use attachments / implements as a man lift or work platform. Keep bystanders away from the work area.

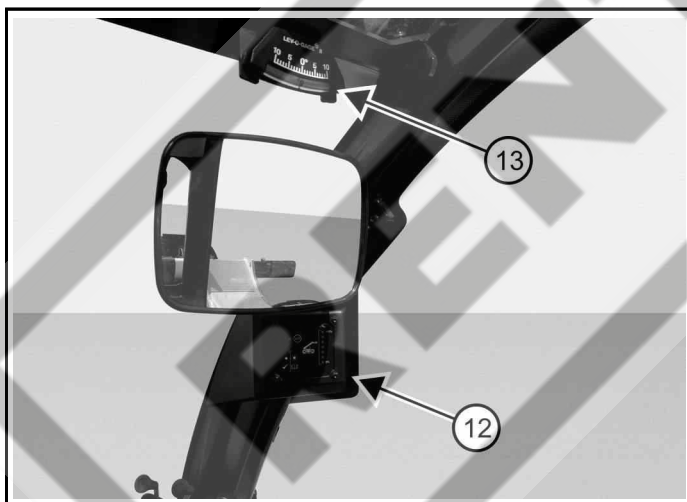
W-2390

Figure 9



EM11323a

Figure 10



C211783a

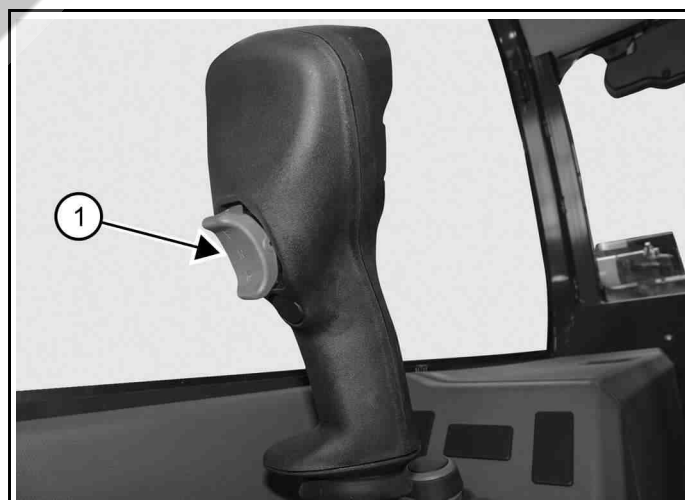
REF	DESCRIPTION	FUNCTION
1	Steering Wheel	(See Steering Wheel on Page 43)
2	Multi-function Lever	(See Multi-function Lever on Page 43)

REF	DESCRIPTION	FUNCTION
3	Center Panel and Center Console Panel	(See Centre Panel on Page 45) and (See Centre Console Panel on Page 45)
4	Right Console Panel	(See Right Console Panel on Page 46)
5	Display	5" standard display (See Standard Display on Page 51)
6	Hydraulic Control Lever (Joystick)	(See Hydraulic Controls on Page 74)
7	Wiper Lever	(See Wiper Lever on Page 44)
8	Service Brake Pedal / Inching Control	(See Service Brake Pedal And Inching Control on Page 53)
9	Accelerator Pedal	(See Accelerator Pedal on Page 53)
10	Travel Direction Lever (If Equipped)	(See Travel Direction on Page 42)
11	Dashboard Instrument Panel	
12	Longitudinal Load Moment Indicator	(See Longitudinal Load Moment Indicator (LLMI) on Page 49)
13	Sight Level Gauge	(See Sight Level Gauge on Page 53)

Travel Direction

Travel Direction Switch

Figure 11



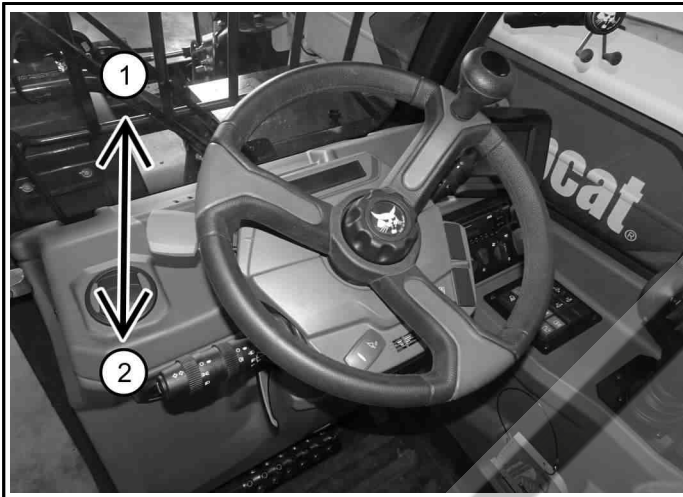
C211787a

- Press the top of the switch (Item 1) [Figure 11] for forward travel; the bottom of the switch for reverse travel. (See Dual F-N-R on Page 82) for more information. The back-up alarm will sound when the switch is in the reverse position.

Travel Direction Lever

The machine can be equipped with a travel direction lever.

Figure 12

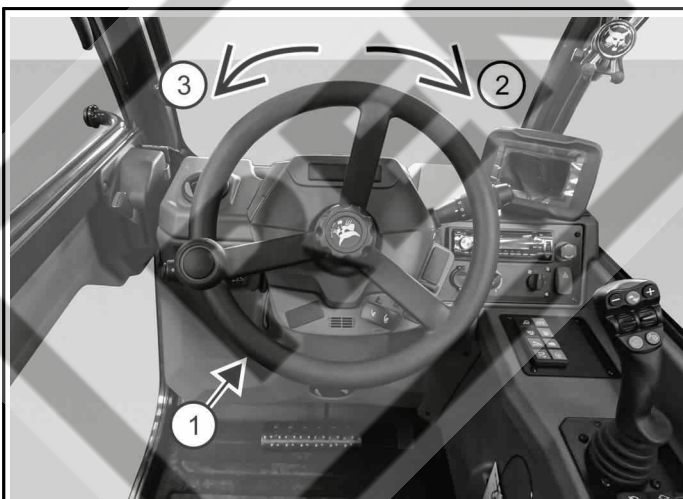


EM11324a

- Move the lever forward (Item 1) for forward travel; backward (Item 2) [Figure 12] for reverse travel. (See Dual F-N-R on Page 82) for more information. The back-up alarm will sound when the lever is in the reverse position.

Steering Wheel

Figure 13

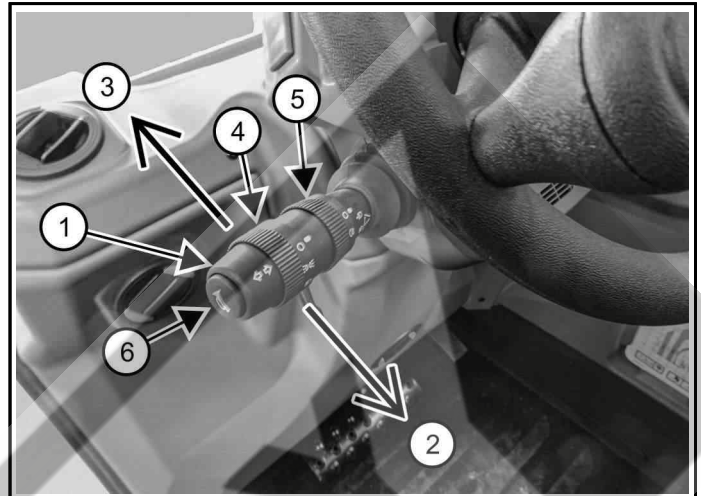


C211763a

- Turn the steering wheel (Item 1) [Figure 13] clockwise (Item 2) to turn right; anticlockwise (Item 3) to turn left. (See Driving and Steering the Machine on Page 68)

Multi-function Lever

Figure 14



C211764a

This lever (Item 1) [Figure 14] has four functions:

- Direction signal
- Parking lights and head lights
- Fog lights
- Horn

Direction Signal

- Move the lever backward (Item 2) for left direction signal; forward (Item 3) [Figure 14] for right direction signal. Be sure to turn the direction signals off after you have completed the turn.

Headlights And Rear Lights

- The lever (Item 1) also includes the lights switch (Item 4) [Figure 14] which has three positions. Rotate the lever to select front lights:
 - OFF
 - Parking lights and rear lights
 - Headlights and rear lights
- When the headlights are ON:
 - Push the lever (Item 1) [Figure 14] away from the steering wheel to change to high beam headlights. Pull the lever to come back to low beam position.
 - Pull the lever (Item 1) [Figure 14] to the steering wheel for momentary high beam headlights in addition to low beam headlights.

Fog Lights

- The lever (Item 1) also includes the fog lights switch (Item 5). Rotate the switch (Item 5) [Figure 14] and release to select fog lights. Rotate again to turn off the fog lights.

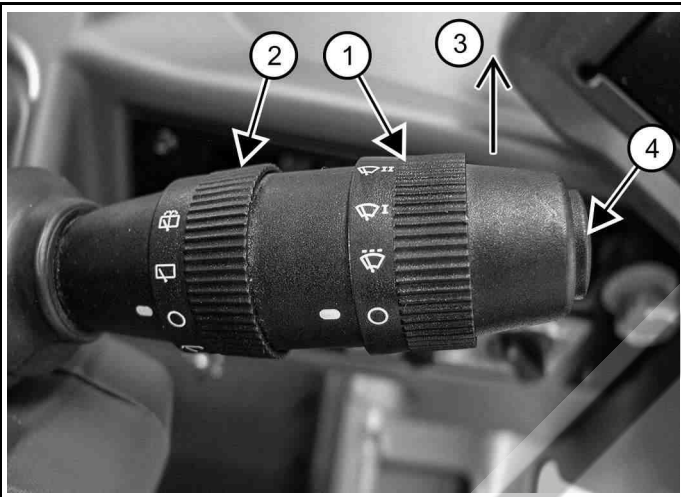
Horn

- Push the lever in (Item 6) [Figure 14] to sound the horn.

Wiper Lever

The wiper lever controls the front wiper, the rear / roof wipers, momentary front / roof washers, and a quick windshield clean function.

Figure 15



C210781a

1. Rotate the ring (Item 1) [Figure 15] on the lever to select the front wiper speed:

SYMBOL	DESCRIPTION
	High speed
	Low speed
	Intermittent
O	OFF

2. Rotate the ring (Item 2) [Figure 15] on the lever to select the rear or roof wipers:

SYMBOL	DESCRIPTION
	Hold for rear wiper washer
	Rear wiper
O	OFF
	Roof wiper

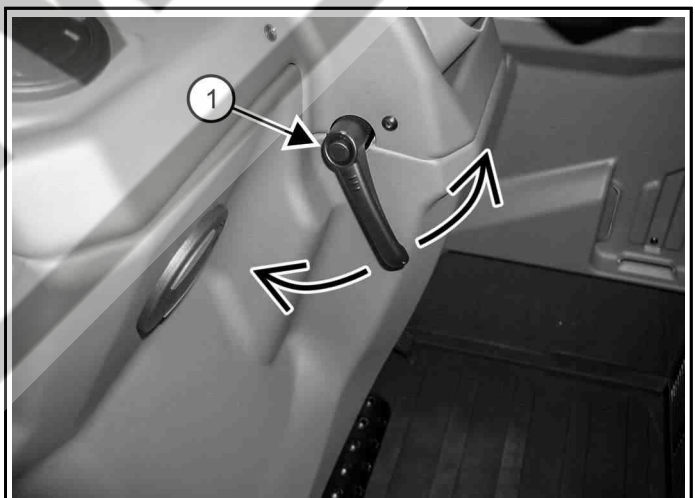
3. Raise the lever (Item 3) [Figure 15] to activate the front windshield washer and the roof washer.
4. Press the button (Item 4) momentarily to activate all wipers. Press and hold the button (Item 4) [Figure 15] to activate all wipers and washers. (Quick windshield clean)

NOTE: The rear washer will be activated when the button is released.

Adjusting The Steering Wheel

Steering Wheel Tilt Position

Figure 16



C211791a

1. Turn the lever (if equipped) (Item 1) [Figure 16] anticlockwise to loosen the steering wheel tilt mechanism.
2. When the steering wheel is in the desired position, turn the lever (Item 1) [Figure 16] clockwise. Tighten firmly to lock position.

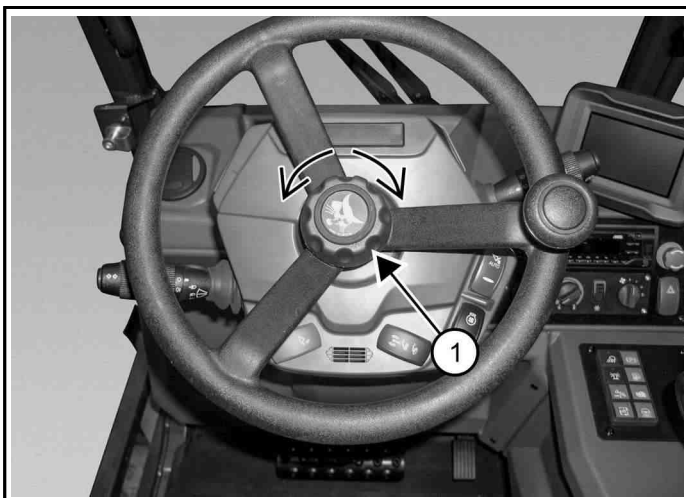
Always keep the steering wheel tilt mechanism in the lock position when operating the machine.

Steering Wheel Height

This machine may be equipped with a steering wheel

with adjustable height.

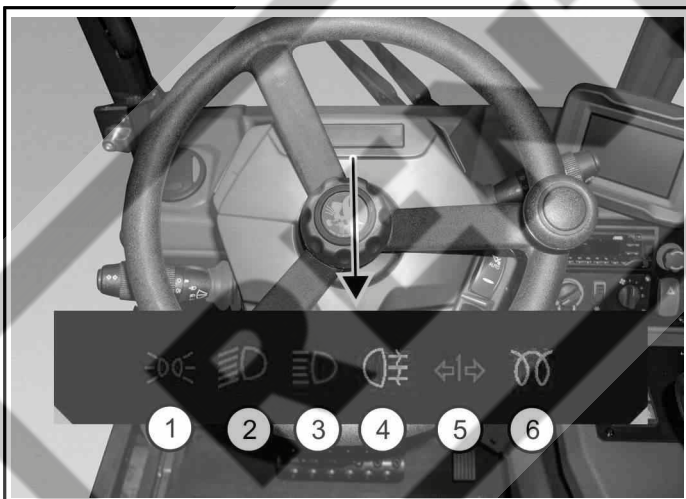
Figure 17



3. Turn the steering wheel central knob (Item 1) [Figure 17] anticlockwise to unlock the height adjustment.
4. Push down or pull up the steering wheel to adjust the height.
5. Turn the steering wheel central knob (Item 1) [Figure 17] clockwise to lock the position of the steering wheel.

Centre Panel

Figure 18

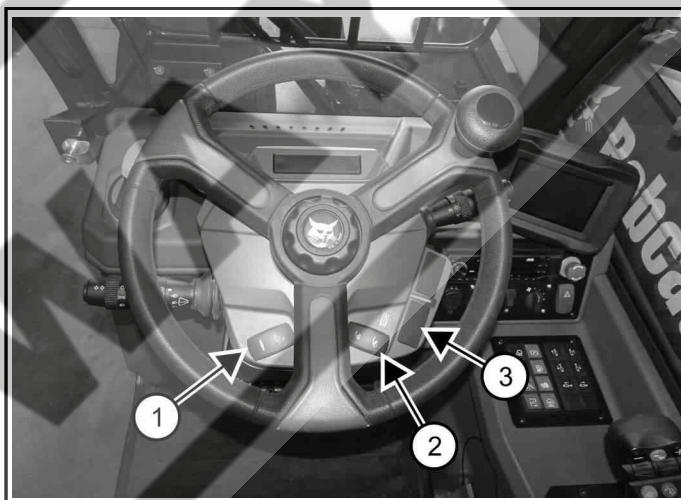


REF	DESCRIPTION	FUNCTION
1	Position Light Indicator	Light is illuminated when the position (park) lights are activated.
2	Low Beam Indicator	Light is illuminated when the low beam road lights are activated.

REF	DESCRIPTION	FUNCTION
3	High Beam Indicator	Light is illuminated when the high beam road lights are activated.
4	Rear Fog Light Indicator	Light is illuminated when the fog lights are activated.
5	Trailer Turn light Indicator (If equipped)	Light is illuminated when the directional signals are used with a trailer connected to the machine.
6	Preheating Light Indicator	Light is illuminated while the glow plugs are activated.

Centre Console Panel

Figure 19



REF	DESCRIPTION	FUNCTION
1	Hydraulic Attachment Lock Switch (If equipped)	- Power Bob-Tach attachment mounting system: Press the bottom of the switch to unlock the hydraulic attachment lock. Press the top of the switch the lock the hydraulic attachment lock. - Power Quick-Tach or Power Mani-Tach: Press and hold the bottom of the switch to unlock the hydraulic attachment lock. When released, the attachment locking pins will automatically lock at a slow speed.
2	Longitudinal Load Moment (LLM) Override Switch	(See Longitudinal Load Moment Controller (LLMC) Override Switch on Page 118)
3	Fan Inverter Switch (If equipped)	Press bottom of the switch once to clean debris from radiator. Fan resumes normal operation after 30 seconds. The switch is illuminated when the function is activated, either manually or automatically. (See Auto Reverse Cooling Fan on Page 81)

Right Console Panel

⚠ WARNING

GENERAL HAZARD

Failure to follow instructions can cause serious injury or death.

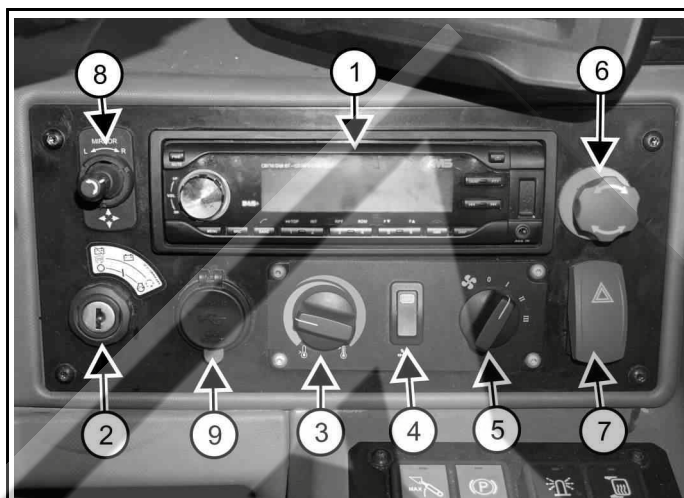
Before you leave the operator's position:

- Put the Travel Direction Control and the Joystick in neutral.
- Engage the parking brake.
- Retract and lower the boom and attachment / implement flat on the ground.
- Stop the engine. ◀

W-2907

Right Panel Components

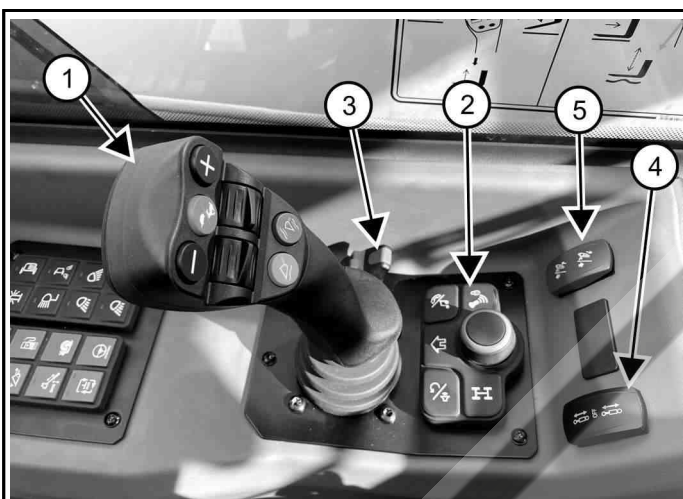
Figure 20



REF	DESCRIPTION	FUNCTION
1	Radio (If equipped)	
2	Start / Stop Switch (Rotary Switch or Key Switch optional)	Used to turn the electrical system on and off, and to start and stop the engine. (See Standard Key Panel on Page 89)
3	Temperature Control	Turn clockwise to increase cab temperature; anticlockwise to decrease.
4	Air Conditioning Switch	Press the top of the switch to turn the Air Conditioning on. Press the bottom of the switch to turn off.
5	Fan Switch	Turn switch clockwise to increase fan speed. "O" - Off, "I" - Low, "II" - Medium, "III" - Fast
6	Emergency Stop	Push to immediately shut down the engine and its fuel supply. The display shows "STOP". Pull to unlock from pressed position.
7	Hazard Lights	Press the bottom of the switch to turn the Hazard Lights ON; press the top to turn OFF. Switch light flashes when Hazard Lights are ON.

REF	DESCRIPTION	FUNCTION
8	Electrical Mirror Joystick (If equipped)	Move and rotate the joystick to adjust the electrical right-side mirror. (See Adjusting The Electrical Mirror on Page 89)
9	USB Port	(See USB Port on Page 53)

Figure 21



REF	DESCRIPTION	FUNCTION
1	Joystick	
2	Jog Shuttle	(See Jog Shuttle (Standard Display) on Page 49)
3	Flex Drive Engine Speed Lever (If equipped)	Push the lever to increase and set the engine speed. (See Flex Drive on Page 69)
4	ACD Switch	(See Attachment Control Connector on Page 83)
5	Not Used	---

Standard Panel

The machine is equipped with the standard panel below.

Figure 22

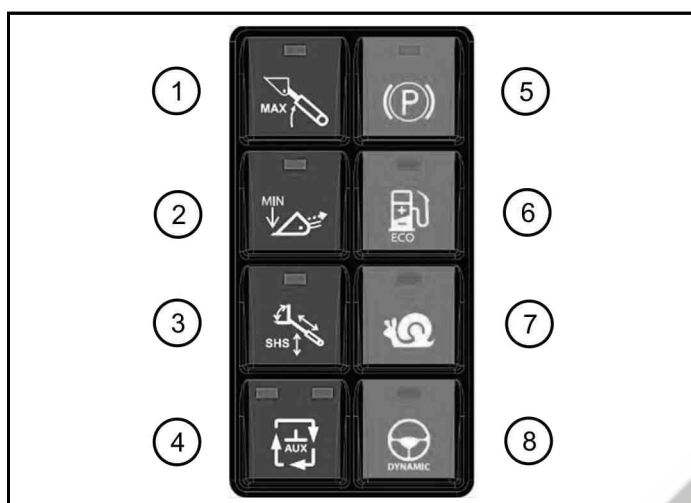


REF	DESCRIPTION	FUNCTION
1	Work Lights	Press the switch to turn the work lights ON; press again to turn OFF. NOTE: The position lights must be turned ON to be able to turn the worklights ON.
2	Rotating Beacon	Press the switch to turn the rotating beacon ON; press again to turn OFF.
3	Smart Handling System	Press the switch to reduce the boom movements; press again to turn OFF. (See Smart Handling System (SHS) on Page 80)
4	Auxiliary Hydraulic Flow	(See Operating The Front Auxiliary Hydraulics on Page 77)
5	Parking Brake	(See Parking Brake on Page 67)
6	ECO Mode	Press the switch to limit the engine RPM when full RPM is not needed in order to save fuel; press again to turn OFF. (See ECO Mode on Page 91)
7	Speed Management (Creep Mode)	(See Speed Management on Page 71)
8	Dynamic Drive	Press the switch to activate dynamic drive mode; press again to turn OFF. This mode increases the travel direction shift speed and accelerator pedal responsiveness.

Smart Function Panel

The machine may be equipped with the smart function panel below.

Figure 23



REF	DESCRIPTION	FUNCTION
1	Maximum Lifting Angle (If equipped)	Press the switch to activate the maximum lifting angle function; press again to turn OFF. (See Operating With Maximum Boom Angle on Page 124)
2	Return-To-Earth (If equipped)	Press the switch to activate the Return-To-Earth function; press again to turn OFF.
3	Smart Handling System	Press the switch to reduce the boom movements; press again to turn OFF. (See Smart Handling System (SHS) on Page 80)
4	Auxiliary Hydraulic Flow	Press the switch once to activate the auxiliary hydraulic flow. Press a second time to activate continuous auxiliary hydraulic flow. Press a third time to disable all. (See Operating The Front Auxiliary Hydraulics on Page 77)
5	Parking Brake	(See Parking Brake on Page 67)
6	ECO Mode	Press the switch to limit the engine RPM when full RPM is not needed in order to save fuel; press again to turn OFF. (See ECO Mode on Page 91)

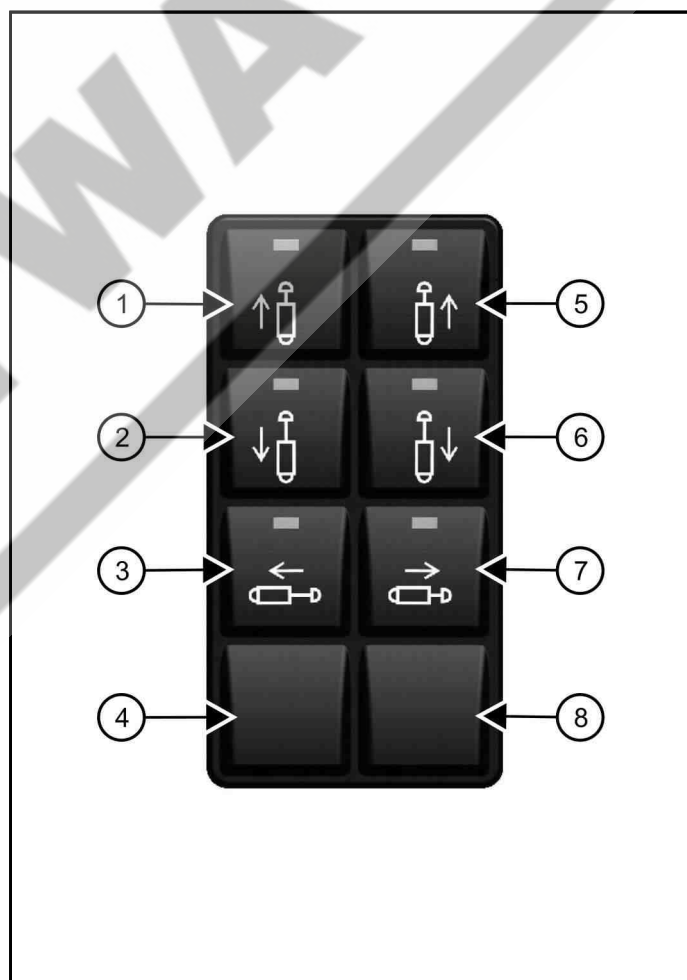
REF	DESCRIPTION	FUNCTION
7	Speed Management (Creep Mode)	(See Speed Management on Page 71)
8	Dynamic Drive	Press the switch to activate dynamic drive mode; press again to turn OFF. This mode increases the travel direction shift speed and accelerator pedal responsiveness.

ACD Panel

The machine may be equipped with the Attachment Control Device (ACD) panel below.

The ACD panel [Figure 24] in the operator cab controls the attachment. See the attachment Operation & Maintenance Manual for more details:

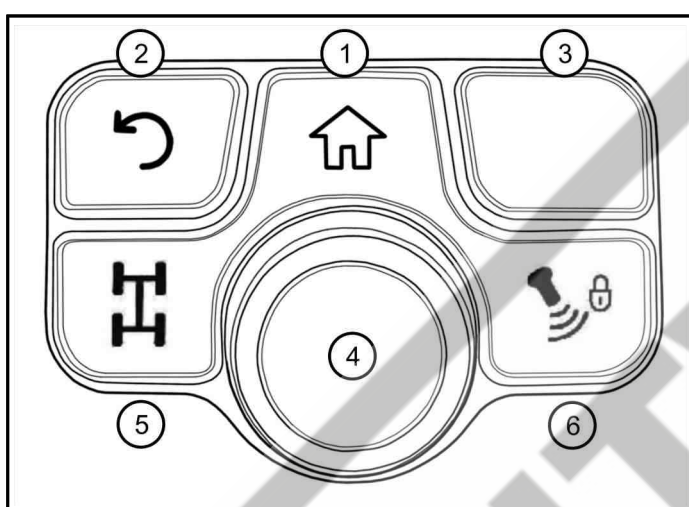
Figure 24



REF.	DESCRIPTION
1	Move Left-Hand Side Up
2	Move Left-Hand Side Down
3	Move Attachment Left
4	Not Used
5	Move Right-Hand Side Up
6	Move Right-Hand Side Down
7	Move Attachment Right
8	Not Used

Jog Shuttle (Standard Display)

Figure 25



NA3977a

REF	DESCRIPTION	FUNCTION
1	Home Screen (Gauges)	Press to change display view to the GAUGES screen.
2	Back	Press to return to previous screen.
3	Not Used	---
4	Jog Shuttle / Activate Button	Rotate to navigate between available icons on display. Press to select highlighted icon.
5	Steering Mode	Press to change display view to the STEERING MODE screen. (See Selecting The Steering Mode on Page 58)
6	Joystick Lockout	Press to disable joystick hydraulic functions. Press again to enable.

Longitudinal Load Moment Indicator (LLMI)

The LLMI warns the operator about inadequate stability in the longitudinal plane (forward direction).

The LLMI is intended to warn for tipping over in the case of:

- The machine is stationary on solid, stable and level ground
- The machine is performing load picking, carrying, loading and unloading
- The telescopic boom is not fully retracted.

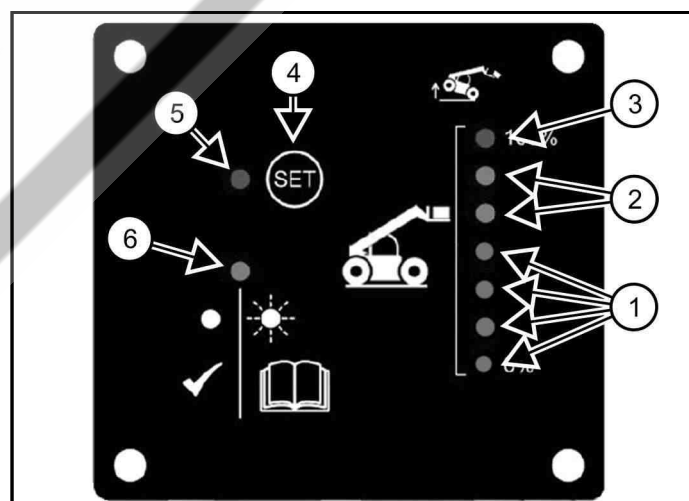
NOTE: All hydraulic movements are functional if the boom is fully retracted, regardless of the machine's stability level.

NOTE: When the longitudinal stability level reaches a critical level (Critical zone) with the boom not fully retracted and the boom angle below 5°, only hazardous movements are disabled (tilt and boom lowering are reduced in speed). It is still possible to retract and lift the boom.

The LLMI is not intended to warn for tipping over in the case of:

- A sudden overload
- Travelling with a lifted load
- Travelling on rough terrain or on grounds with obstacles and holes
- Travelling across a slope or turning on a slope
- Turning corners too fast or too sharp.

Figure 26



C213534c

The indicator lights (Items 1, 2 and 3) [Figure 26] sequentially illuminate as the machine's longitudinal stability decreases. They identify three zones of the machine's longitudinal stability level:

Secure zone:

Green indicator lights (Item 1) [Figure 26] (four lights). The operator works in a secure zone.

In this zone, the following machine functions are progressively reduced in speed as the machine's longitudinal stability decreases:

- Boom lowering
- Boom extend
- Tilting of attachment
- Auxiliary hydraulic functions.

Warning zone:

Orange indicator lights (Item 2) [Figure 26] (two lights). The longitudinal stability level gets close to the critical zone.

In this zone, the following machine functions are progressively reduced in speed as the machine's longitudinal stability decreases:

- Boom lowering
- Boom extend
- Tilting of attachment
- Auxiliary hydraulic functions.

Critical Zone:

Red indicator light (Item 3) [Figure 26] (one light). The machine's longitudinal stability reaches a critical level. A warning horn is activated along with the red indicator light.

In this zone, the following machine functions are reduced in speed or disabled:

- Boom lowering (disabled with boom angle above 5°, reduced in speed when below 5°)
- Boom extend (disabled)
- Tilt (reduced in speed)
- Auxiliary hydraulic functions (reduced in speed)

Use the remaining active functions to bring the machine back to a safe level of stability. If necessary, activate the Longitudinal Load Moment Controller (LLMC) override mode to enable a disabled function such that the machine can be brought back to a safe level of stability.

NOTE: The LLMC override mode should only be activated when necessary and is automatically deactivated after a running period of 60 seconds.

NOTE: The warning horn cannot be deactivated.

Set Button:

The calibration set button (Item 4) [Figure 26] has two functions:

- Testing the correct functioning of the LLMI and the LLMC. (See LLMC Calibration Test on Page 144)
- Calibrating the LLMI / LLMC system. (See your Bobcat dealer for calibration.)

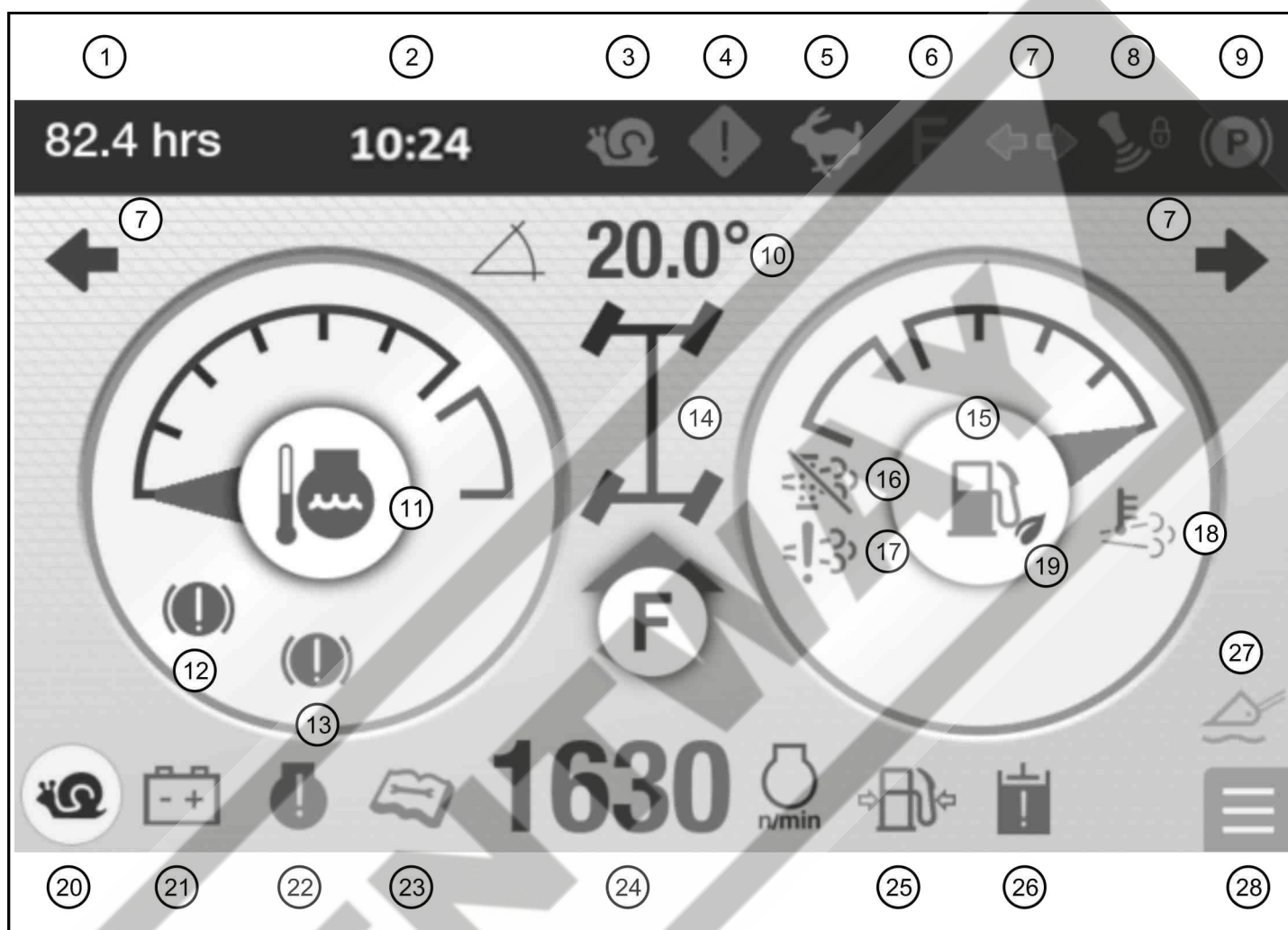
The set indicator light (RED) (Item 5) [Figure 26] is used for the test procedure and the LLMI / LLMC system calibration. The light flashes when the LLMC is in fault mode.

The control indicator light (ORANGE) (Item 6) [Figure 26] indicates that the machine is under control of the LLMC. The light flashes when the LLMC override switch is activated.

Standard Display

The standard display is a visual interface that provides control of certain machine settings and operating information through the use of a jog shuttle control. The standard display is scratch resistant and weather resistant.

Figure 27



The following table shows the description and function for the icons located on the gauges (home) screen [Figure 27].

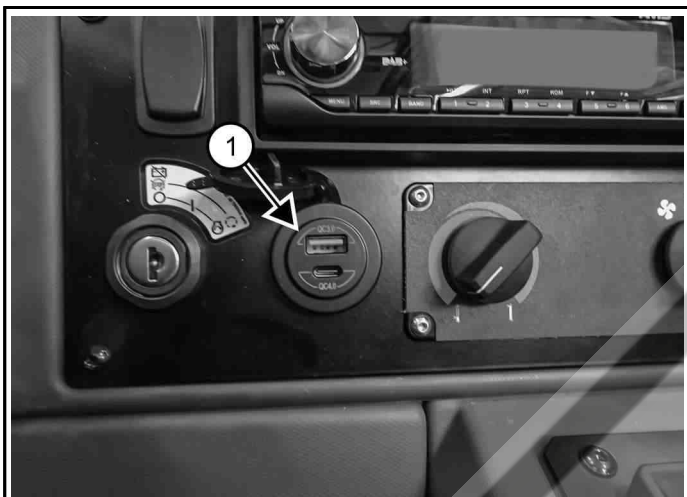
REF	DESCRIPTION	FUNCTION
1	Hourmeter	Shows machine operating hours. This will remain visible on most screens.
2	Current Time (If equipped)	Shows the time.
3	Creep Mode	This icon is ON when creep mode is activated.
4	General Warning	This icon is ON with malfunction of one or more machine functions.
5	Speed Management	Current drive speed range: low (turtle) or high (rabbit).
6	Travel Direction Switch (F-N-R)	Shows the selected travel mode. The icon will flash when attempting to start the engine when the Travel Direction Control (Travel Direction Switch and / or Lever) is not in neutral position.
7	Turn Signals Status	This icon is flashing when a direction signal is activated or when the hazard lights are activated.

REF	DESCRIPTION	FUNCTION
8	Joystick Lockout	This icon is ON when the joystick functions cannot be operated.
	Attachment Unlocked	The Attachment Unlocked icon is ON when the Power Bob-Tach attachment mounting system is in the unlocked position.
9	Parking Brake Engaged	This icon is ON when the parking brake is engaged.
10	Boom Angle	Shows the current boom angle.
11	Engine Coolant Temperature Icon and Gauge	This icon turns red when engine coolant temperature is too high. The gauge shows the engine coolant temperature.
12	Brake Pressure Failure	This icon turns ON or flashes in case of a pressure failure in the brake system.
13	Brake Electrical Failure	This icon turns ON in case of an electric failure in the brake system.
14	Steering Mode	Shows the current steering mode and the status of wheel alignment.
15	Fuel Gauge	Shows the amount of fuel in the tank. The icon turns red when the fuel level is low, the fuel pressure is low, the fuel temperature is too high, or the sensor is faulty.
16	DPF Icon	- The icon is ON: the DPF system is regenerating. - The DPF icon flashes slowly: perform a forced parked regeneration as soon as possible. - The icon flashes quickly: contact an authorised Bobcat service dealer to service the DPF.
17	DPF Inhibit icon	The inhibit icon will display here when inhibit mode is selected. The inhibit icon flashes slowly: inhibit mode is active but the machine would like to launch an automatic regen as the conditions have been met (soot load > 100%)
	DPF Emissions Error	This icon is ON when the DPF is malfunctioning.
18	High Exhaust System Temperature (HEST)	This icon is ON when the exhaust temperature is higher than normal operation. This indicates that there is an active regeneration ongoing.
19	ECO Mode	This icon is ON when ECO mode is activated.
20	On-The-Fly Settings	This icon shows which setting is activated. The setting can be adjusted using the '+' and '-' buttons on the joystick.
21	Low Battery Voltage	Battery voltage is low.
22	Engine Malfunction	Engine malfunction or failure.
23	Service Due	Indicates service is due. (See Record A Service on Page 193)
24	Engine rpm	Shows engine rpm.
25	Fuel Pressure Failure	This icon is ON when fuel filter pressure is not correct.
26	Hydraulic System Malfunction	The light comes on when there is a hydraulic malfunction or failure or if the hydraulic / hydrostatic fluid temperature is high or if the hydraulic filter is plugged. The light will flash if the hydraulic / hydrostatic fluid temperature is extremely high.

REF	DESCRIPTION	FUNCTION
27	Boom Suspension or Boom Float (shown)	(See Boom Suspension on Page 70) or (See Levelling The Ground Using Float on Page 124)
28	Navigation Handle	This icon is used to open the navigation bar. (See Navigation Bar on Page 191)

USB Port

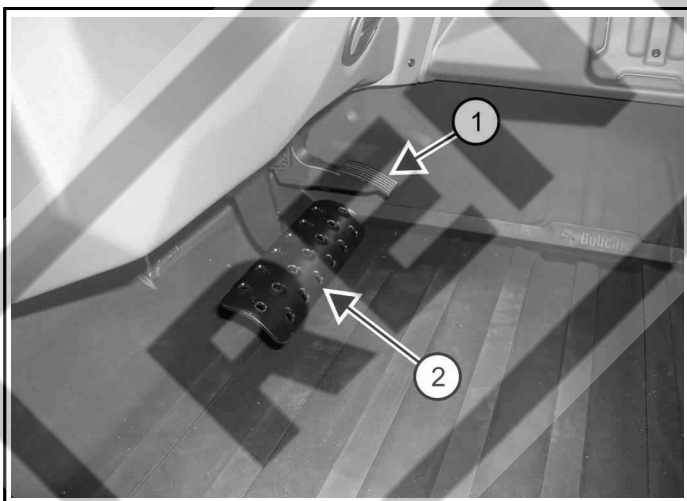
Figure 28



The USB port (Item 1) [Figure 28] is a 5volt (V) dual receptacle for accessories.

Accelerator Pedal

Figure 29



The accelerator pedal (Item 1) [Figure 29] is at the right side of the steering console.

- Press the accelerator pedal down to increase engine speed. Release foot pressure to decrease engine speed. In Flex Drive mode (if equipped), the accelerator pedal controls only travel speed.

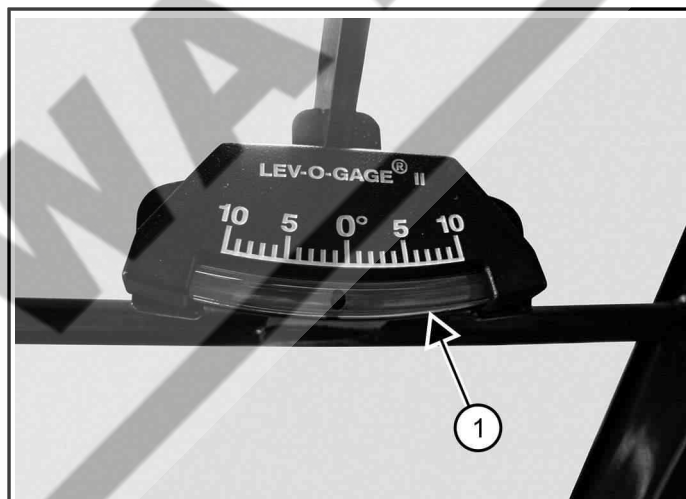
Service Brake Pedal And Inching Control

The service brake pedal (Item 2) [Figure 29] is at the left of the accelerator pedal.

- Press the brake pedal a small amount to decrease travel speed and control inching (gradual travel of the machine). Approximately the first half of the total brake pedal travel is for inching control.
- Press down to stop travel of the machine.

Sight Level Gauge

Figure 30



The sight level gauge (Item 1) [Figure 30] indicates position of the frame to the horizontal plane.

When carrying out load handling work, carefully monitor this sight level gauge and take the necessary measures.

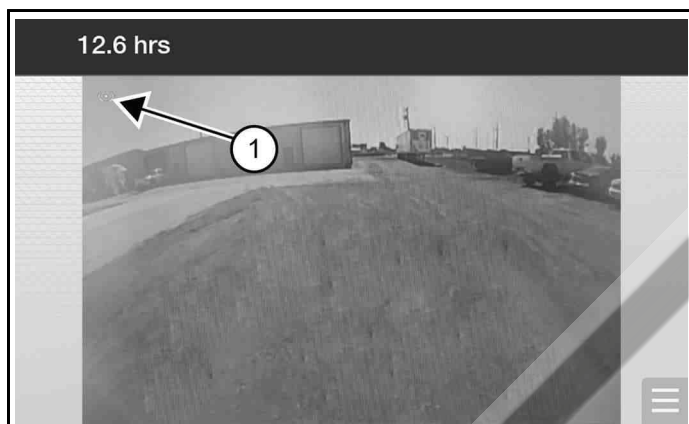
REAR VIEW CAMERA SYSTEM

Rear View Camera System Description

The machine may be equipped with a rear view camera system.

A rear view camera system is not a substitute for keeping bystanders away from the work area. Operators must remain fully aware of the surroundings using direct visibility and the rear view camera system. The operator must service and maintain the camera system to ensure proper function.

Figure 31



The camera view is shown on the display [Figure 31] by selecting **[CAMERA]** on the display.

The rotating icon (Item 1) [Figure 31] in the upper left corner of the display indicates a live broadcast from the camera.

If the icon freezes, it indicates that the camera is not supplying a live broadcast and service may be required.

The display will change to camera view automatically when the operator moves the travel direction switch or lever (if equipped) in reverse.

NOTE: Objects viewed on the camera display are closer than they appear.



WARNING

CRUSHING HAZARD

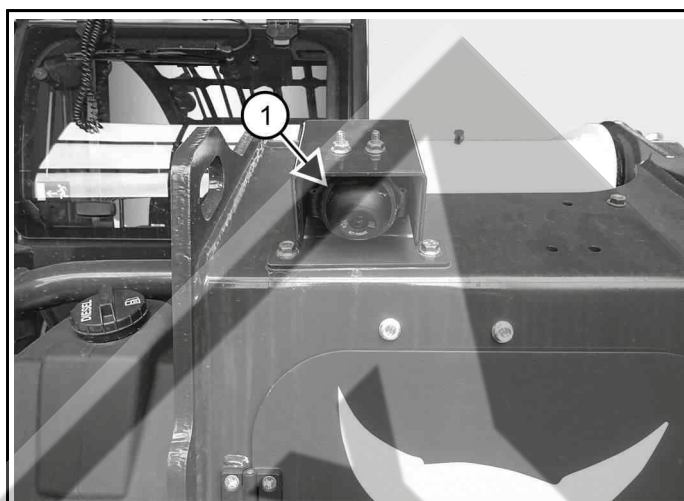
Contact with machine can cause serious injury or death.

- Always keep bystanders away from the work area and travel path.
- The operator must maintain a clear view of the direction of travel and look before and during machine movement.
- The back-up alarm must sound when operating the machine in the reverse direction. ◀

W-2783

Maintaining Rear View Camera System

Figure 32



The rear view camera (Item 1) [Figure 32] is located on the rear cover.

1. Perform the following daily or as necessary:
 - Clean the lens of the camera using a soft cloth and clean water.
 - Remove mud, snow, ice, or other debris that could affect the clear view provided by the camera system.
 - Verify proper camera adjustment. Adjust camera if necessary.
 - Replace damaged rear view camera system components. See your Bobcat dealer for service and parts.

Adjusting Rear View Camera System

Perform the following steps to adjust the rear camera:

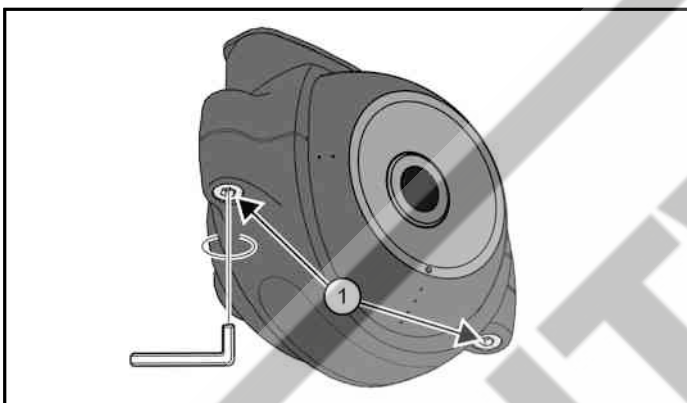
1. Make a mark on the ground 1,25 m (4 ft) behind the machine.
2. Turn the machine ON without starting the engine. Set the display for camera.

Figure 33



3. Ensure the camera is centred left and right. The mark on the ground (Item 1) [Figure 33] from step 1 should be visible on the display. Continue with procedure if necessary.

Figure 34



4. Loosen the screws (Item 1) [Figure 34] of the clamp holding the camera.
5. Adjust the camera until the mark on the ground (Item 1) [Figure 33] from step 1 is visible on the display. Ensure the camera is centred left and right.
6. Tighten the screws to 0,8 – 1,0 N·m (7 – 8.8 in-lb) torque.
7. Install the rear cover and bolts.
8. Verify proper camera adjustment [Figure 33].
9. Repeat steps 4 through 8 if necessary.
10. Turn the machine OFF.

OPERATOR CAB

Operator Cab Description

⚠ WARNING

MODIFICATION HAZARD

Changes to the cab can cause loss of operator protection from rollover and falling objects resulting in serious injury or death.

- Never modify operator cab by welding, grinding, drilling holes, or adding attachments / implements unless instructed to do so by Bobcat.
- DO NOT operate without right window. ◀

W-2906

The Bobcat machine has an operator cab (ROPS / FOPS) as standard equipment to protect the operator. The seat belt must be worn for ROPS / FOPS protection.

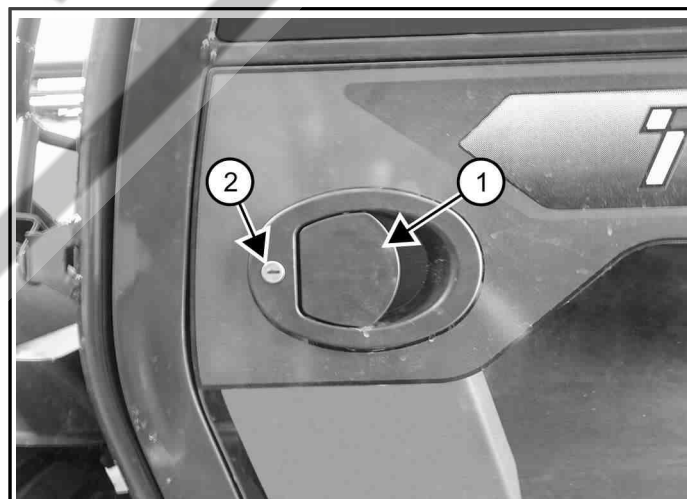
Check the ROPS / FOPS cab, mounting, and hardware for damage. Never modify the ROPS / FOPS cab. Replace the cab and hardware if damaged. See your Bobcat dealer for parts.

ROPS / FOPS - Roll-over Protective Structure per EN ISO 3471, FOPS per EN ISO 3449 (FOPS Level I).

The operator cab does not provide protection against hazardous substances. Do not use this machine under conditions requiring protection against hazardous substances.

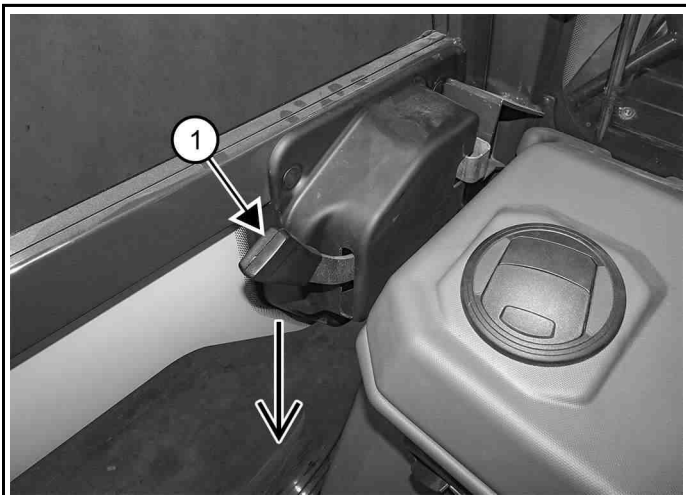
Cab Door

Figure 35



C215904a

Figure 36

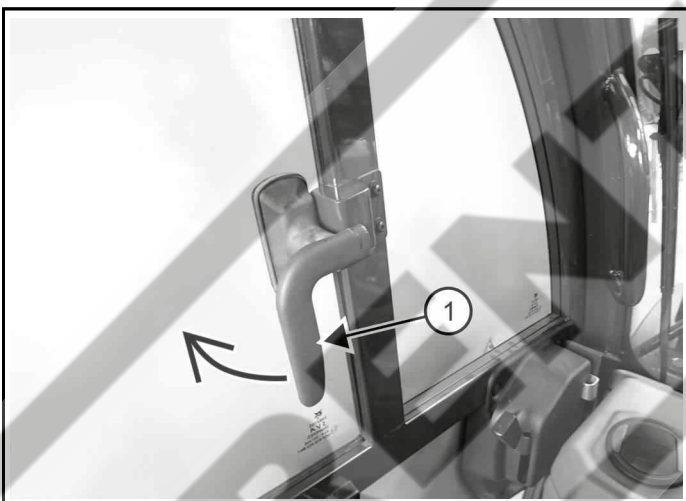


C215905a

- The cab door can be opened from the outside of the cab using the handle (Item 1) [Figure 35] and opened from the inside of the cab when you pull the lever (Item 1) [Figure 36] down.
- The cab door can be locked (Item 2) [Figure 35] with the same key as the starter switch.

Cab Door Window

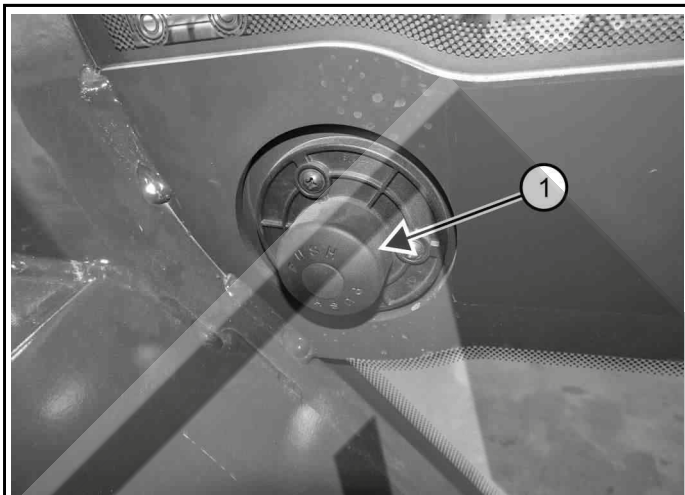
Figure 37



C215906a

1. Turn the handle (Item 1) [Figure 37] (clockwise) to unlock the window. Push the window fully open until it latches against the cab.

Figure 38

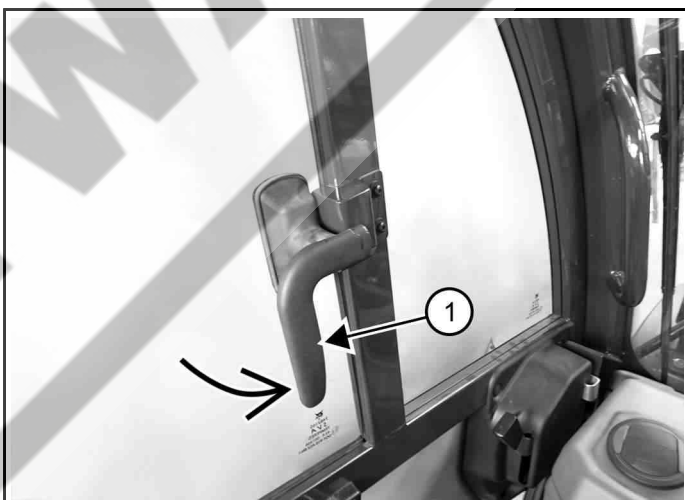


EM11331a

2. Push the knob (Item 1) [Figure 38] to disengage the latch and close the window.

There is a second knob available on the outside of the cab.

Figure 39

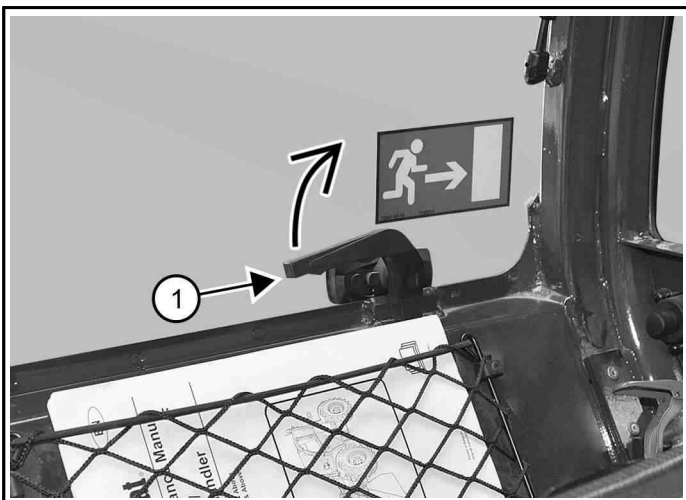


C215906b

3. Turn the handle (Item 1) [Figure 39] back into the original position (anticlockwise) to lock the window.

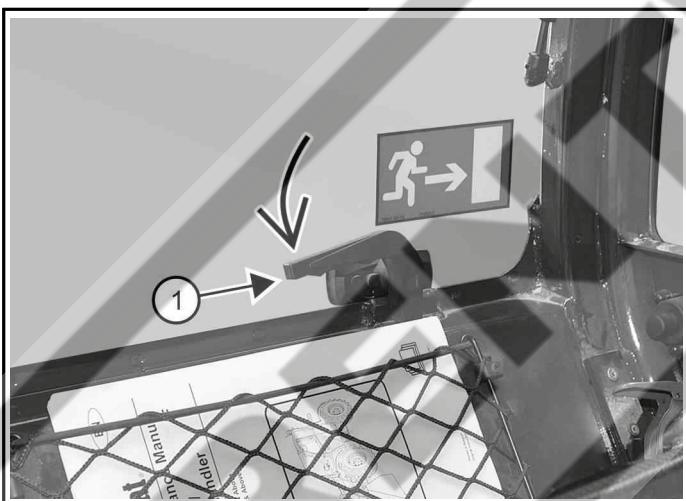
Rear Cab Window

Figure 40



1. Turn the handle (Item 1) [Figure 40] (as shown) to unlock the rear window.
2. Push the rear window open until in fully open position.
3. Pull the window down to close it.

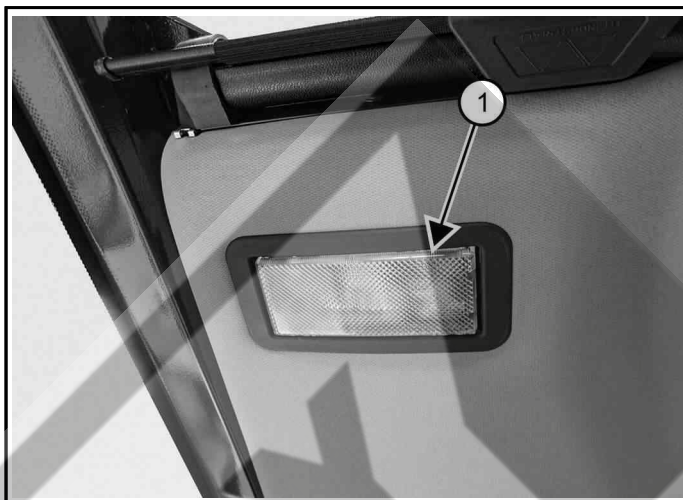
Figure 41



4. Turn the handle (Item 1) [Figure 41] back into the original position (as shown) to lock the window.

Cab Light

Figure 42

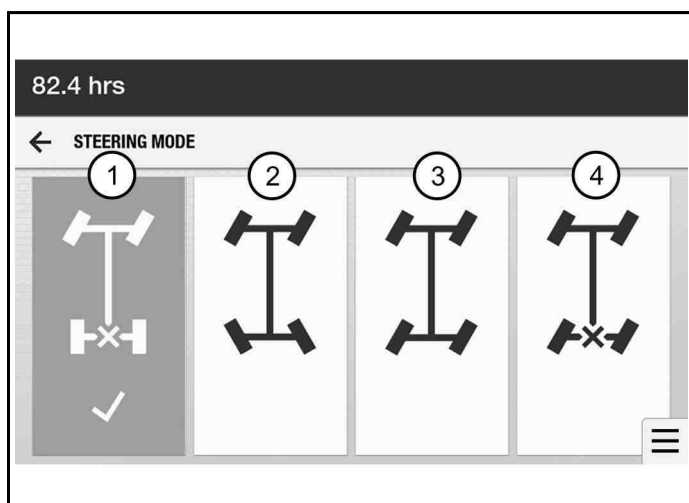


The cab light [Figure 42] is located above the operator's head.

1. Push either side of the lens (Item 1) [Figure 42] to turn the light on.
2. Return the lens to the centre position to turn the light off.

STEERING MODE

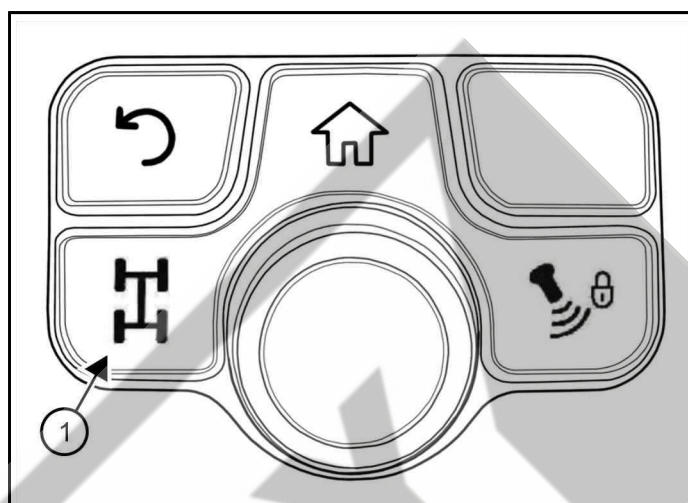
Figure 43



C210768a

Selecting The Steering Mode

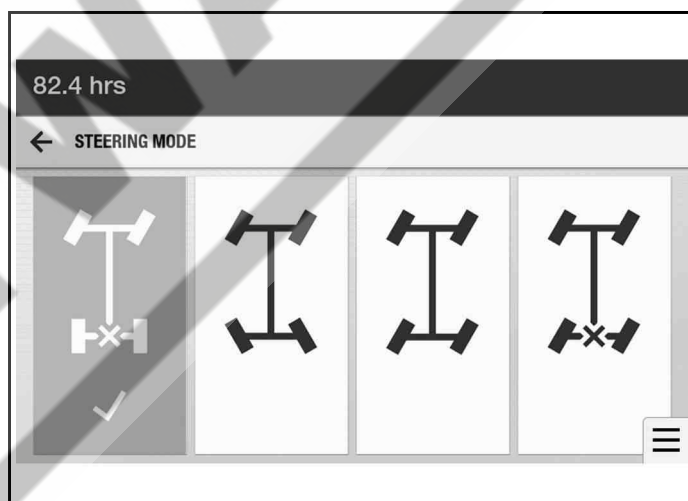
Figure 44



NA3977b

1. Press the steering mode button (Item 1) [Figure 44] to access **STEERING MODE** in the display panel.

Figure 45



C210768

2. Select the desired steering mode on the **STEERING MODE** screen [Figure 45].

As soon as the new steering mode is selected, the display returns to the **GAUGES** screen.

In manual alignment mode, the selected steering mode is immediately activated.

In semi-automatic alignment mode, the selected steering mode will be activated if the front and rear wheels are already aligned.

If the front and / or rear wheels are not aligned, the semi-automatic aligning procedure will start. (See Semi-Automatic Aligning Procedure on Page 59)

STEERING MODES ON STEERING MODE SCREEN		
REF	DESC.	FUNCTION
1	2-Wheel Steering	The front wheels will turn the direction that the steering wheel is turned. The rear wheels remain straight ahead. Required mode when travelling on public roads at higher speeds.
2	4-Wheel Steering	The front wheels will turn the direction that the steering wheel is turned. The rear wheels turn the opposite direction. The machine will turn in a smaller circle. Use in most working conditions.
3	Crab Steering	Front and rear wheels turn the same direction that the steering wheel is turned. The machine moves diagonally in the direction the steering wheel is turned. Use in confined areas to move away from buildings or to reposition the machine.
4	Semi-Crab Steering (If equipped)	The rear wheels are kept in a fixed position. The front wheels will turn the direction that the steering wheel is turned. Use in confined areas to work along walls or to reposition the machine.

Aligning Modes

To switch between the different steering modes (See Driving and Steering the Machine on Page 68) , the operator has a choice between two aligning modes:

- In manual aligning mode, the operator can apply the selected steering mode directly and regardless of the front and rear wheel aligned statuses.
- In semi-automatic aligning mode, the operator first has to choose the desired steering mode and will then receive instructions on which wheels need to be aligned. Once the wheel alignment instruction(s) (indicated by the flashing of the front or rear wheels of the icon on the **GAUGES** screen) are followed, the chosen steering mode will be automatically activated.

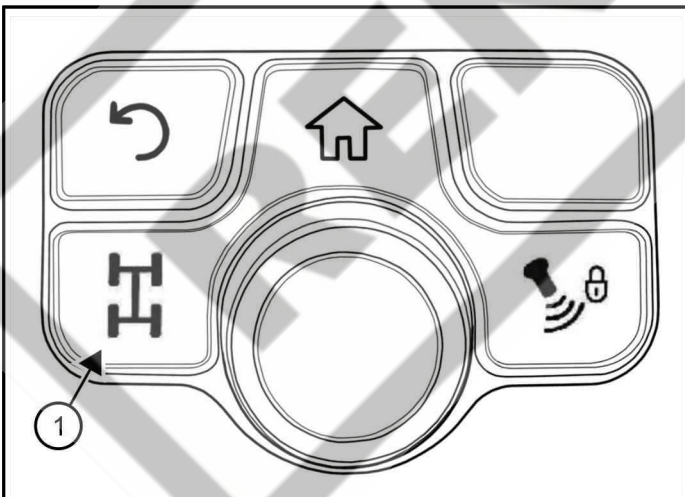
NOTE: The wheel alignment can be affected by several factors such as ground type, frequency of turns, tyre type and load handling. It is recommended to perform an alignment procedure at least on a daily basis.

Selecting Steering Aligning Modes

1. Go to **[MACHINE SETTINGS]** on the display. (See Machine Settings on Page 195)
2. Scroll to **[STEERING ALIGNMENT MODE]**.
3. The semi-automatic aligning mode is the default setting. **SEMI-AUTO** appears to the right of **[STEERING ALIGNMENT MODE]**.
4. Select **[STEERING ALIGNMENT MODE]** to switch the steering alignment mode to manual aligning mode. **MANUAL** appears to the right of **[STEERING ALIGNMENT MODE]**.

Semi-Automatic Aligning Procedure

Figure 46



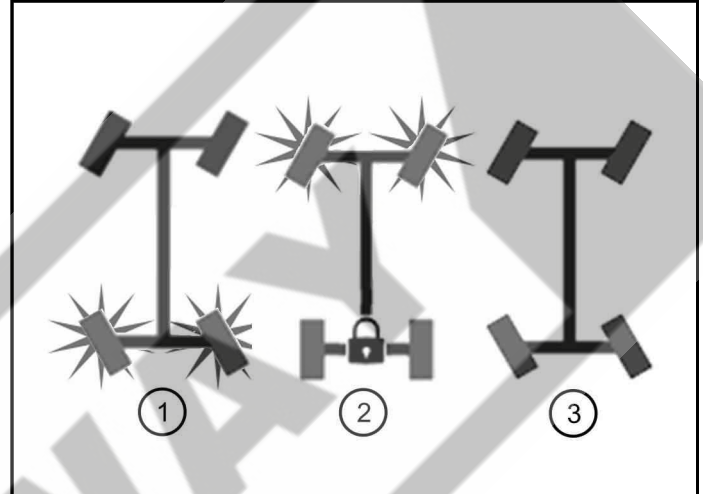
1. Press the steering mode button (Item 1) [Figure 46] to access **STEERING MODE** in the display panel.

2. Select the desired steering mode. (See Selecting The Steering Mode on Page 58)

If the front and rear wheels are straight ahead, the desired steering mode will be activated.

If the front and / or rear wheels are not straight ahead, the display returns to the **GAUGES** screen and the semi-automatic aligning procedure will start.

Figure 47



3. If the rear wheels are not straight ahead, the rear wheels of the icon (Item 1) [Figure 47] will flash green. Turn the steering wheel until the rear wheels turn to solid green. The rear wheels are straight ahead now.

If the front wheels are straight ahead, the desired steering mode is now active.

In case of leaving semi-crab steering mode to another steering mode, the semi-automatic alignment procedure will start with front wheels alignment.

4. If the front wheels are not straight ahead, the front wheels of the icon (Item 2) will flash green. Turn the steering wheel until the front wheels turn to solid green (Item 3) [Figure 47]. The front wheels are straight ahead now.

The desired steering mode is now active.

In case of leaving semi-crab steering mode to another steering mode, the semi-automatic alignment procedure will end with rear wheels alignment.

Manual Aligning Mode Procedure

The manual steering alignment mode allows the operator to apply the selected steering mode directly and regardless of the front and rear aligned statuses. It is recommended to align the wheels before driving the machine.

Figure 48

1. To align the wheels, turn the steering wheel until the four wheels of the icon (Item 1) [Figure 48] turn green.

If the wheels do not align straight ahead, use the following procedure:

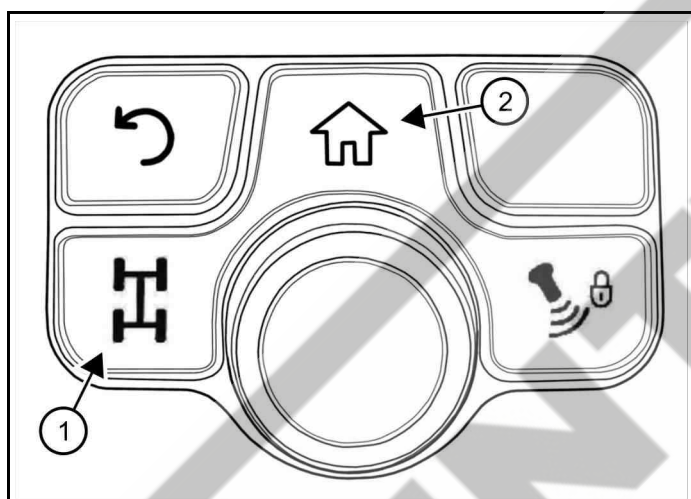
1. Select the 4-Wheel steering mode and turn the steering wheel until the rear wheels align straight ahead (icon's rear wheels turn green).
2. Select the 2-Wheel steering mode and turn the steering wheel until the front wheels align straight ahead (icon's front wheels turn green).

Now you can select the desired steering mode and the machine will steer correctly.

Quick Wheel Realignment

1. Park the machine on level ground.

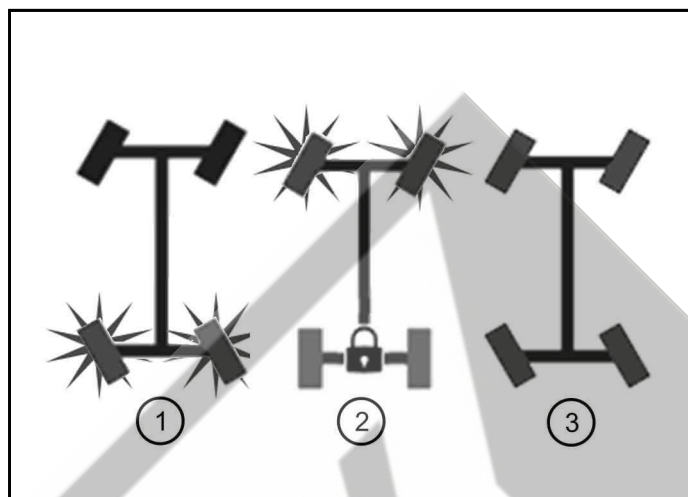
Figure 49



2. Press and hold the steering mode button (Item 1) and press the home button (Item 2) [Figure 49] to start quick wheel realignment.

The display turns to the **GAUGES** screen and the semi-automatic aligning procedure will start.

Figure 50



3. If the rear wheels are not straight ahead, the rear wheels of the icon (Item 1) [Figure 50] will flash green. Turn the steering wheel until the rear wheels turn to solid green. The rear wheels are straight ahead now and stay locked in that position until the procedure is complete.
4. If the front wheels are not straight ahead, the front wheels of the icon (Item 2) will flash green. Turn the steering wheel until the front wheels turn to solid green (Item 3) [Figure 50]. The front wheels are straight ahead now.

When the front and rear wheels are aligned, the selected steering mode will be active.

DIESEL PARTICULATE FILTER (DPF) SYSTEM

DPF Description

The engine exhaust system is equipped with a DPF.

The DPF is an emissions reduction device that removes diesel particulate matter (soot) from the exhaust gases of the diesel engine. The DPF will trap and collect the soot until it is burned off.

The process of burning off the collected soot is called regeneration. There are four types of regeneration: passive, automatic, forced parked and service regeneration. An inhibit mode is also available to the operator.

WARNING

FIRE AND EXPLOSION HAZARD

Hot exhaust gas and exhaust system components can cause serious injury or death when the engine is running and during regeneration.

Keep flammable material, explosive dust, and explosive gases away from exhaust system. ‹

W-2936

Term	Description
Passive Regeneration	The engine provides adequate exhaust temperature during operation for regeneration.
Automatic Regeneration	The Engine Control Unit (ECU) automatically controls active regeneration. Active regeneration can occur any time the engine is operating once the soot accumulated in the DPF reaches a certain level.
Forced Parked Regeneration	The operator activates a forced parked regeneration. This selection requires confirmation after certain machine conditions are met.
Service Regeneration	Your Bobcat dealer uses specialized equipment to perform a service regeneration.
Inhibit Mode	Active regeneration will not occur. This selection requires confirmation.

DPF Regeneration Tables

Soot Level	0 – 75%	75 – 100%	100 – 105%	105 – 110%	110 – 120%	120 – 150%	> 150%
Active Regeneration Status	Not Required	Not Required	Regenerating	Regenerating	Regenerating	Not Regenerating	Not Regenerating
Inhibit Allowed 	Yes	Yes	Yes	Yes	Yes	Yes	Yes

DPF Regeneration Status Icons

Icon	Definition
	DPF - Appears on the display during regeneration. Machine is requesting that operator activate a forced parked regeneration when flashing.
	Hot Exhaust System Temperature (HET) - Appears on the display during regeneration to indicate that exhaust and exhaust gases can be hot.
	Inhibit - Appears on the display when the operator has selected inhibit mode. Machine is indicating it would like to do regeneration when flashing.
	Emissions Error - Appears on the display to indicate a problem with the emission regulating system.

Soot Level	0 – 75%	75 – 100%	100 – 105%	105 – 110%	110 – 120%	120 – 150%	> 150%
Forced Parked Allowed 	No	Yes	Yes	Yes	Yes	No	No
DPF Icon 	Off	Off	On	Flashing Slowly	Flashing Slowly	Flashing Quickly	Off
HEST Icon 	Off	Off	On	On	On	Off	Off
Check Engine Icon 	Off	Off	Off	Off	On	On	On
Regeneration Type	Passive	Passive	Automatic	Automatic	Automatic	Service	None
Soot Load Bar Colour	Grey	Blue	Blue	Red	Red	Red	Red
Service Code	None	None	None	None	P2463	P24A3	P24A3
Torque Derate	None	None	None	None	Mild	Severe	Severe
Operator Action	None	None	None	Activate Forced Parked Regeneration when possible	Activate Forced Parked Regeneration when possible	Dealer Service Regeneration Required (See DPF Service Regeneration on Page 151)	Contact your Bobcat dealer to service the DPF

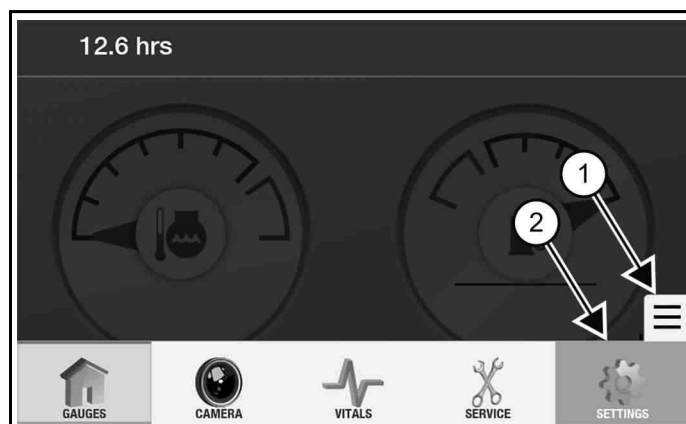
NOTE: The general warning icon on the display will also turn on to alert operator of active service codes.

Automatic Regeneration Operation

Automatic regeneration mode is selected by default every time the machine is started.

The DPF management screen is available on the display, where you can check the status of the DPF and select the required regeneration mode.

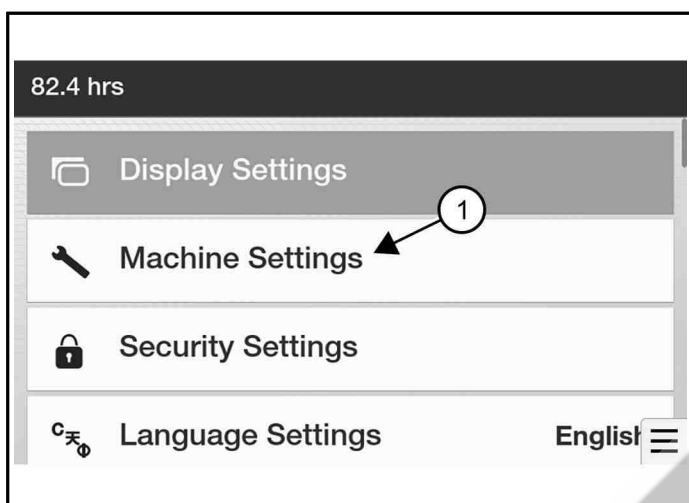
Figure 51



NA3669A

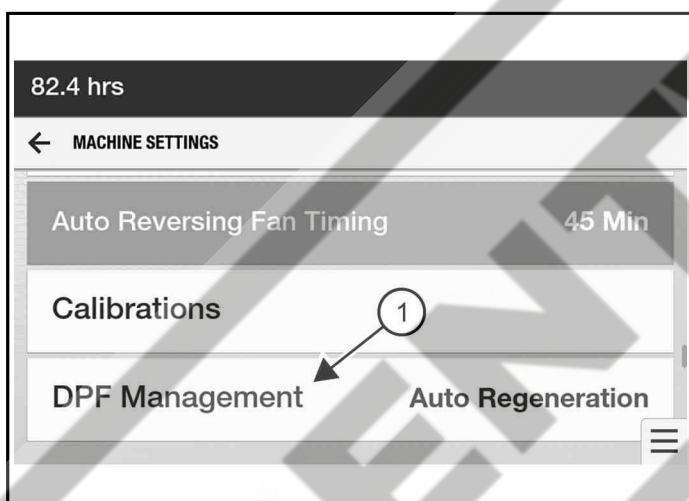
1. Select the **[NAVIGATION HANDLE]** icon (Item 1) [Figure 51].
2. Select **[SETTINGS]** (Item 2) [Figure 51].

Figure 52



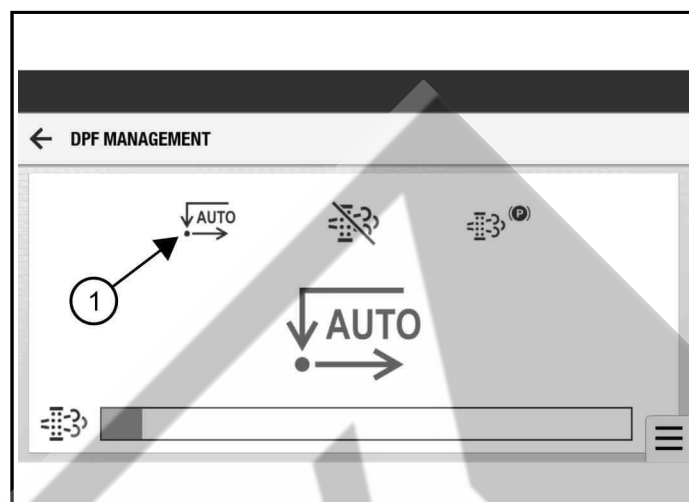
3. Select **[MACHINE SETTINGS]** (Item 1) [Figure 52].

Figure 53



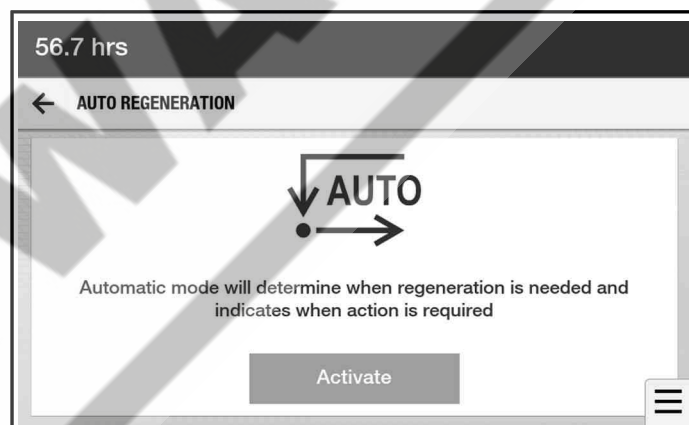
4. Scroll down and select **[DPF MANAGEMENT]** (Item 1) [Figure 53].

Figure 54



5. Select the automatic regeneration icon (Item 1) [Figure 54].

Figure 55



6. Select **[ACTIVATE]** [Figure 55] if not already active.

The ECU will monitor soot load and perform a regeneration automatically. The operator will be informed that an automatic regeneration has started by the HEST icon.

The machine should be operated during this regeneration.

NOTE: The regeneration process can last for 30 minutes or longer.

It is recommended to increase engine speed to high idle during an automatic regeneration and operate the machine under load if possible.

It is recommended to allow the regeneration cycle to finish before turning the machine off.

Forced Parked Regeneration Operation

A forced parked regeneration can be activated by the operator using the DPF management screen. The machine cannot be operated during this regeneration.

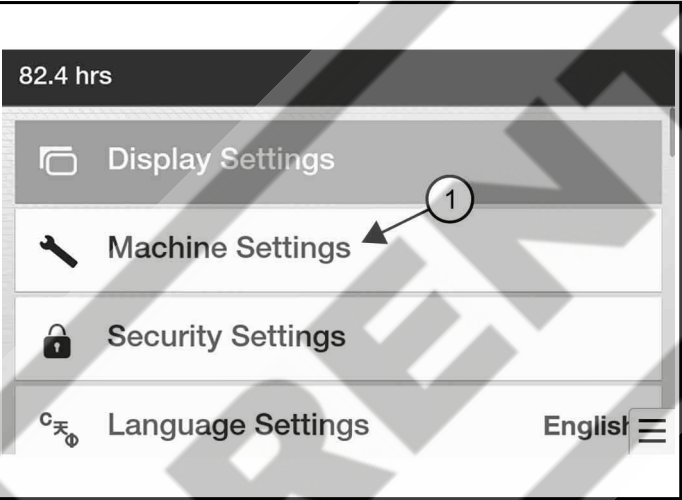
NOTE: The regeneration process can last for 40 minutes or longer.

Figure 56



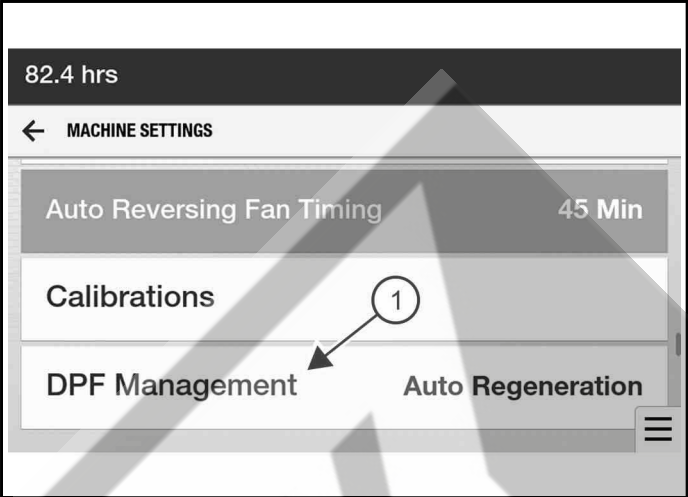
- 1. Select the **[NAVIGATION HANDLE]** icon (Item 1) [Figure 56].
- 2. Select **[SETTINGS]** (Item 2) [Figure 56].

Figure 57



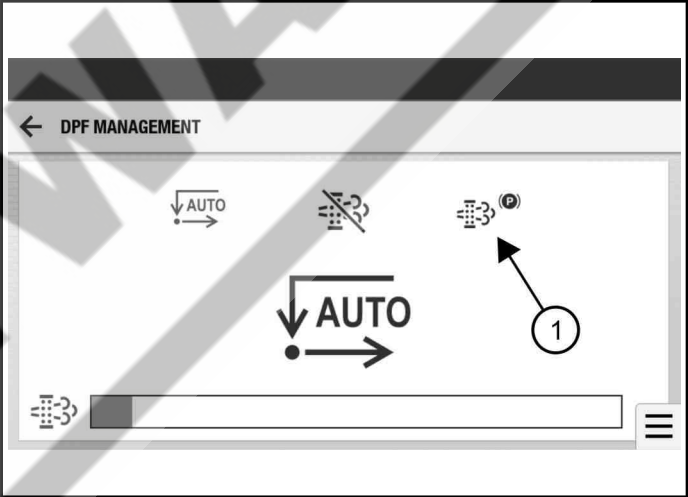
- 3. Select **[MACHINE SETTINGS]** (Item 1) [Figure 57].

Figure 58



- 4. Scroll down and select **[DPF MANAGEMENT]** (Item 1) [Figure 58].

Figure 59



- 5. Select the forced parked regeneration icon (Item 1) [Figure 59].

! IMPORTANT

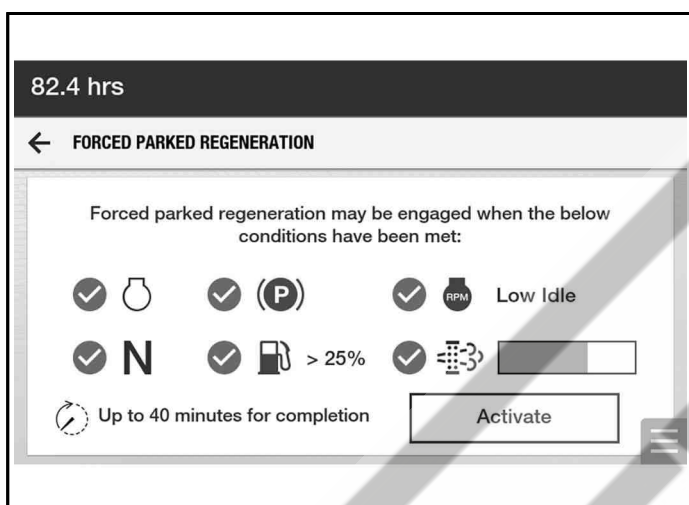
MACHINE DAMAGE HAZARD
Failure to follow directions may cause damage to the DPF.
Never stop the engine during the regeneration cycle. This will by-pass the programmed cool down cycle required after a high temperature regen.

The following machine conditions must be met before forced parked regeneration is allowed:

- No active DPF related service codes
- Engine coolant temperature higher than 40°C (104°F)
- Soot load between 75 percent and 120 percent
- Parking brake engaged
- Engine speed at low idle
- Travel Mode in Neutral
- More than 25 percent fuel in the tank

6. Decrease engine speed to low idle.

Figure 60



7. Select **[ACTIVATE]** [Figure 60] to start regeneration.

The ECU will control engine speed until the regeneration cycle is finished.

Inhibit Mode Operation

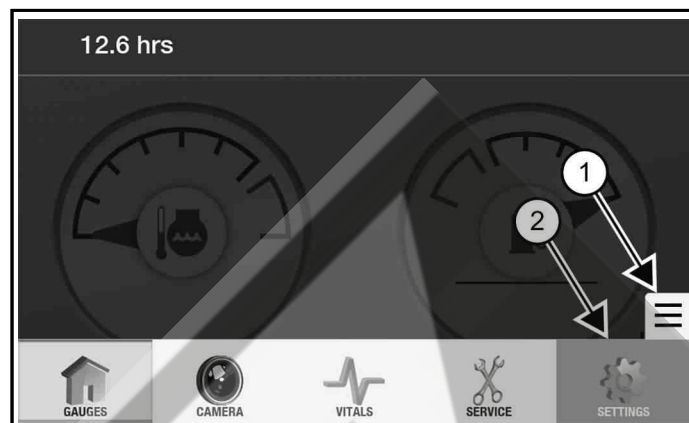
Regeneration can be prevented from occurring by selecting inhibit mode. The machine should be operated under load when inhibit mode is selected.

! IMPORTANT

MACHINE DAMAGE HAZARD
Operating the machine in inhibit mode for extended periods may cause severe damage to the DPF. ◀

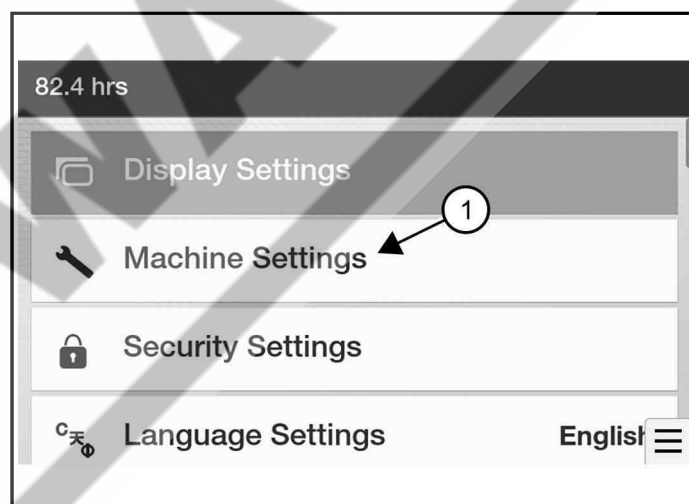
The DPF will be inhibited from actively regenerating until a regeneration mode is selected or the machine is turned OFF. The machine will revert to automatic mode the next time the machine is turned ON.

Figure 61



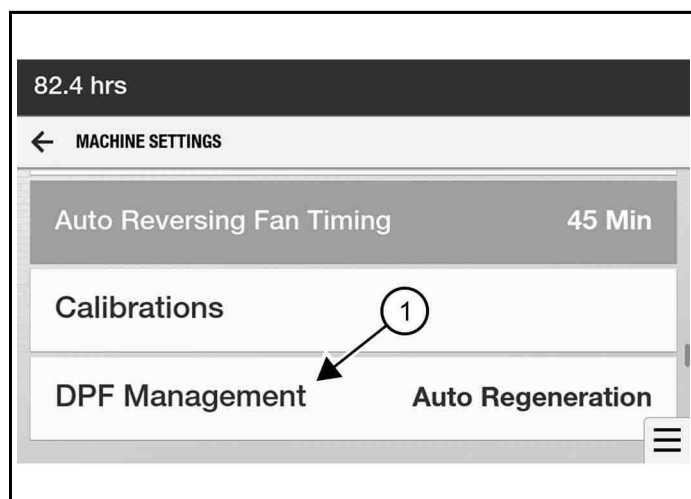
1. Select the **[NAVIGATION HANDLE]** icon (Item 1) [Figure 61].
2. Select **[SETTINGS]** (Item 2) [Figure 61].

Figure 62



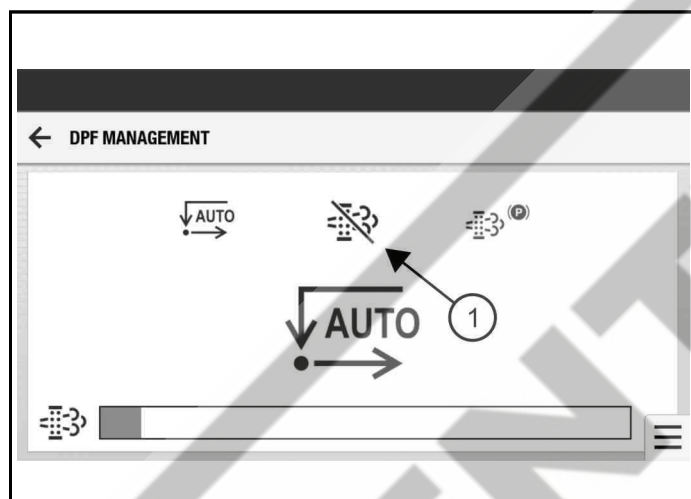
3. Select **[MACHINE SETTINGS]** (Item 1) [Figure 62].

Figure 63



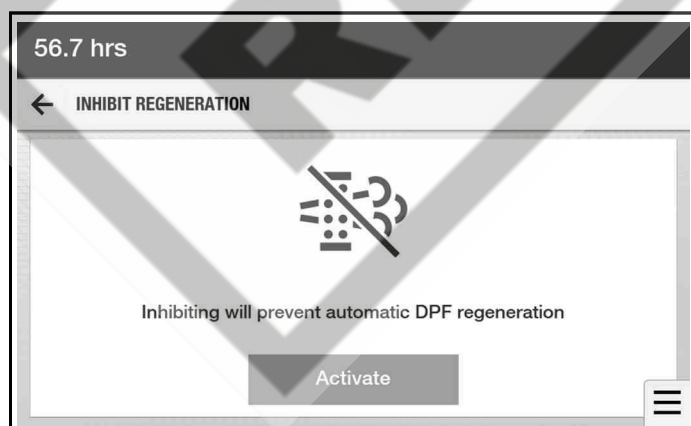
4. Scroll down and select **[DPF MANAGEMENT]** (Item 1) [Figure 63].

Figure 64



5. Select the inhibit mode icon (Item 1) [Figure 64].

Figure 65



6. Select **[ACTIVATE]** to inhibit regeneration.
7. After running the machine in inhibit mode, take one of the below actions as soon as possible:
 - Place the machine in automatic regeneration mode
 - Perform a forced parked regeneration if possible (The soot load bar must be blue or red.)

PARKING BRAKE

Operating The Parking Brake

This machine is equipped with an automated parking brake system.

When the machine is stopped and the travel direction switch is set to neutral, the parking brake automatically activates.

The parking brake can also be activated or deactivated manually:

Figure 66



1. Press the button (Item 1) [Figure 66] to toggle the parking brake on or off (the LED light on the button will turn on or off).
2. If the parking brake has been engaged manually while the travel direction switch is set to Forward or Reverse, press the accelerator pedal to ensure that the machine does not move. If the machine moves while the parking brake is activated, contact your Bobcat dealer for service.

NOTE: In case of failure of the service brake, the parking brake is automatically used as an emergency brake. The parking brake will engage proportionally to the service brake pedal position.

3. To disengage the parking brake, press the button (Item 1) [Figure 66] (the LED light on the button will turn off) or switch the travel direction switch to Forward or Reverse, and press the accelerator pedal.

The parking brake display icon disappears once the parking brake is disengaged.

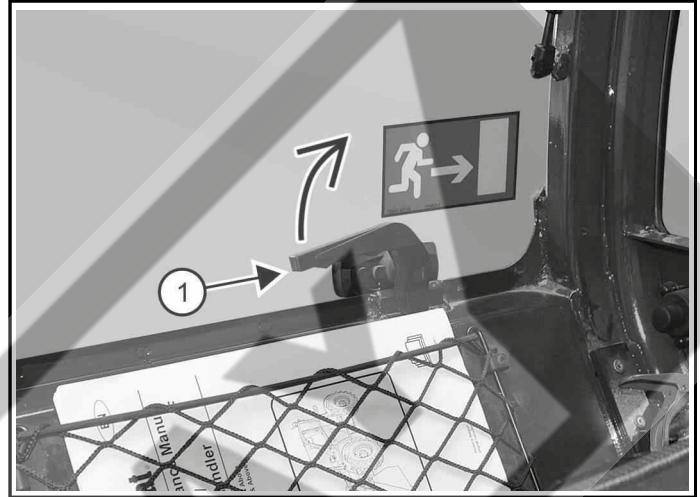
NOTE: Disengage the parking brake manually in case of towing the machine or allowing the machine to go down a slope by itself.

EMERGENCY EXIT

Rear Window

1. Open the rear window.

Figure 67



2. Turn the handle (Item 1) [Figure 67] clockwise and push the rear window fully open.

Figure 68

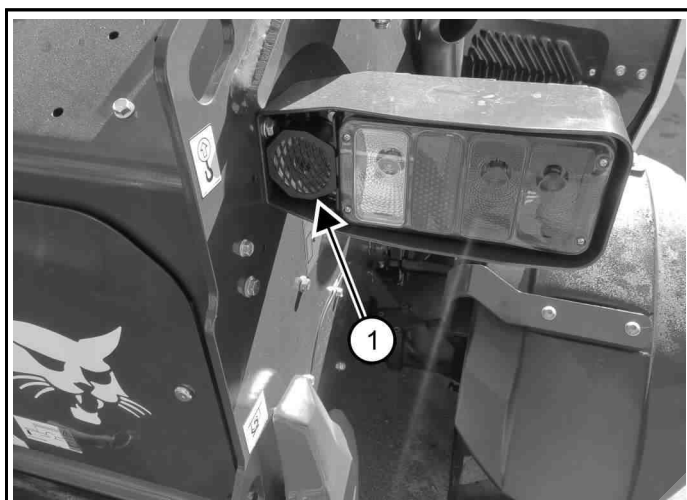


3. Exit through the rear window opening [Figure 68].

BACK-UP ALARM SYSTEM

Back-Up Alarm System Description

Figure 69



The back-up alarm (Item 1) [Figure 69] is located at the rear of the machine, next to the right rear road light.

A back-up alarm is not a substitute for looking to the rear when operating the machine in reverse, or for keeping bystanders away from the work area.

Operators **must always** look in the direction of travel, including **reverse**, and must also keep bystanders away from the work area, even though the machine is equipped with a back-up alarm.

Operators must be trained to **always** look in the direction of travel, **including when operating the machine in reverse** and to keep bystanders away from the work area. Other workers should be trained to **always** keep away from the operator's work area and travel path.

Back-Up Alarm System Operation

⚠ WARNING

CRUSHING HAZARD

Contact with machine can cause serious injury or death.

- Always keep bystanders away from the work area and travel path.
- The operator must maintain a clear view of the direction of travel and look before and during machine movement.
- The back-up alarm must sound when operating the machine in the reverse direction. ◀

The back-up alarm will sound when the operator prepares the machine for reverse travel. (See Travel Direction on Page 42)

If alarm does not sound, see inspection and maintenance instructions for the back-up alarm system in the preventive maintenance section of this manual.

DRIVING AND STEERING THE MACHINE

Driving And Steering The Machine Procedure

⚠ WARNING

INSTABILITY HAZARD

Tipping or roll-over can cause serious injury or death. When operating the machine:

- Operate only from operator's seat with seat belt securely fastened. ◀

W-2811

⚠ WARNING

UNINTENDED MACHINE MOVEMENT HAZARD

Failure to follow instructions can cause serious injury or death.

- The direction the machine turns when moving backward is different in each steering mode.
- Know and understand the selected steering mode before operating. ◀

W-2812

- Select the desired steering mode. Align the wheels if needed.

Figure 70



C211763c

- Move the steering wheel smoothly. Avoid sudden starting and stopping.
- Forward Travel - Prepare the machine for forward travel. (See Travel Direction on Page 42)
- Left Turn Forward / Right Turn Forward - Slowly press the Accelerator Pedal (Item 1) and turn the steering wheel (Item 2) [Figure 70] to the right or left. Look in the direction of travel.
- Reverse Travel - Prepare the machine for reverse travel. (See Travel Direction on Page 42)
- Left Turn Backward / Right Turn Backward - Slowly press the Accelerator Pedal (Item 1) and turn the steering wheel (Item 2) [Figure 70] to the right or left. Look in the direction of travel.

- Press the accelerator pedal down to increase engine speed. Release foot pressure to decrease engine speed. In Flex Drive mode (if equipped), the accelerator pedal controls only travel speed. (See Flex Drive on Page 69)
- Press the brake pedal (Item 3) [Figure 70] a small amount to decrease travel speed and control inching (gradual travel of the machine). (See Service Brake Pedal And Inching Control on Page 53)

Stopping The Machine

When the accelerator pedal is released, the hydrostatic transmission will slow the machine to a stop.

- To decrease stopping distance, press down the brake pedal (Item 3) [Figure 70].

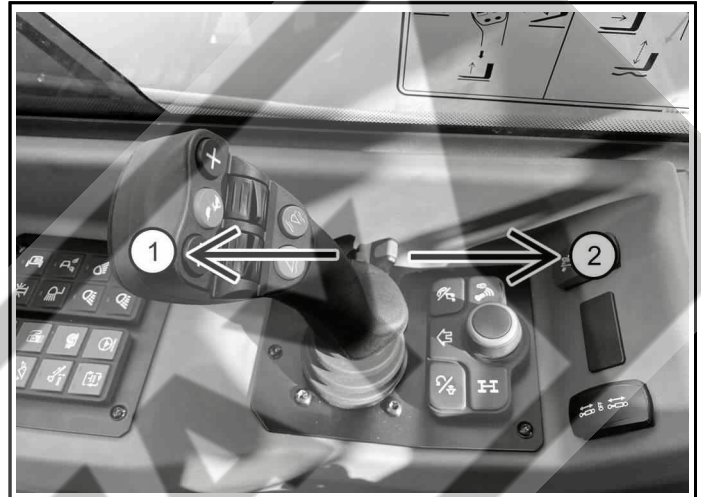
The further the brake pedal is pressed, the faster the machine will slow to a stop.

FLEX DRIVE

Setting Engine Speed In Flex Drive Mode

In flex drive mode, the engine speed is adjusted with the hand lever (if equipped) to maintain a constant hydraulic flow to the boom and attachment.

Figure 71



- Push the engine speed lever forward (Item 1) [Figure 71] to activate flex drive mode and set the engine speed.
 - With ECO mode engaged, the accelerator pedal will control only travel speed.
 - With ECO mode disengaged, the engine speed lever sets a minimum engine speed. The accelerator pedal will control only travel speed until the set engine speed is too low for the demanded travel speed. Beyond this point, the accelerator pedal will control engine speed and travel speed.
- Pull the engine speed lever fully backward (Item 2) [Figure 71] to deactivate flex drive mode.

The accelerator pedal will control engine speed and travel speed.

BOOM SUSPENSION

Boom Suspension Description

The machine can be equipped with manual boom suspension.

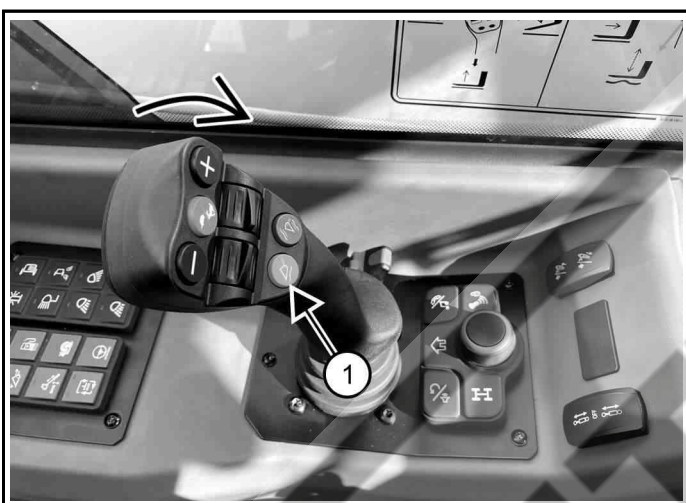
This option dampens boom movements while travelling on the road to increase operator comfort.

Operating The Boom Suspension

Activating The Boom Suspension

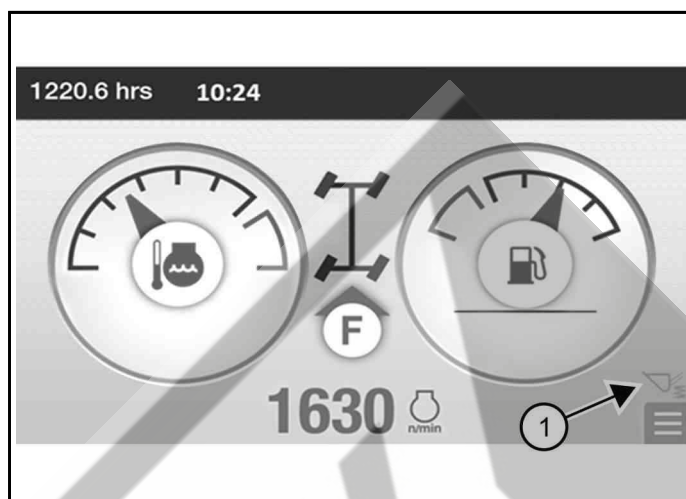
1. Enter the machine and perform the PRE-STARTING PROCEDURE.
(See Pre-starting Procedure on Page 86) Start the engine. (See Starting the Engine on Page 89)

Figure 72



2. Press and hold the button (Item 1) while pulling the joystick up [Figure 72]. The boom suspension activates when the boom angle is between 4,5° and 54°.

Figure 73



Once activated, the boom suspension icon (Item 1) [Figure 73] will be ON.

Adding or removing a load on the attachment with boom suspension function activated can cause small boom movement. This is normal behavior of a suspension system. Lower and retract the boom to reduce boom movement.

3. Release the button (Item 1) [Figure 72].
4. Drive the machine.

When operating on a public road or motorway, always follow local regulations.

Deactivating The Boom Suspension

1. To deactivate boom suspension, press the button (Item 1) [Figure 72].

The icon on the display [Figure 73] will turn OFF.

SPEED MANAGEMENT

Operating Speed Management

The Speed Management feature allows the machine to be manoeuvred at a slower travel speed, even during maximum engine rpm.

This feature can be useful for attachments requiring hydraulic flow, not for loading, digging, etc..

Example:

- Angle Broom: Allows the auxiliary hydraulic flow to the attachment and machine forward travel speed to be independently controlled.

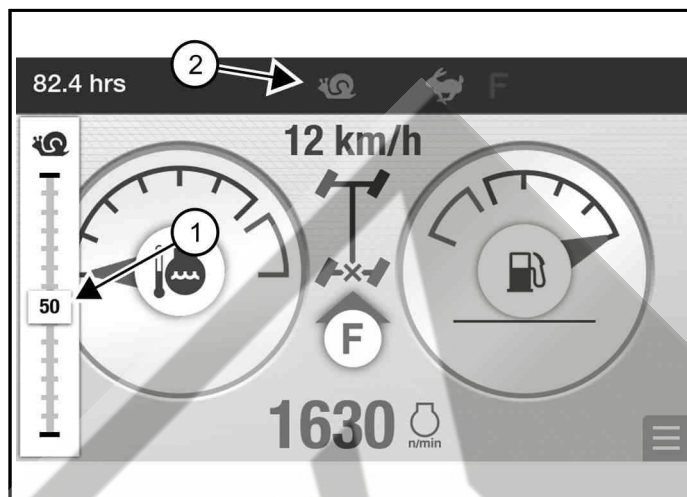
Engaging:

Figure 74



1. Press the switch (Item 1) [Figure 74] on the right console panel once to activate Speed Management. The light on the switch will turn ON.

Figure 75



The speed management icon (Item 2) [Figure 75] will appear in the display and remain on until the speed management button is pressed again or the machine is turned off.

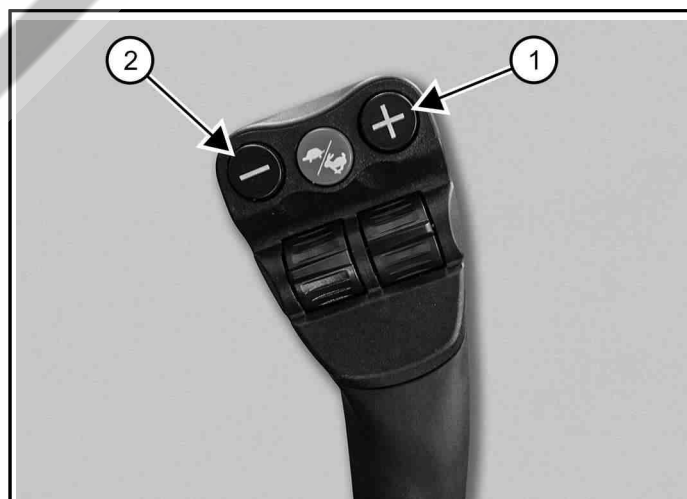
When speed management is engaged, the machine will travel at a percentage of standard travel speed. That percentage will appear briefly in the display (Item 1) [Figure 75].

NOTE: The default percentage setting can be changed by the operator.

NOTE: The factory default setting can be changed by the operator.
(See Changing Speed Management Default Setting (Standard Display) on Page 72)

Adjusting On-The-Fly:

Figure 76



2. Press the '+' adjustment button (Item 1) [Figure 76] on the joystick to increase the speed up to 100%.

The percentage graph will appear in the display (Item 1) [Figure 75] while adjusting.

3. Press the '-' adjustment button (Item 2) [Figure 76] on the joystick to decrease the speed down to 0%.

The percentage graph will appear in the display (Item 1) [Figure 75] while adjusting.

4. Press the switch (Item 1) [Figure 74] again to disengage speed management and return to standard travel speed. The speed management icon will turn off.

The system will retain the selected speed percentage as long as the machine remains ON.

EXAMPLE: You can be using the machine at 40%, then disengage speed management to reposition the machine, and then reengage Speed Management. The speed percentage will still be at 40%.

EXAMPLE: Turning the machine OFF will return the Speed Management setting to the default percentage. The next time you start the engine and engage speed management, the speed is set at the last default setting saved by the operator. (See Changing Speed Management Default Setting (Standard Display) on Page 72)

Changing Speed Management Default Setting (Standard Display)

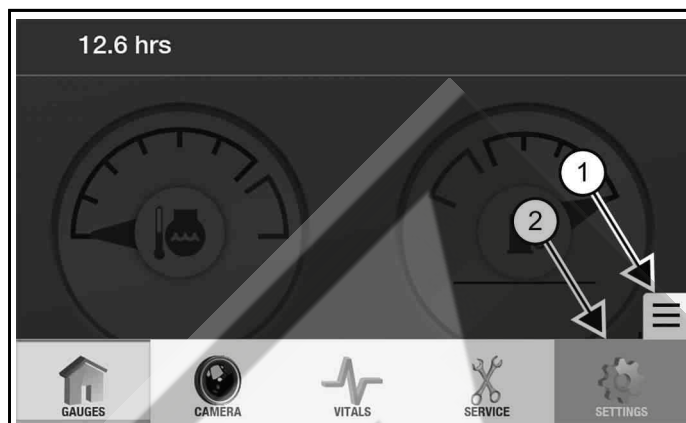
The Speed Management factory default setting can be changed by the operator to save adjustment time.

EXAMPLE: Your machine is often used for sweeping and you prefer a Speed Management setting of 30% of Standard Travel Speed for that application. The Speed Management default setting can be changed to 30% of Standard Travel Speed instead of the factory default setting of 50%. Each time you start the machine and first select Speed Management, the machine will default to 30% of Standard Travel Speed.

When Speed Management is first selected each time the machine is started, the percentage you selected will be the default setting. Speed Management can still be adjusted from 0% to 100% of Standard Travel Speed.

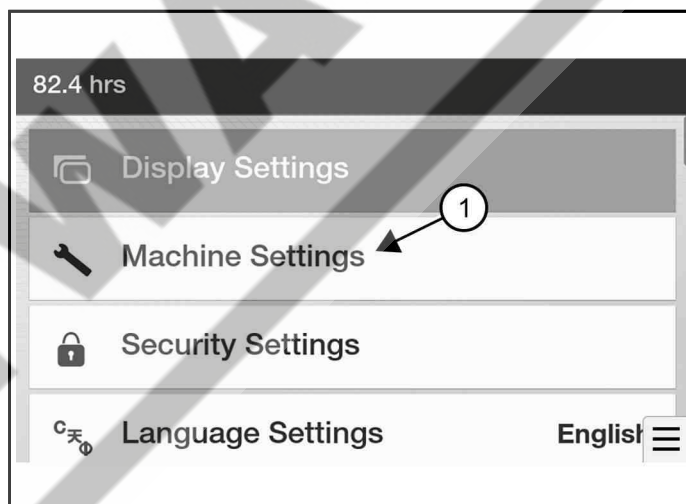
The default setting can be changed any time the operator chooses.

Figure 77



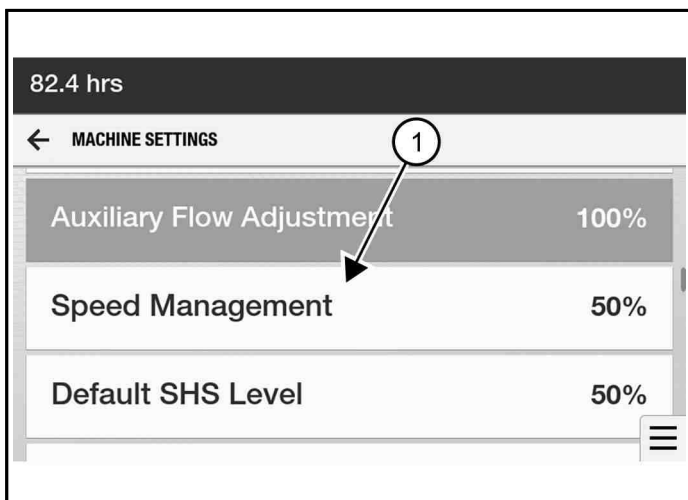
1. Select the [NAVIGATION HANDLE] icon (Item 1) [Figure 77].
2. Select [SETTINGS] (Item 2) [Figure 77].

Figure 78



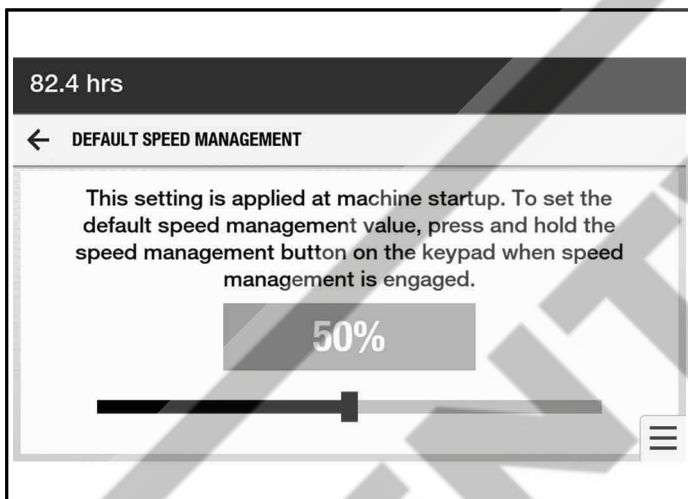
3. Select [MACHINE SETTINGS] (Item 1) [Figure 78].

Figure 79



4. Select **[SPEED MANAGEMENT]** (Item 1) [Figure 79].

Figure 80



5. Use the slider bar [Figure 80] to adjust to desired default setting.

Figure 81



6. To save the default setting, either press the jog shuttle or press and hold the button (Item 1) [Figure 81] on right console panel for several seconds.

When speed management is first engaged the next time the machine is started, the percentage you saved is the new default setting. Speed management can still be adjusted from 0% to 100% of standard travel speed.

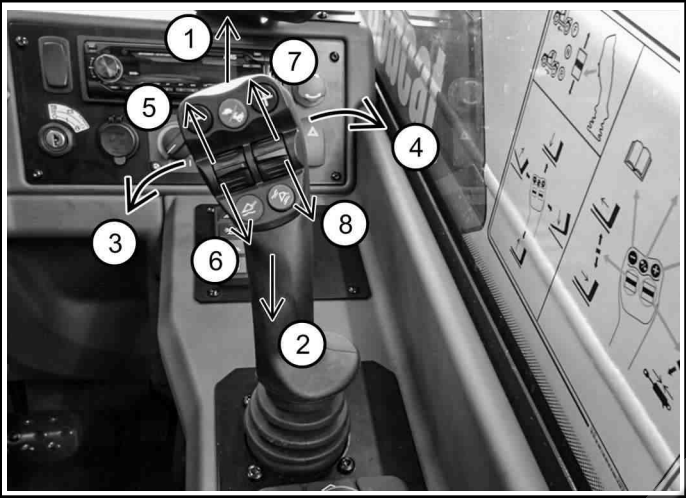
The default setting can be changed any time the operator chooses and is saved for each operator.

7. Press the button (Item 1) [Figure 81] on the right console panel or turn the machine off to disengage speed management and return the machine to standard travel speed.

HYDRAULIC CONTROLS

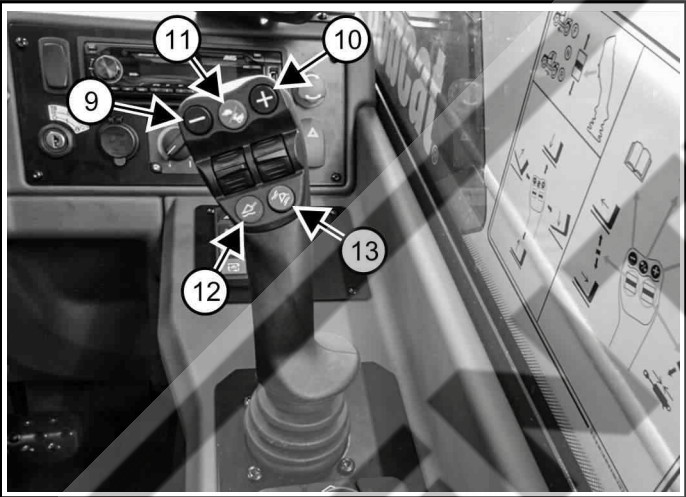
Hydraulic Control Lever (Joystick)

Figure 82



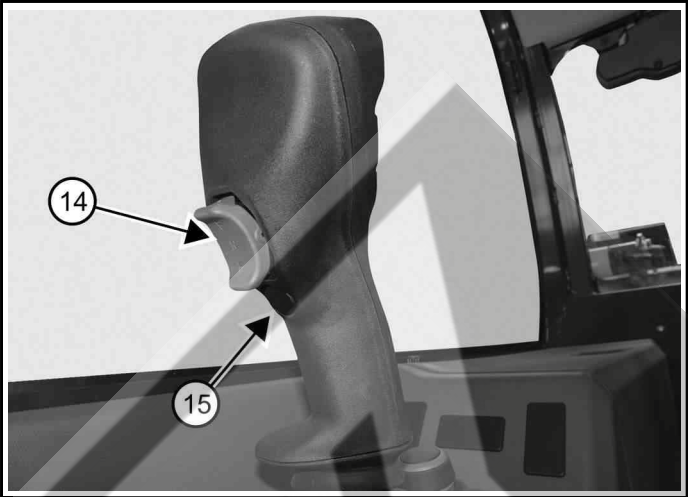
C211761a

Figure 83



C211761b

Figure 84



C211767b

The joystick controls the movement of the boom and attachment [Figure 82], [Figure 83] and [Figure 84].

REF	DESC.	FUNCTION
1	Lower boom	
2	Raise boom	
3	Tilt attachment backward	
4	Tilt Attachment forward	
5	Extend telescopic boom	
6	Retract telescopic boom	
7	Front auxiliary hydraulics (flow) (if equipped)	Controls the function of the Front Auxiliary Hydraulics (Example: close grapple teeth). Rotate the roller all the way up through the detent for continuous flow auxiliary hydraulics. (See Operating The Front Auxiliary Hydraulics on Page 77)

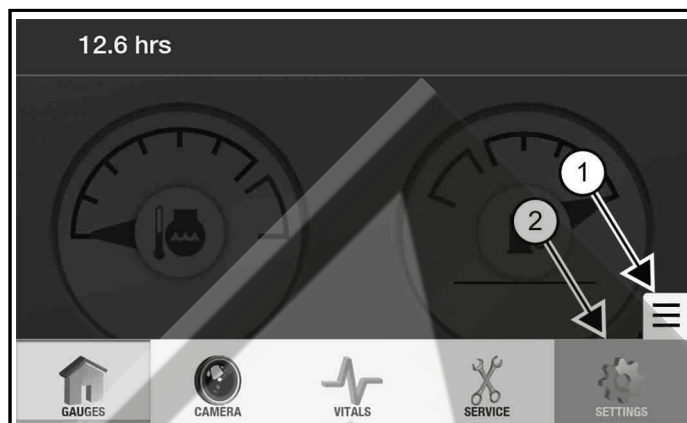
REF	DESC.	FUNCTION
8	Front auxiliary hydraulics (reverse flow) (if equipped)	Controls the function of the Front Auxiliary Hydraulics (Example: open grapple teeth). Rotate the roller all the way down through the detent for reverse continuous flow auxiliary hydraulics. (See Operating The Front Auxiliary Hydraulics on Page 77)
9	Adjustment '-'	Decreases the value when setting a function
10	Adjustment '+'	Increases the value when setting a function
11	Low / high speed	Press the button to toggle between low and high speed.
12	Boom float or boom suspension (if equipped)	Used in combination with lower boom movement (Item 1) to engage the float control function.
13	Bucket shake (If equipped)	(See Emptying the Bucket using Bucket Shaking on Page 121)
14	Travel direction switch (F-N-R)	(See Travel Direction Switch on Page 42)
15	White work lights (If equipped with blue work lights)	Press the button to turn the white work lights on or off when the blue work lights are activated.

The above joystick functions (Items 1 - 8) are proportional. The farther you move the control, the faster the hydraulic function operates.

Changing The Maximum Auxiliary Flow (Standard Display)

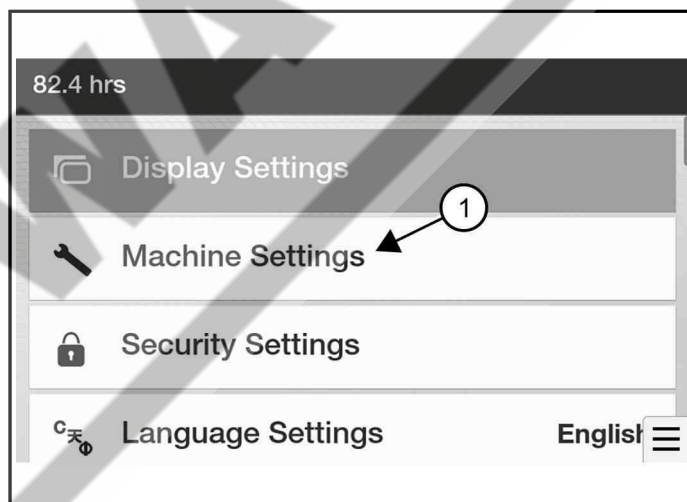
The maximum available auxiliary flow setting can be adjusted by the operator to improve control of the auxiliary hydraulics.

Figure 85



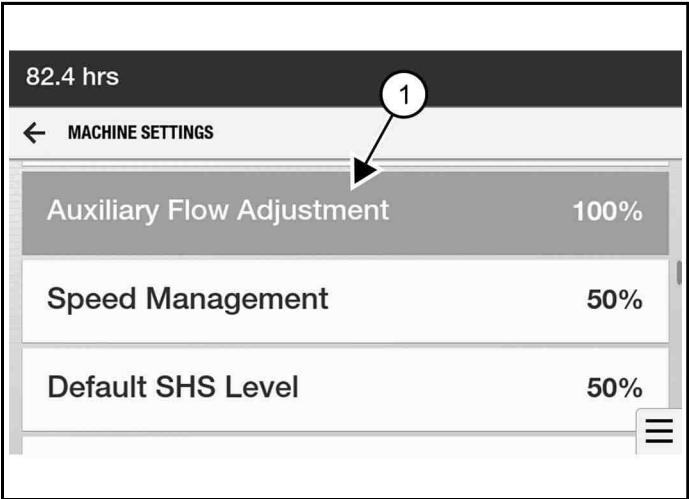
1. Select the **[NAVIGATION HANDLE]** icon (Item 1) [Figure 85].
2. Select **[SETTINGS]** (Item 2) [Figure 85].

Figure 86



3. Select **[MACHINE SETTINGS]** (Item 1) [Figure 86].

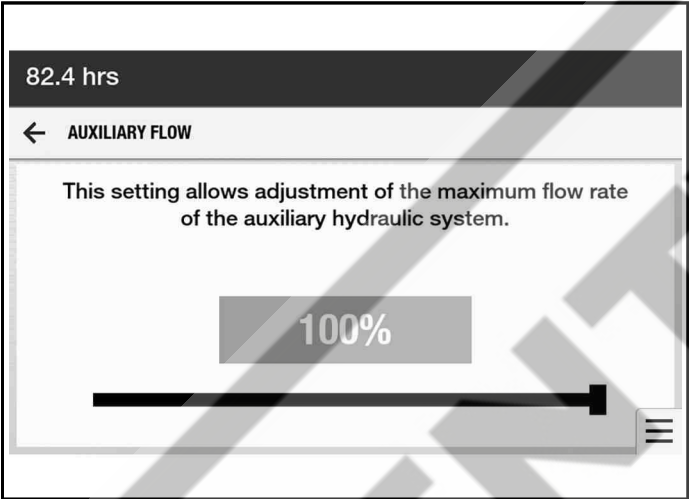
Figure 87



C210742b

4. Select **[AUXILIARY FLOW ADJUSTMENT]** (Item 1) [Figure 87].

Figure 88



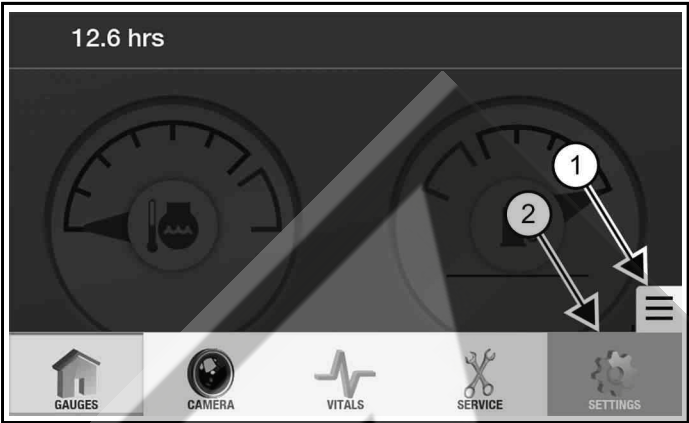
C210716

5. Use the slider bar [Figure 88] to adjust to desired default setting.

Auxiliary Hydraulics At Startup

The operator can choose whether the Auxiliary Hydraulics are enabled or disabled at startup.

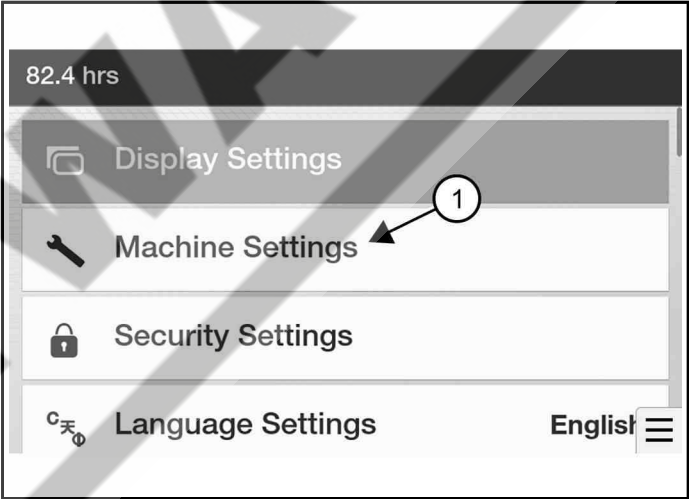
Figure 89



NA3659A

1. Select the **[NAVIGATION HANDLE]** icon (Item 1) [Figure 89].
2. Select **[SETTINGS]** (Item 2) [Figure 89].

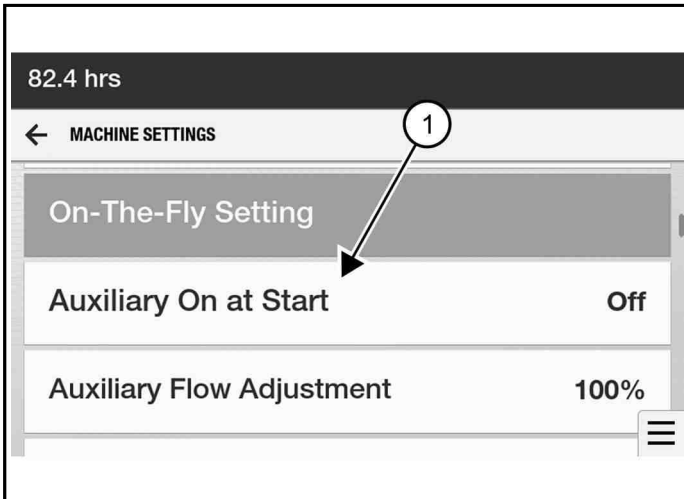
Figure 90



C210761a

3. Select **[MACHINE SETTINGS]** (Item 1) [Figure 90].

Figure 91



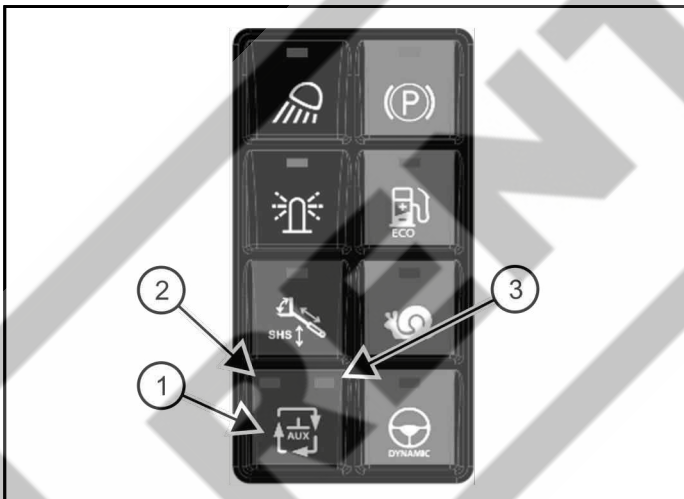
4. Select **[AUXILIARY ON AT START]** (Item 1) [Figure 91] to toggle between **ON** or **OFF**.

Operating The Front Auxiliary Hydraulics

Reverse flow can cause damage to some attachments. Use reverse flow with your attachment only if approved. See your attachment Operation & Maintenance Manual for detailed information.

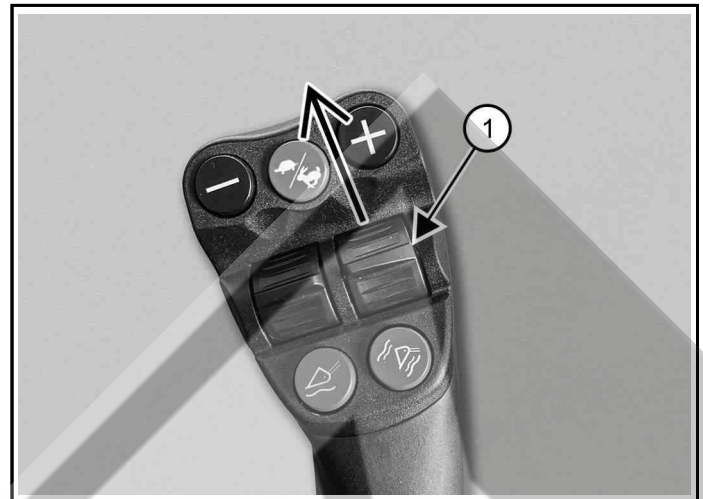
Continuous auxiliary hydraulic flow (female coupler is pressurised):

Figure 92



1. Press the switch (Item 1) to activate the auxiliary hydraulics. The left LED (Item 2) [Figure 92] will be illuminated.
2. Press the switch (Item 1) a second time to enable continuous auxiliary hydraulic flow. The right LED (Item 3) [Figure 92] will be illuminated.

Figure 93



3. Overpress the thumbwheel (Item 1) [Figure 93] upwards to activate continuous flow auxiliary hydraulics. The right LED (Item 3) [Figure 92] will flash. This function allows constant auxiliary hydraulic fluid flow to the front female coupler (female coupler is pressurised). (Example: Operate an angle broom.)
4. To stop continuous auxiliary fluid flow, overpress the thumbwheel (Item 1) [Figure 93] a second time, press the auxiliary flow button or press the joystick lockout button.

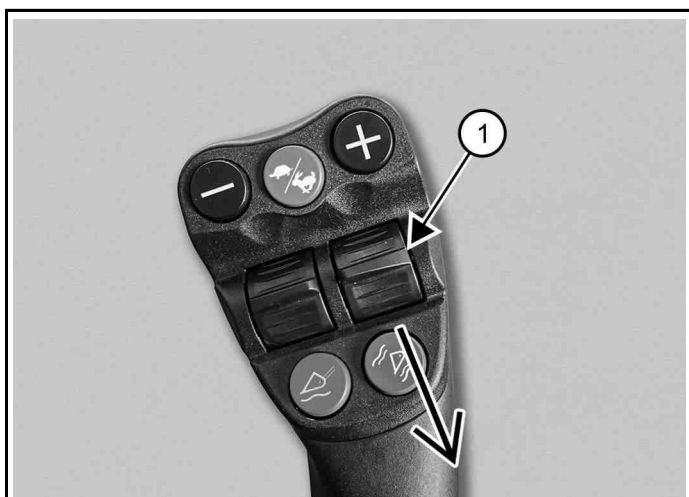
Reverse continuous auxiliary hydraulic flow (male coupler is pressurised):

Figure 94



5. Press the switch (Item 1) to activate the auxiliary hydraulics. The left LED (Item 2) [Figure 94] will be illuminated.
6. Press the switch (Item 1) a second time to enable continuous auxiliary hydraulic flow. The right LED (Item 3) [Figure 94] will be illuminated.

Figure 95

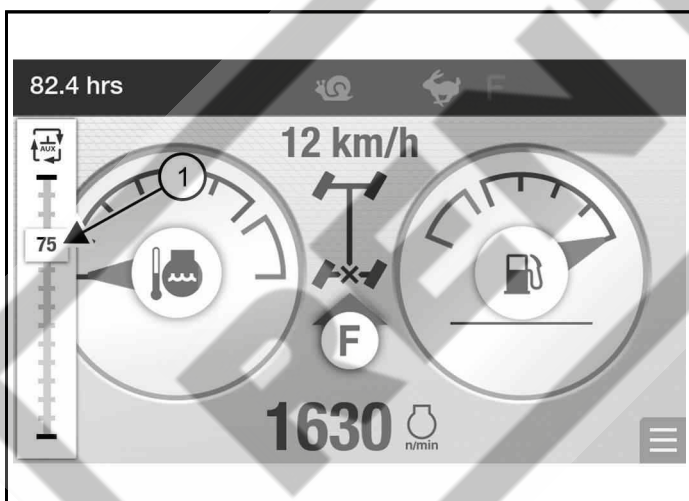


C21077c

7. Overpress the thumbwheel (Item 1) [Figure 95] downwards to activate reverse continuous flow auxiliary hydraulics. The right LED (Item 3) [Figure 92] will flash. This function allows constant auxiliary hydraulic fluid flow to the front male coupler (male coupler is pressurised). (Example: Operate an angle broom.)
8. To stop reverse continuous auxiliary fluid flow, overpress the thumbwheel (Item 1) [Figure 95] a second time, press the auxiliary flow button or press the joystick lockout button.

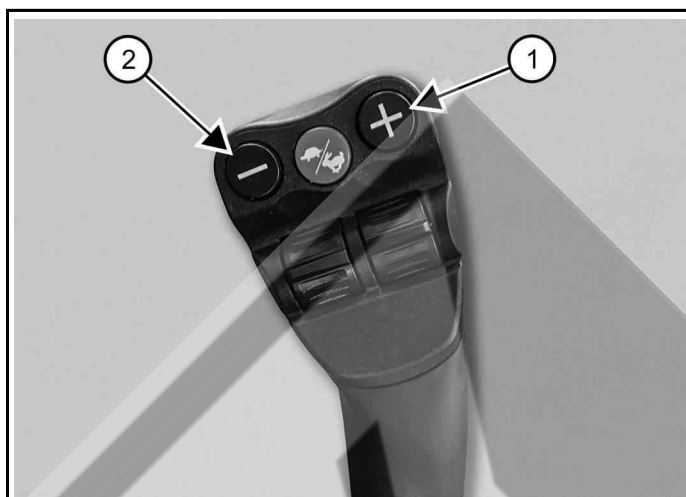
Adjusting On-The-Fly:

Figure 96



C211598a

Figure 97



C210778a

9. Press the '+' adjustment button (Item 1) [Figure 96] on the joystick to increase the maximum auxiliary hydraulic flow up to 100%.

The percentage graph will appear in the display (Item 1) [Figure 96] while adjusting.

10. Press the '-' adjustment button (Item 2) [Figure 96] on the joystick to decrease the maximum auxiliary hydraulic flow down to 0%.

The percentage graph will appear in the display (Item 1) [Figure 96] while adjusting.

11. Press and hold the auxiliary hydraulics switch (Item 1) [Figure 94] to store the value as the default maximum auxiliary hydraulic flow.

The setting is automatically saved in memory every time the machine is turned off.

Quick Couplers

⚠ WARNING

BURN HAZARD

Hydraulic fluid, tubes, fittings and quick couplers can get hot when running machine and attachments / implements. Be careful when connecting and disconnecting quick couplers. ◀

W-2220

⚠ WARNING

INJECTION HAZARD

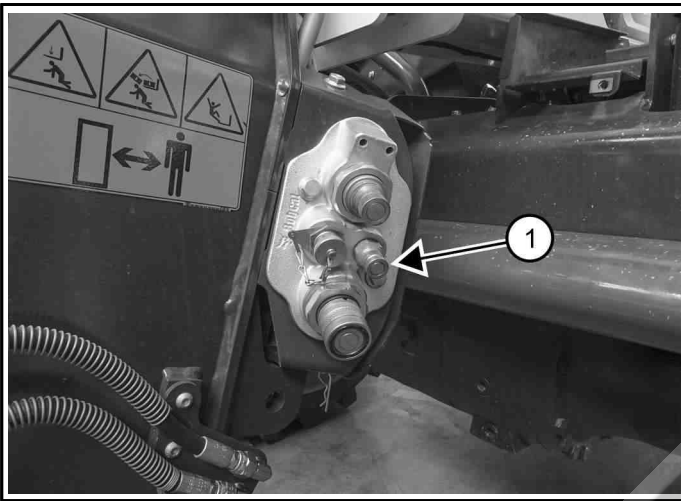
Pressurised diesel fuel or hydraulic fluid can penetrate skin and eyes, causing serious injury or death.

Fluid leaks under pressure may not be visible. Use a piece of cardboard or wood to find leaks. **DO NOT** use your bare hand. Wear safety goggles. If fluid enters skin or eyes, get immediate medical attention from a doctor familiar with this injury. ◀

W-2072

- Remove dirt or debris from the surface of both the male and female couplers, and from the outside diameter of the male coupler.

Figure 98



- Visually check the couplers for corroding, cracking, damage or excessive wear. If any of these conditions exist, the coupler(s) [Figure 98] must be replaced.
- To Connect: Install the male couplers into the female couplers. Full connection is made when the ball release sleeve slides forward on the female coupler.

Some attachments may have a case drain that needs to be connected to the small quick coupler (Item 1) [Figure 98].
- To Disconnect: Hold the male coupler. Retract the sleeve on the female coupler until the couplers disconnect.

Auxiliary Hydraulic Release

WARNING

BURN HAZARD

Hydraulic fluid, tubes, fittings and quick couplers can get hot when running machine and attachments / implements.

Be careful when connecting and disconnecting quick couplers. ◀

W-2220

WARNING

INJECTION HAZARD

Pressurised diesel fuel or hydraulic fluid can penetrate skin and eyes, causing serious injury or death.

Fluid leaks under pressure may not be visible. Use a piece of cardboard or wood to find leaks. DO NOT use your bare hand. Wear safety goggles. If fluid enters skin or eyes, get immediate medical attention from a doctor familiar with this injury. ◀

W-2072

SMART HANDLING SYSTEM (SHS)

The maximum speed of the boom movements can be adjusted by the operator to improve control of the boom functions.

Smart Handling System (SHS) Operation

Engaging:

Figure 99



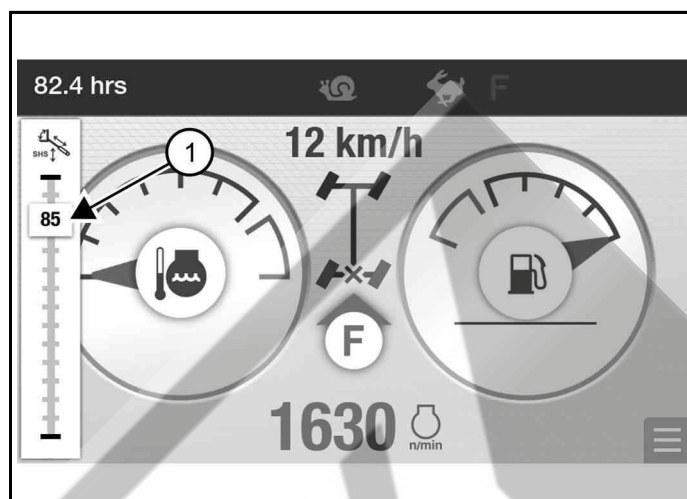
NA3974c

1. Press the SHS switch (Item 1) [Figure 99] on the right console panel to turn on.

The software will use the last saved settings selected by the operator to adjust the maximum hydraulic flow on the boom movements.

The switch activation has no effect until the joystick goes back to neutral (for all boom movements).

Figure 100

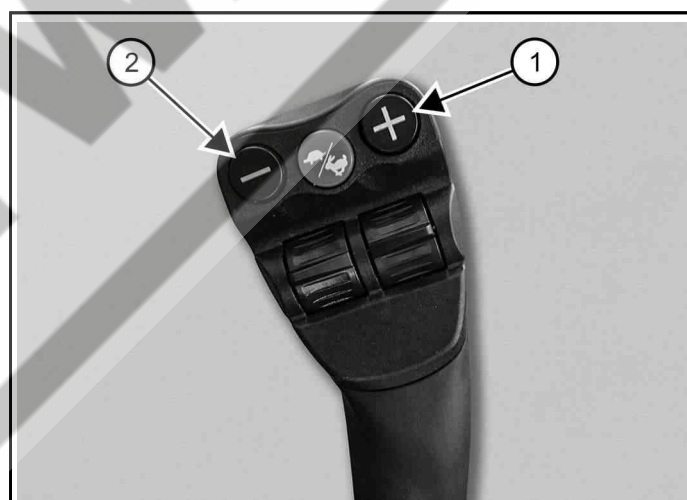


C211601a

When SHS is engaged, The software will use the last saved settings selected by the operator to adjust the maximum hydraulic flow on the boom movements. That percentage will appear briefly in the display (Item 1) [Figure 100].

Adjusting On-The-Fly:

Figure 101



C210778a

2. Press the '+' adjustment button (Item 1) on the joystick to increase the SHS level up to 100%.

The percentage graph will appear in the display (Item 1) [Figure 100] while adjusting.

3. Press the '-' adjustment button (Item 2) on the joystick to decrease the SHS level down to 0%.

The percentage graph will appear in the display (Item 1) [Figure 100] while adjusting.

4. Press and hold the SHS switch (Item 1) [Figure 99] to store the value as the default SHS level.

The setting is automatically saved in memory every time the machine is turned off.

When the switch is in the OFF position the software will allow the maximum speed of every boom movement.

AUTO REVERSE COOLING FAN

This machine may be equipped with an Auto Reverse Cooling Fan.

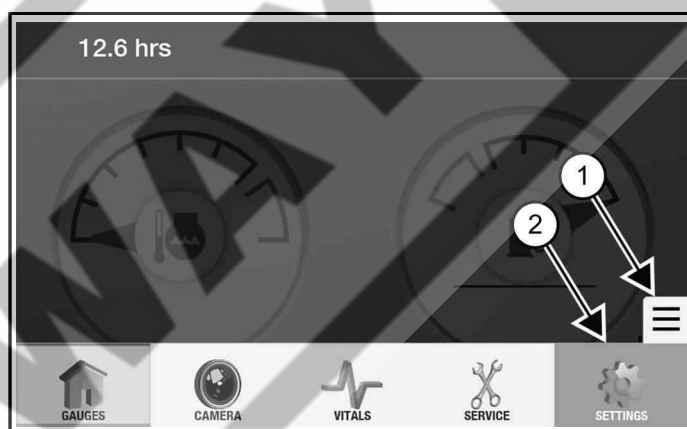
The auto reverse cooling fan interval times are 5, 15, 30, 45, 60 and 90 minutes.

NOTE: When 5 minute auto reverse cooling fan interval time is selected, cooling performances could be decreased.

The setting is automatically saved in memory every time the machine is turned off.

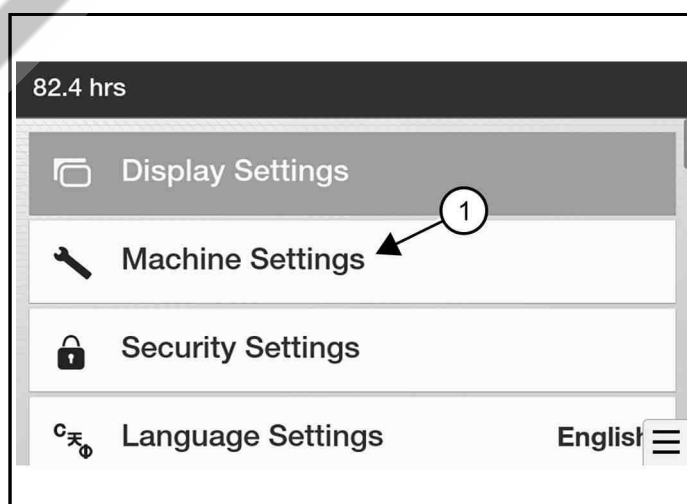
The manual reverse cooling fan can be launched by pressing the Reverse Cooling Fan switch regardless of the auto reverse cooling fan status.

Figure 102



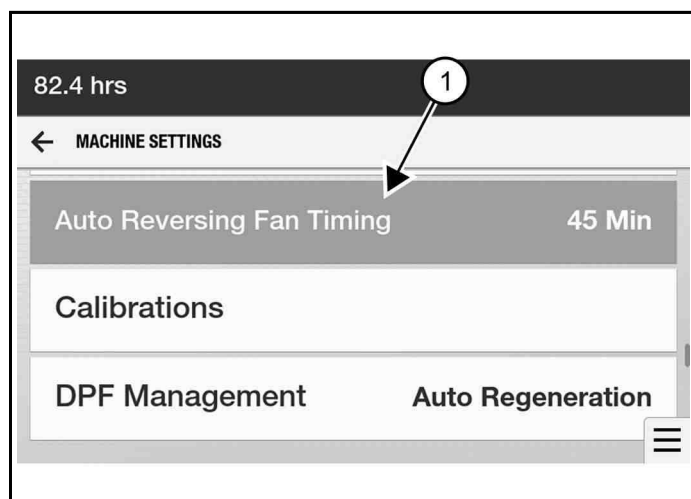
1. Select the **[NAVIGATION HANDLE]** icon (Item 1) [Figure 102].
2. Select **[SETTINGS]** (Item 2) [Figure 102].

Figure 103



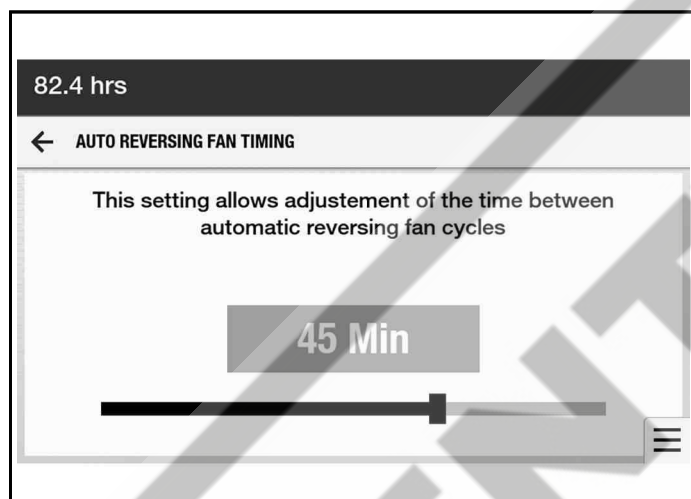
3. Select **[MACHINE SETTINGS]** (Item 1) [Figure 103].

Figure 104



4. Select **[AUTO REVERSE FAN TIMING]** (Item 1) [Figure 104].

Figure 105



5. Use the slider bar [Figure 105] to adjust to desired default setting.

DUAL F-N-R

Dual F-N-R Operation

The machine can be equipped with a joystick with Travel Direction Switch and a Travel Direction Lever at the same time. The operator can choose between the Travel Direction Switch on the joystick and the Travel Direction Lever.

Engine Cranking Condition

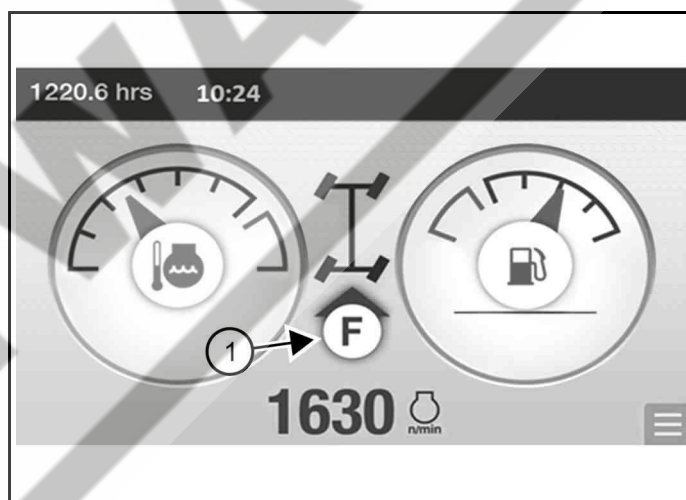
Both the Travel Direction Lever and the Travel Direction Switch on the joystick have to be in NEUTRAL to allow engine cranking.

Travel Direction Control

When the engine is running, the first command that goes out of NEUTRAL becomes the active control (FORWARD or REVERSE).

Switching Between The Travel Direction Switch and The Travel Direction Lever

Figure 106



Both the Travel Direction Lever and the Travel Direction Switch on the joystick have to be in NEUTRAL to allow switching controls.

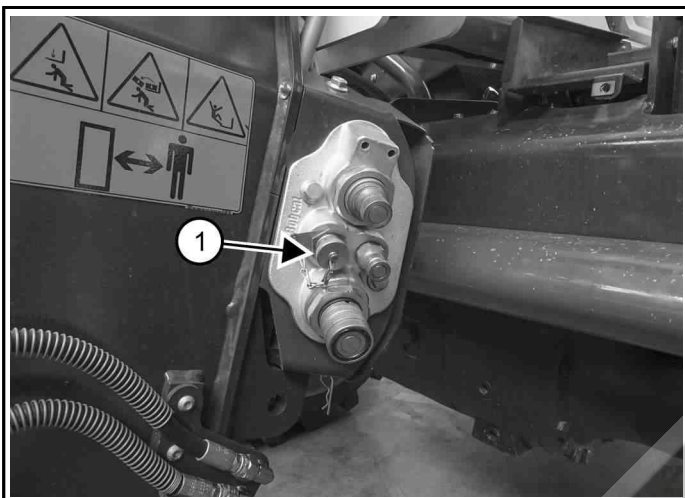
When both F-N-R controls are out of NEUTRAL the display will show **FNR NOT IN NEUTRAL** and three short beeps will sound in the cab.

The transmission will remain disabled until both the Travel Direction Switch and the Travel Direction Lever are set to NEUTRAL.

ATTACHMENT CONTROL CONNECTOR

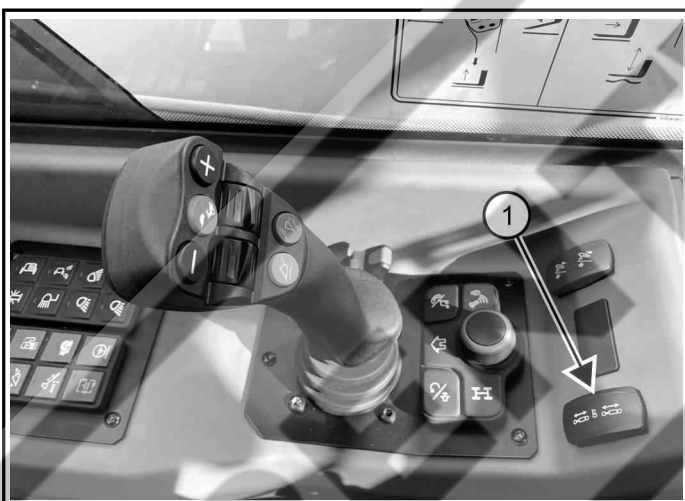
This machine may be equipped with an electric line on the boom.

Figure 107



Connect the attachment's electrical harness to the 7-pin connector (Item 1) [Figure 107].

Figure 108



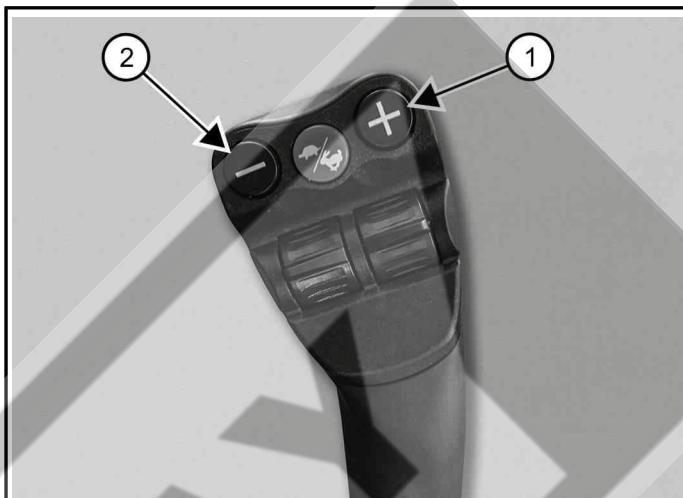
Additional switch (Item 1) [Figure 108] on the joystick panel (behind the joystick) is used to control some attachment functions through the electrical connector on the boom.

See the appropriate attachment Operation & Maintenance Manual for control details.

ON-THE-FLY SETTINGS

On-The-Fly Settings Description

Figure 109

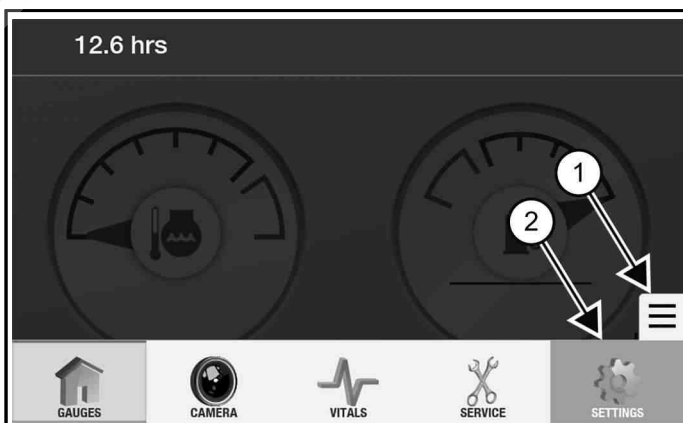


The operator can choose one function to be adjusted 'on-the-fly' by using the '+' (Item 1) and '-' (Item 2) [Figure 109] adjustment buttons on the joystick. Three functions are available for 'on-the-fly' operation:

- Speed Management (Creep Mode): adjusting the travel speed. (See Speed Management on Page 71)
- Auxiliary Flow: adjusting the maximum auxiliary hydraulic flow. (See Operating The Front Auxiliary Hydraulics on Page 77)
- SHS: adjusting SHS level. (See Smart Handling System (SHS) on Page 80)

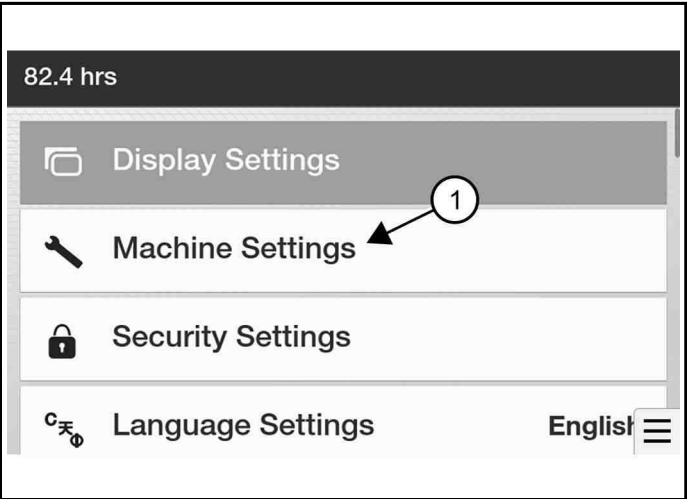
Selecting On-The-Fly Settings (Standard Display)

Figure 110



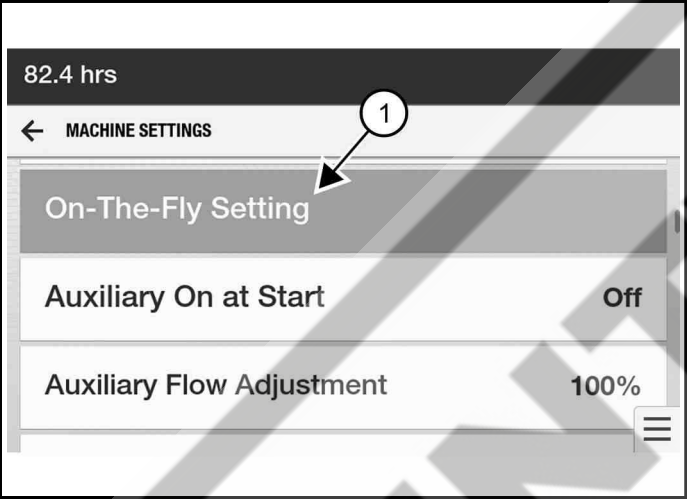
1. Select the **[NAVIGATION HANDLE]** icon (Item 1) [Figure 110].
2. Select **[SETTINGS]** (Item 2) [Figure 110].

Figure 111



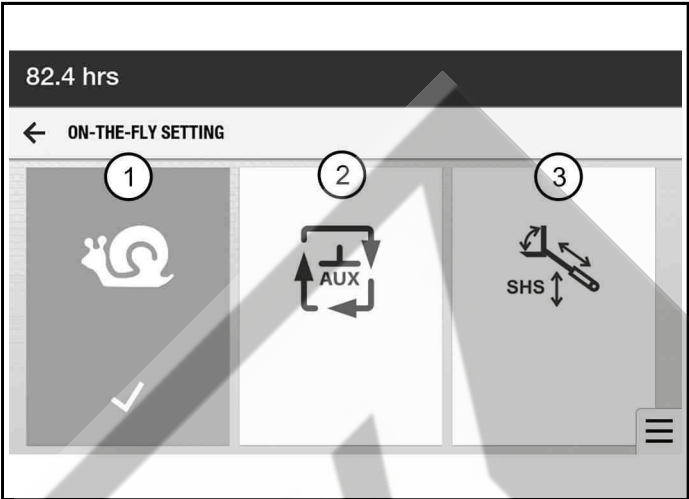
3. Select **[MACHINE SETTINGS]** (Item 1) [Figure 111].

Figure 112



4. Scroll down and select **[ON-THE-FLY SETTING]** (Item 1) [Figure 112].

Figure 113



5. Select one of the following functions [Figure 113]:

REF.	FUNCTION
1	Speed Management (Creep Mode)
2	Auxiliary Flow
3	SHS

DAILY INSPECTION

Daily Inspection And Maintenance

WARNING

INSUFFICIENT INSTRUCTIONS HAZARD
Untrained operators or failure to follow instructions can cause serious injury or death. Operators must have adequate training and instruction before operating. ◀

W-2001

IMPORTANT

MACHINE DAMAGE HAZARD
Improper pressure washing may lead to damage of the decal.

- Direct the stream at a 90 degree angle and at least 300 mm (12 in) from the decal.
- Wash from the centre of the decal toward the edges. ◀

I-2226

IMPORTANT

MACHINE DAMAGE HAZARD
Water in the fuel system can cause serious engine damage.
Remove water from the main fuel filter daily. ◀

I-2354

WARNING

FIRE AND EXPLOSION HAZARDS
Engines can have hot parts and hot exhaust gas that can cause serious injury or death.

- Keep flammable material away.
- DO NOT use machines in an atmosphere containing explosive dust or gases. ◀

W-2051

WARNING

INHALATION HAZARD
Exhaust fumes contain odorless, invisible gases that can kill without warning.
Fresh air must be added to avoid concentration of exhaust fumes when an engine is running in an enclosed area. If the engine is stationary, vent the exhaust outside. ◀

W-2050

WARNING

EXPLOSION HAZARD
Failure to follow instructions can cause serious injury, death, or severe engine damage.
DO NOT use ether with preheat systems ◀

W-2391

Maintenance work must be done at regular intervals. Failure to do so will result in excessive wear and early failures. The Service Schedule is a guide for correct maintenance of the Bobcat Telescopic Handler. (See Service Schedule on Page 138)

1. Check the following items before each day of operation:
 - Engine Oil Level
 - Hydraulic / Hydrostatic Fluid Level
 - Brakes - Check Function
 - Tilt Cylinder - Lubricate with multipurpose lithium based grease
 - Attachment Carrier Pins - Lubricate with multipurpose lithium based grease
 - Engine Air System - Check Air System for Damage or Leaks
 - Engine Coolant Level - Check Engine Cooling System - Check System for Damage or Leaks
 - Operator Cab and Cab Mounting Hardware - DO NOT operate without right cab window
 - Seat Belt
 - Tyres - Check for Wear, Damage, Correct Air Pressure; Use only approved tyres with correct pressure
 - Loose or Broken Parts - Repair or replace as necessary
 - Safety Treads and Safety Signs (Decals) - Replace as necessary
 - Check and Clean Mirrors and Windows - Replace as necessary
 - Fuel Filter - Remove trapped water through the drain valve on the bottom of the filter. (See Fuel Filter on Page 154)
 - Back-up Alarm - Check function, replace as necessary
 - Gauges and Horn - Check function, replace as necessary
 - Engine Cooling System - Check system for damage or leaks

NOTE: Fluids such as engine oil, hydraulic fluid, coolant, etc. must be disposed of in an environmentally safe manner. Some regulations require that certain spills and leaks on the ground must be cleaned in a specific manner. See local regulations for correct disposal.
2. Allow the engine and hydraulic fluid to warm completely before beginning operation
3. Use the joystick to check for smooth operation of the following hydraulic functions:

- Raise and lower the boom
- Extend and retract the boom
- Tilt the attachment device forward and backward

4. Check forward and reverse travel
5. Check operation of the accelerator and brake
6. Check operation of the steering. Cycle the steering mode regularly to ensure correct wheel alignment

If any of the functions do not operate correctly, have it repaired immediately before continuing.

Cleaning The Operator Cab

- Clean soft upholstery in the cab with a cloth that has been dipped in a solution composed of water and detergent and then thoroughly wrung out.
- Clean the operator's seat and the floor with a vacuum cleaner and / or a stiff brush. If necessary, use a damp cloth to remove any stubborn stains.
- Fabric-covered seats should be cleaned with a stiff brush or vacuum cleaner. Plastic-covered seats should be cleaned with a damp cloth.
- Clean the seat-belts with a sponge dipped in hot soapy water and simply leave them to dry.

PRE-STARTING PROCEDURE

Entering The Machine

Figure 114



C217364a

- Use the grab handles (Item 1) [Figure 114] when entering the machine.

DO NOT JUMP.

Safety treads are installed on the machine to provide a slip resistant surface for getting on and off the machine.

Keep safety treads clean and replace when damaged. Replacement treads are available from your Bobcat dealer.

Operation & Maintenance Manual And Operator's Handbook Locations

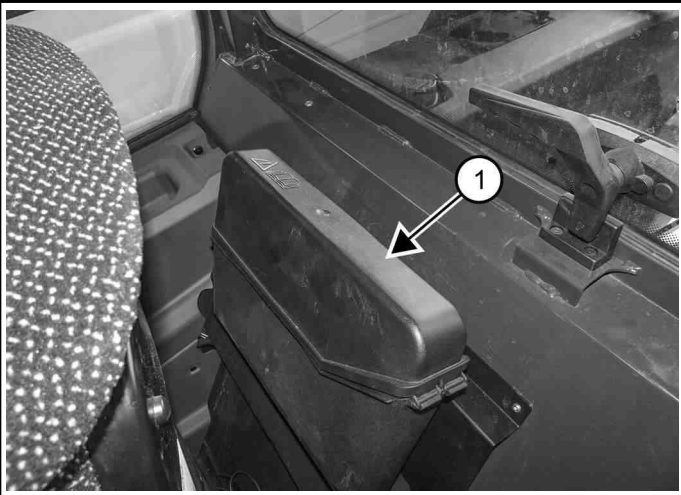
WARNING

INSUFFICIENT INSTRUCTIONS HAZARD
Untrained operators or failure to follow instructions can cause serious injury or death.

- Read and understand the Operation & Maintenance Manual, Operator's Handbook and decals on machine.
- Follow warnings and instructions in the manuals when making repairs, adjustments or servicing.
- Check for correct function after adjustments, repairs or service. *

W-2003

Figure 115



C215913a

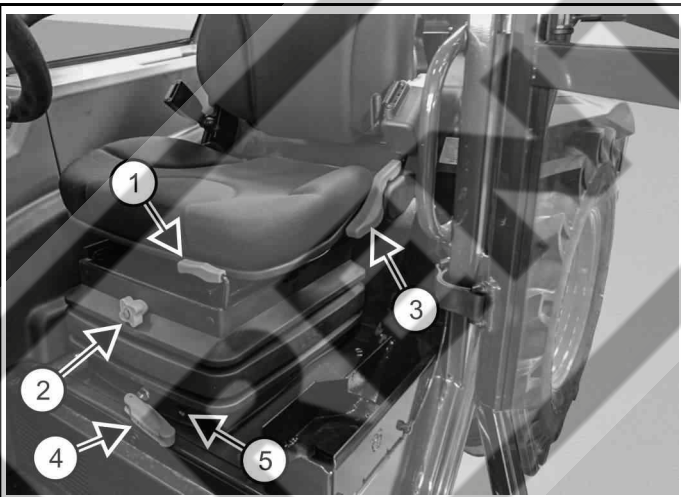
- Read and understand the Operator's Handbook and the Operation & Maintenance Manual (Item 1) [Figure 115] before operating the machine.
- Perform the daily inspection.
(See Daily Inspection on Page 85)

Adjusting The Seat

- Adjust the seat for comfortable operation.

Standard Seat

Figure 116



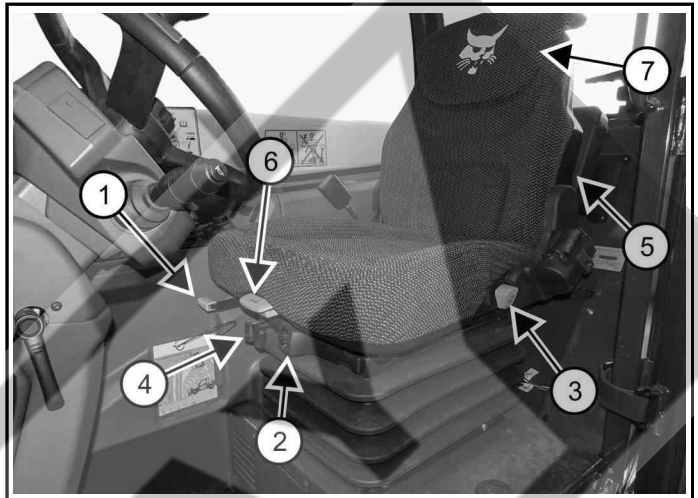
C211765a

- Pull the lever (Item 1) [Figure 116] to adjust the seat distance from the steering wheel and pedals.
- Turn the knob (Item 2) [Figure 116] to adjust the height of the seat.
- Release the lever (Item 3) [Figure 116] to adjust the angle of the seat back.
- Turn the lever (Item 4) [Figure 116] to adjust the seat cushion for weight of the operator.

The gauge (Item 5) [Figure 116] indicates the chosen value in kilograms.

Air Suspension Seat

Figure 117



C215914a

- Pull the lever (Item 1) [Figure 117] to adjust the seat distance from the steering wheel and pedals.
- Push the knob (Item 2) [Figure 117] up or down to adjust the height of the seat.
- Release the lever (Item 3) [Figure 117] to adjust the angle of the seat back.
- Turn the lever (Item 4) [Figure 117] fully clockwise to engage the horizontal suspension. The horizontal suspension dampens forward and backward movements.
- Turn the knob (Item 5) [Figure 117] on the back of the seat to adjust the lumbar setting.
- Pull the lever (Item 6) [Figure 117] to adjust the seat cushion depth.
- Pull upwards or push down on the headrest (Item 7) [Figure 117] to adjust its height.

Adjusting The Seat Belt

Figure 118



C211782a

1. Fasten the seat belt (Item 1) [Figure 118].
2. Make sure that the seat belt is snug around the lower part of your hips.

Adjusting And Cleaning The Mirrors

- Adjust and clean the mirrors to obtain the best visibility.

Cleaning The Mirrors

Do not use abrasive or highly alkaline cleaners.

Do not clean with brushes.

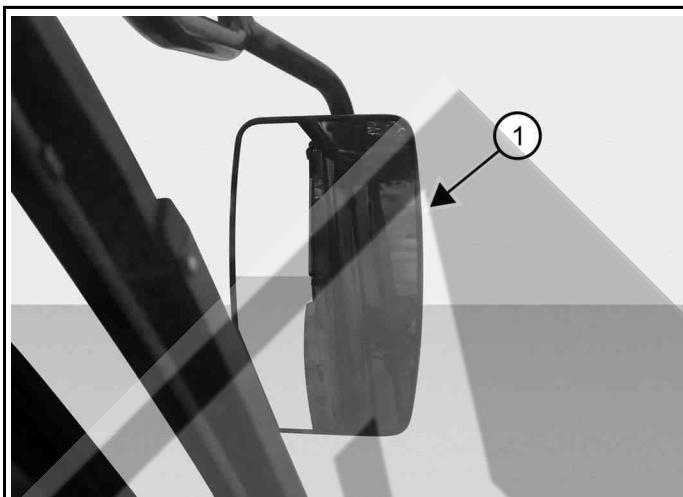
Clean mirrors every day and more often when necessary:

1. Pre-rinse with water to remove dirt and bird soiling.
2. Wash with a mild household detergent and warm water. Use a sponge or a soft cloth.
3. Rinse with water and dry with a clean soft cloth.

Adjusting The Mirrors

For more information on visibility,
(See Visibility Diagrams on Page 315) .

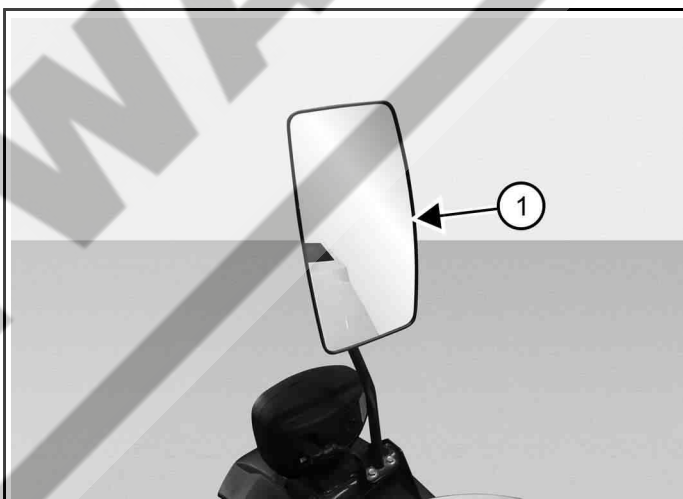
Figure 119



C211789a

- Adjust the left side mirror (Item 1) [Figure 119] until the left side of the Telescopic Handler is visible from the operator's point of view.

Figure 120

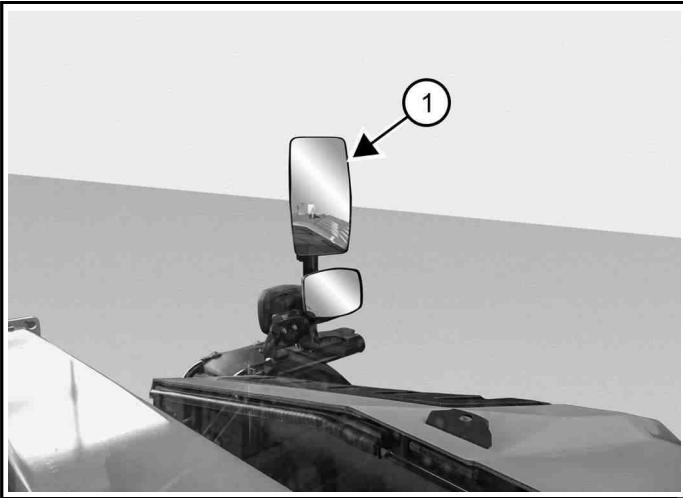


C217545a

- Adjust the right side mirror (Item 1) [Figure 120] until the right side of the Telescopic Handler is visible from the operator's point of view.

Adjusting The Electrical Mirror

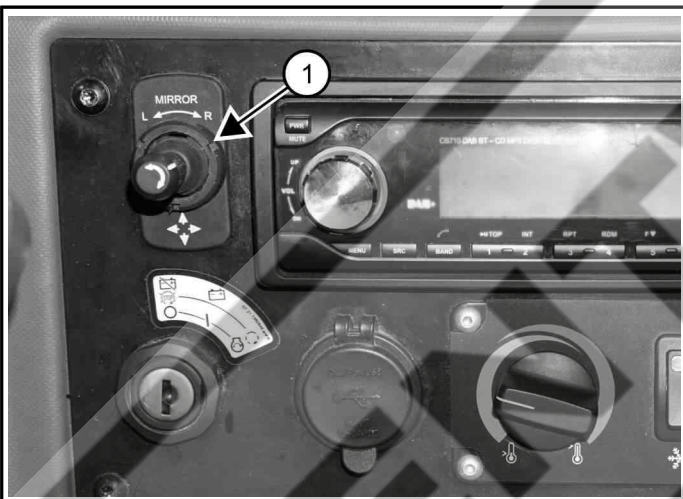
Figure 121



C211780b

This machine may be equipped with an electrical mirror (Item 1) [Figure 121].

Figure 122



C219958b

- To adjust the mirror, use the joystick (Item 1) [Figure 122]:
 - Rotate the joystick to adjust the angle of the mirror.
 - Move the joystick to adjust the position of the mirror.

STARTING THE ENGINE

Standard Key Panel

⚠ IMPORTANT

MACHINE DAMAGE HAZARD

Engaging the starter for longer than 30 seconds can cause overheating which can damage the starter. Cool the starter for one minute between uses. ◀

1-2208

⚠ WARNING

FIRE AND EXPLOSION HAZARDS

Engines can have hot parts and hot exhaust gas that can cause serious injury or death.

- Keep flammable material away.
- DO NOT use machines in an atmosphere containing explosive dust or gases. ◀

W-2051

⚠ WARNING

INHALATION HAZARD

Exhaust fumes contain odorless, invisible gases that can kill without warning.

Fresh air must be added to avoid concentration of exhaust fumes when an engine is running in an enclosed area. If the engine is stationary, vent the exhaust outside. ◀

W-2050

1. Perform the PRE-STARTING PROCEDURE. (See Standard Key Panel on Page 89) (See Pre-starting Procedure on Page 86) (See Daily Inspection on Page 85)
2. The Travel Direction Control and all other controls must be in NEUTRAL POSITION before starting the engine.

Figure 123

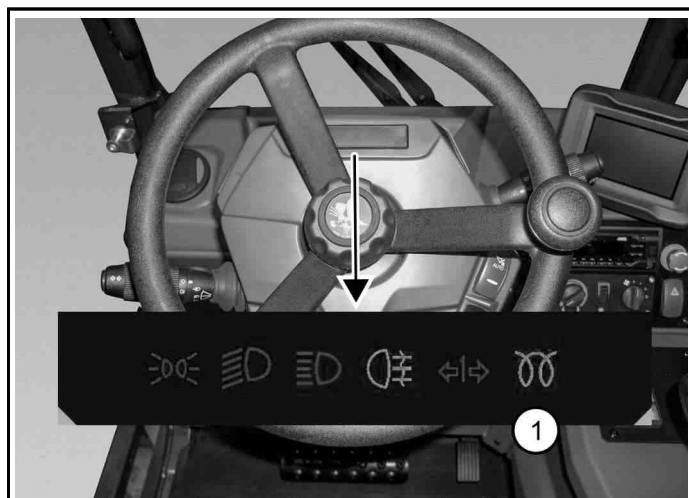


C211777b

3. Turn the key switch (Item 1) to RUN (Item 2) [Figure 123].

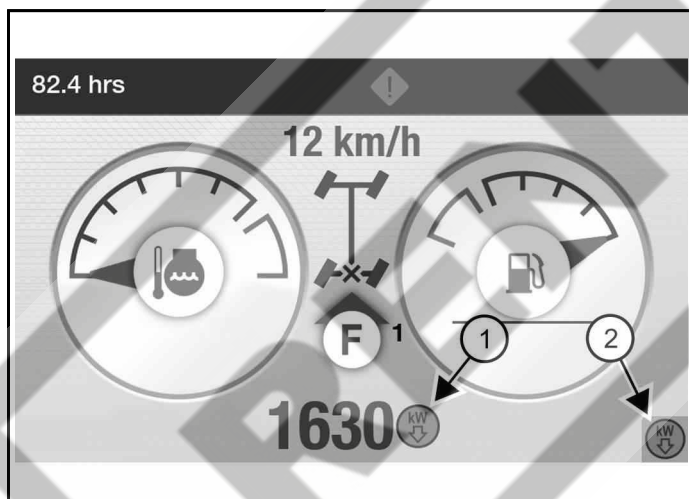
Check if the emergency stop (Item 3) [Figure 123] is not in the pressed position.

Figure 124



4. Keep the key in RUN position for engine preheat while the engine pre-heat icon (Item 1) [Figure 124] is ON on the centre indicator panel.
5. When the engine preheat icon (Item 1) [Figure 124] goes OFF, turn the key switch to START (Item 4) [Figure 123]. Release the key when the engine starts and allow it to return to the RUN (Item 2) [Figure 123] position.

Figure 125



If the engine oil temperature is below 10°C (50°F) after starting the engine, the machine performance icon (Item 1) [Figure 125] is shown close to the engine speed on the display and the engine speed is limited to 1260 rpm.

Select the machine performance icon (Item 2) [Figure 125] to open the **MACHINE PERFORMANCE** screen. The message "Throttle: Control Not Allowed" is shown on the screen.

Cold Temperature Starting

⚠ WARNING

EXPLOSION HAZARD

Failure to follow instructions can cause serious injury, death or severe engine damage. **DO NOT** use ether or starting fluid with glow plug or air intake heater systems.

If the temperature is below freezing, perform the following procedures to make starting the engine easier:

- Replace the engine oil with the correct type and viscosity for the anticipated starting temperature. (See Engine Oil Chart on Page 157)
- Make sure the battery is fully charged.

Warming The Hydraulic / Hydrostatic System

- Let the engine operate for a minimum of 5 minutes to warm the engine and hydrostatic transmission fluid before operating the machine.

NOTE: The full range of the engine speed control and the full range of travel speeds will not be available until the engine controller determines the machine is adequately warmed. (See Cold Temperature Starting on Page 90)

⚠ IMPORTANT

MACHINE DAMAGE HAZARD

Failure to follow directions can result in machine damage. Starting the engine when the temperature of the hydraulic fluid is less than -29°C (-20°F) will result in significant damage to the hydraulic system and components. Park the machine in a heated location or provide some means of warming the hydraulic fluid prior to starting the engine if the ambient temperature at startup is expected to be -29°C (-20°F) or below.

ECO MODE

The ECO Mode switch enables the operator to save fuel by limiting the engine revolutions per minute (rpm) when full rpm is not needed.

ECO Mode Operation

Figure 126



1. Press the ECO Mode switch (Item 1) [Figure 126] to activate the ECO Mode.

The activation of the ECO mode is only possible at low idle rpm (900 rpm).

2. Press the ECO Mode switch (Item 1) [Figure 126] again to turn OFF.

Deactivation of this mode is allowed independently of rpm.

If continuous flow is still activated when turning OFF the ECO mode, the ECO mode light (Item 2) and the AUX mode light (Item 3) [Figure 126] will blink three times and deactivation will fail.

ECO Mode will be disabled at Key ON.

MONITORING THE STANDARD DISPLAY DURING OPERATION

Figure 127

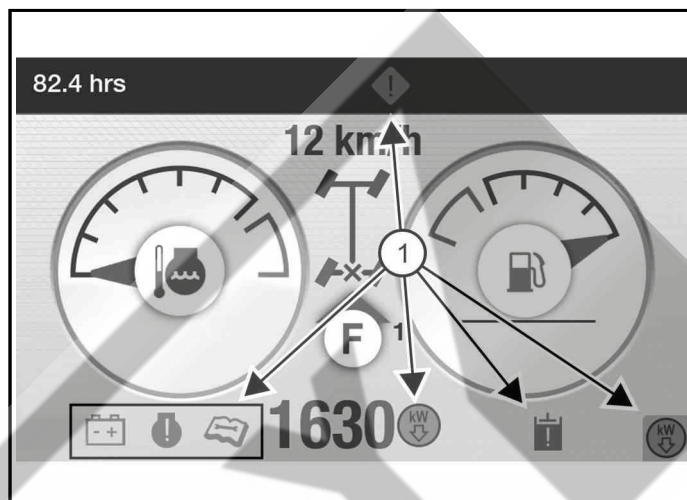
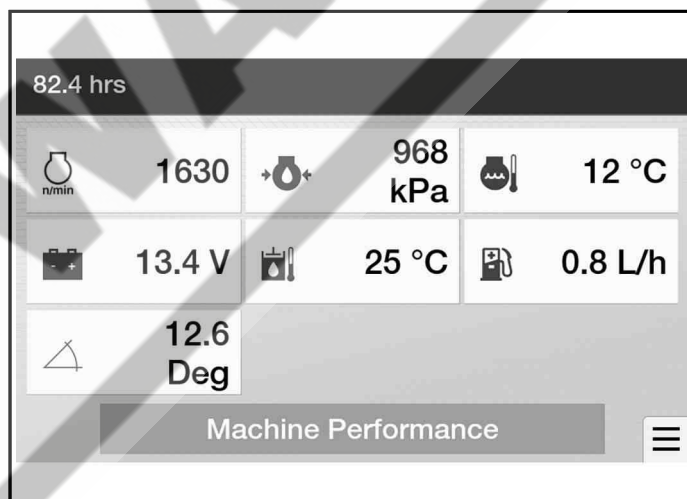
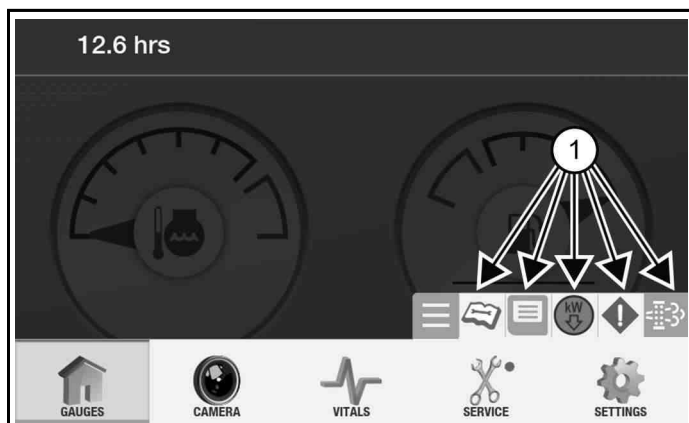


Figure 128



- Frequently monitor the **GAUGES** or **VITALS** screens [Figure 127] and [Figure 128].
- These icons (Item 1) [Figure 127] indicate machine conditions that may require service.
- Selecting **[MACHINE PERFORMANCE]** on the vitals screen can also provide details on machine condition.
(See Vital Detail And Machine Performance on Page 192)

Figure 129



- Active shortcuts (Item 1) [Figure 129] can appear in place of, or next to, the navigation handle that also indicate a need for service.
(See Viewing Active Shortcuts on Page 191)
- A red dot next to **[SERVICE]** indicates an active service code.
(See View Service Codes on Page 193)

Derate And Shutdown Conditions

Certain machine conditions can result in a derate condition until the fault is corrected. These derates are designed to protect the machine systems from damage while a fault condition exists.

An engine shutdown can occur during certain system malfunctions. The engine can be restarted to move the machine.

STOPPING THE ENGINE AND LEAVING THE MACHINE

Stopping The Engine And Leaving the Machine Procedure

WARNING

GENERAL HAZARD

Failure to follow instructions can cause serious injury or death.

Before you leave the operator's position:

- Put the Travel Direction Control and the Joystick in neutral.
- Engage the parking brake.
- Retract and lower the boom and attachment / implement flat on the ground.
- Stop the engine.†

W-2907

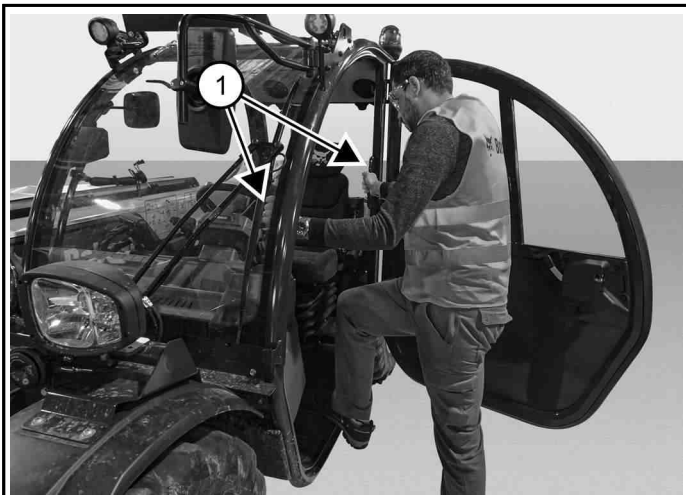
Figure 130



C215970a

1. Stop the machine on solid, flat and level ground. Ensure the machine is parked safely, taking into consideration the surrounding traffic.
2. Put the Travel Direction Control in neutral.
(See Travel Direction on Page 42)
3. Ensure the parking brake is engaged.
(See Parking Brake on Page 67)
4. Retract and lower the boom and attachment flat on the ground [Figure 130].
5. Turn the key switch (if equipped) or start switch (if equipped) to the STOP position to stop the engine and turn the machine's electrical system OFF.
6. Unfasten the seat belt.
7. (Standard Key Panel) Remove the key from the switch to prevent operation of the machine by unauthorised personnel.

Figure 131

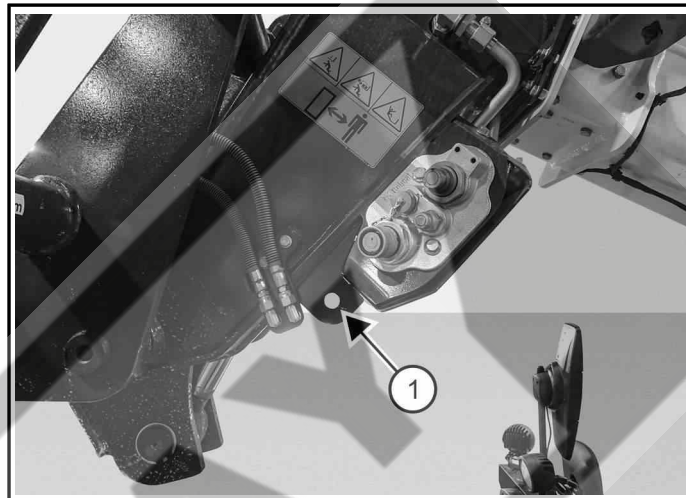


8. Exit the machine using the grab handles (Item 1) [Figure 131] (maintaining a three-point contact).

OBJECT HANDLING (WITH LIFT EYE LINK)

Object Handling (with Lift Eye Link) Procedure

Figure 132



The machine is equipped with a lift eye link (Item 1) [Figure 132] to handle load from the boom head without using attachment.

The maximum load to be carried when using the lift eye link (Item 1) [Figure 132] is the maximum rated load capacity described on the Load Capacity Chart, located inside the cab, and on the lift eye link decal, located next to the lift eye link.

(See Lift Eye Link Load Chart on Page 94)

Suspended Loads

Suspended loads have a dynamic and therefore unpredictable effect on the machine's stability. External working conditions such as the wind speed increase the dynamic and unpredictable effect. Follow the procedure below when operating a suspended load.

- The lifting device is intended to handle vertical pull loads. With the jib, do not carry out horizontal pull and side-pull.
- Carry or place special loads with the lifting device or attachment intended for this type of use.

If the suspended load or the resulting boom geometry block the visibility, alternative carrying means must be considered.

- The operator must know the wind speed. Do not use the machine with wind speeds over 12,5 m/s (28 mph).
- Contact your Bobcat dealer for details on applications.

Static Test

A static strength test has been successfully performed on the jib using a load coefficient of 1,5.

Lift Eye Link Inspection Before Use

In addition to the daily inspection of the machine:

- Check if safety decals are in good condition.
 - ▷ Replace if damaged.
- Check if the lifting shackle rotates freely.
 - ▷ Lubricate as needed.
- Check if lifting hook safety tab is intact and positions itself correctly.
- Inspect the condition of the lifting hook.
 - ▷ Replace if worn or damaged.
- Inspect the lift eye link frame for cracks or deformation.
 - ▷ See your Bobcat dealer for a replacement lift eye link.

Secondary Lifting Devices

The machine is not equipped with a secondary lifting device.

Identify the lifting device based on the type of load and intended use. Identify the adequate strength needed for the object being lifted.

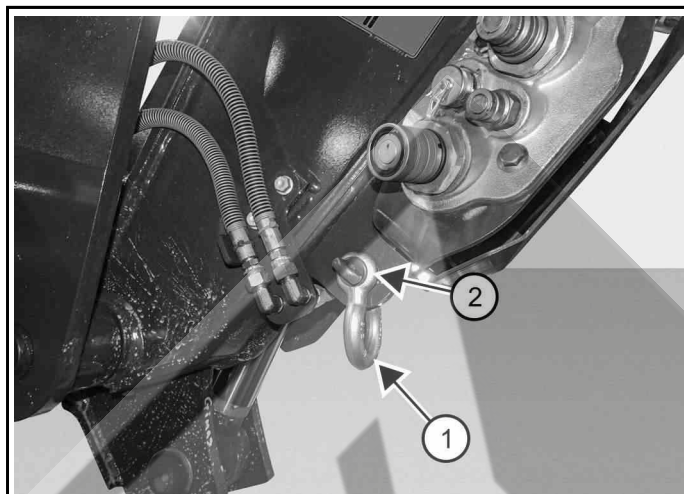
Refer to a competent person to determine the most appropriate equipment and method to properly secure the load. The operator can be assisted by a second person who needs to keep a safe distance of minimum 3 m (10 ft) away from the load and stay clear from the operator's line of sight.

Make sure the secondary lifting system (chain and shackle) is of sufficient strength to lift the object and is superior to the maximum rated load capacity of the machine. (See Performance on Page 307)

Follow the steps below to install a secondary lifting system:

1. Retract and fully lower the boom.

Figure 133



2. Tilt the attachment carrier fully backward so that during installation, the secondary lifting device is free to move without damaging the attachment carrier.
3. Install the shackle (Item 1) through the lift eye (Item 2) [Figure 133] allowing to secure the secondary lifting device.

Secondary Lifting Devices (for Travel)

The movements of the load during travel can be reduced by the use of an additional lifting device between the load and the machine frame.

- When applicable, secure the load to the machine lifting points (See Lifting the Machine on Page 131) or towing points (See Towing And Retrieving The Machine on Page 131) with additional lifting devices (ropes, chains).

This will avoid movement of the load during travel.

NOTE: Make sure to install the secondary lifting device in a way it does not damage the components of the machine during operation.

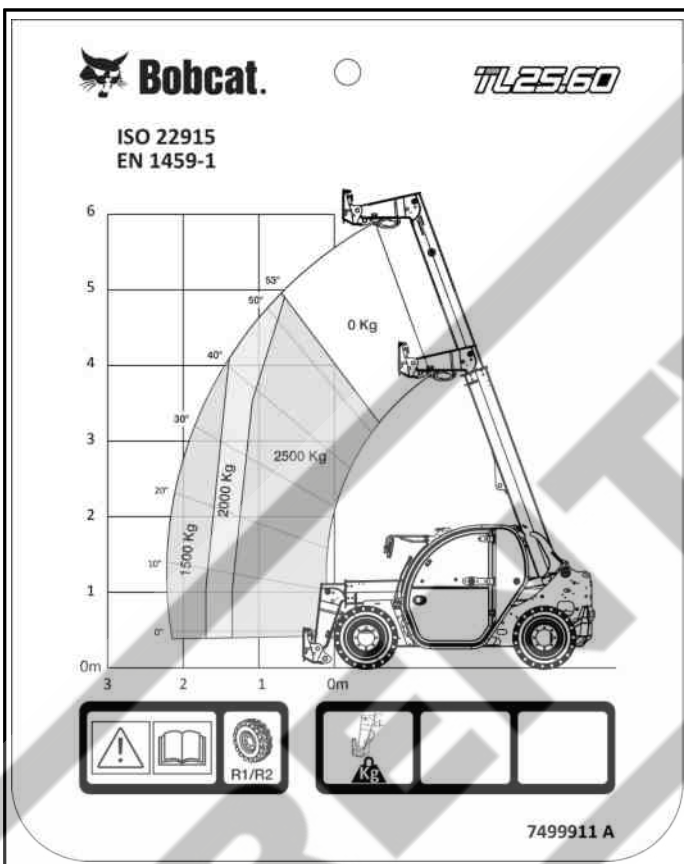
NOTE: Do not use any controls to reposition the load when the load is secured to the machine lifting or towing points. Remove the secondary lifting device between the load and the machine frame prior to repositioning the load.

Lift Eye Link Load Chart

- CAMSO 12-16.5 PR12 SKS 532
 - ▷ With inflation pressure of 550 kPa (5,50 bar) (80 psi).
- CAMSO 14-17,5 PR14 SKS 532
 - ▷ With inflation pressure of 550 kPa (5,50 bar) (80 psi).
- TRELLEBORG 36x14-20 BRAWLER HPS SOLIDFLEX TRACTION
- MICHELIN 300/70 R16,5 137A8/137B BIBSTEEL

- ▷ With inflation pressure of 500 kPa (5,00 bar) (73 psi).
- ALLIANCE 400/55-17,5 16PR 149A8 A328
 - ▷ With inflation pressure of 400 kPa (4,00 bar) (58 psi).
- MICHELIN 280/80 R18 132A8/132B IND TL XMCL
 - ▷ With inflation pressure of 440 kPa (4,40 bar) (64 psi).
- ALLIANCE 300/75 R18 IND 142A8/142B A580
 - ▷ With inflation pressure of 400 kPa (4,00 bar) (58 psi).
- MICHELIN 280/80 R20 133A8/133B IND TL XMCL
 - ▷ With inflation pressure of 440 kPa (4,40 bar) (64 psi).

Figure 134



Complies with stability tests of the relevant parts of ISO 22915.

Load Handling

⚠ WARNING

INSTABILITY HAZARD

Machine tipping or rollover can cause serious injury or death.

Load, unload and turn on flat level ground. DO NOT exceed ROC shown on load charts in cab. ◀

W-3176

When using telescopic handler with a load suspended from the lift eye link:

- Identify and install adequate secondary lifting devices such that unintentional unhooking or displacement of the load or sling is avoided.
- Keep the attachment carrier fully tilt backward (Item 1) so that the secondary lifting device and the load are not in contact with the attachment carrier.
- Do not operate the machine while people are under the suspended load.
- Operate on firm ground.
- Keep lifting hook vertically aligned above the gravity centre of the load.
- Move the lift eye link and machine slowly. During picking, loading and unloading, avoid jerky movements and load oscillations.
- Never shock or abruptly place loads.
- Do not handle loads while the machine is not on level ground.
- Do not carry or place roof trusses with the lift eye link.
- Do not carry hot or corrosive products.

During Travelling

- Identify and install adequate secondary lifting devices (See Secondary Lifting Devices (for Travel) on Page 94) such that unintentional unhooking or displacement of the load or sling is avoided.
- Move the machine with boom fully retracted and load as close as possible to the ground (transport position). The load should not be suspended higher than 500 mm (20 in) above the ground when travelling.
- The machine should travel at speeds appropriate to the ground and load conditions, or not greater than 0,4 m/s (0.9 mph) when carrying suspended loads.
- Do not use any controls to reposition the load. Come to a gradual and complete stop before attempting to reposition the load.
- Avoid crossing, climbing or descending inclines when travelling with a suspended load.
- During starting, travelling, turning and stopping, avoid jerky movements and load oscillations.
- When travelling, the lateral and longitudinal attitude must be horizontal.

Picking Up a Load from the Ground

1. Fully retract and lower the boom and move the machine as close as possible to the load.

2. Position the lift eye link vertically aligned above the load and lower it slowly as close as possible to the lifting point of the load.
3. Put the Travel Direction Control into neutral and make sure the parking brake is engaged.
4. Turn off the engine and remove the ignition key. Exit the cab. Install the lifting hook to the lifting point of the load or install a chain (or other type of the lifting device) through the shackle and connect to the load. Check that the lifting gear is hanging freely and is not twisted or knotted. Always turn off the engine to avoid involuntary hazardous movements, mainly when a second operator is present to install the load.
5. Go back to operating position in the cab and start the engine.
6. Slightly lift the load from the ground by raising the boom. The machine is then in the transport position.
7. In case of travelling with the suspended load, turn off the engine and remove the ignition key (if applicable). Exit the cab. Install the additional lifting device (rope or cable) to secure the load to the machine lifting or towing points. It will reduce the load movement during the travel.
(See Secondary Lifting Devices (for Travel) on Page 94)

Placing a Raised Load

1. With the machine in transport position, move the machine as close as possible to the base of the area where to place the load.
2. Put the Travel Direction Control into neutral and make sure the parking brake is engaged.
3. In case of travelling with the suspended load:
 - a. Turn off the engine and remove the ignition key. Exit the cab. Remove the additional lifting device (wire, cable) to secure the load to the machine lifting or towing points.
 - b. Go back to operating position in the cab and start the engine.
4. Raise and extend the boom to move the load above the area where to place the load.
5. Position the load horizontally and place it on the area by lowering and retracting the boom.
6. Turn off the engine and remove the ignition key. Exit the cab. Remove the lifting hook from the lifting point of the load or disconnect the load and remove the chain (or other type of lifting device) from the shackle. Always turn off the engine to avoid involuntary hazardous movements, mainly when a second operator is present to remove the load.
7. Return the boom to the transport position by raising, retracting and lowering it.

Picking Up a Raised Load

1. Fully retract and lower the boom. Move the machine as close as possible to the load.
2. Put the Travel Direction Control into neutral and make sure the parking brake is engaged.
3. Raise and extend the boom to position the lifting hook vertically aligned above the load and lower it slowly as close as possible to the lifting point of the load.
4. Turn off the engine and remove the ignition key. Exit the cab. Install the lifting hook to the lifting point of the load or install the chain (or other type of lifting device) through the shackle and connect to the load. Check that the lifting gear is hanging freely and is not twisted or knotted. Always turn off the engine to avoid involuntary hazardous movements, mainly when a second operator is present to install the load.
5. Slightly lift the load by raising the boom.
6. Bring the load to transport position by fully retracting the boom and lowering the load as close as possible to the ground.

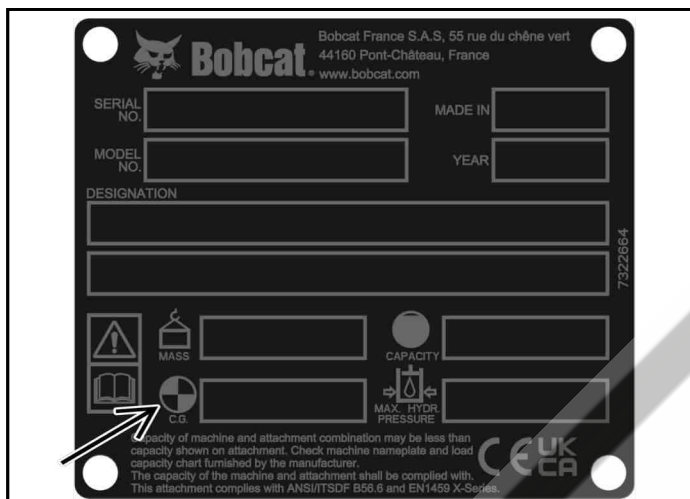
ATTACHMENTS

Serial Plate

Always use the serial number of the attachment when requesting service information or when ordering parts.

If any serial number plate is damaged, contact your Bobcat dealer.

Figure 135



An attachment serial number plate can be found on each attachment [Figure 135].

The centre of gravity (C.G.) indicates the horizontal distance between the attachment's centre of gravity and the attachment hook-up.

Attachment Operation & Maintenance Manual

Depending on the design of your Bobcat attachment, the operation and maintenance procedures are described in your Bobcat Telescopic Handler Operation & Maintenance Manual or in specific Bobcat attachment Operation & Maintenance Manual.

The operation and maintenance procedures for the attachments listed below are covered by your Bobcat Telescopic Handler Operation & Maintenance Manual:

- Pallet Fork
- Bale Spike
- Buckets
- Jibs

The operation and maintenance procedures for the attachments listed below are described in a specific Bobcat attachment Operation & Maintenance Manual:

- Adapter Quick-Tach to Bob-Tach attachment mounting system
- Angle Broom
- Auger
- Blades

- Boom Truss
- Brushcat rotary cutter
- Combination Bucket
- Flail Cutter
- Land Plane
- Landscape Rake
- Mixing Bucket
- Salt & Sand Spreader
- Seeder
- Snow Blower
- Snow Pushers
- Soil Conditioner
- Sweeper
- Tiller
- Trencher
- Snow Attachments
- Vibratory Roller
- Other Attachments. Contact your Bobcat dealer for all available attachments and Operation & Maintenance Manuals.

Contact your Bobcat Dealer to get additional copy of the specific attachment Operation & Maintenance Manual.

Attachment Declaration Of Conformity

Depending on the design of your Bobcat attachment, the homologation can be covered by your Bobcat Telescopic Handler Declaration of Conformity or requires a specific Bobcat attachment Declaration of Conformity.

When required, the attachment Declaration of Conformity specific for your region is available in the Operation & Maintenance Manual describing the operation and maintenance procedures of your Bobcat attachment.

The homologation of the attachments listed below is covered by your Bobcat Telescopic Handler Declaration of Conformity:

- Buckets
- Bale Spike
- Pallet fork

The homologation of the attachments listed below is covered by a specific Bobcat attachment Declaration of Conformity:

- Jibs
- Sweeper

Travel Speed Restrictions With Solid Tyres

Certain attachments when combined with solid tyres exceed the maximum authorised gross weight of 5600 kg (12346 lb). Because of this it's not allowed to travel at maximum speed with solid tyres while the attachment is installed on the machine. See below for a list of attachments this applies to.

Available solid tyres:

- TRELLEBORG 36x14-20 BRAWLER HPS

PART NUMBER	ATTACHMENT
7439856	Sweeper Brush, 248 L (8.8 ft³), 1,85 m (6.1 ft), Bob-Tach attachment mounting system
7439857	Sweeper Brush, 290 L (10.2 ft³), 2,15 m (7.1 ft), Bob-Tach attachment mounting system
7218087	Mower Brushcat rotary cutter, 1,8 m (72 in), Standard Flow, Bob-Tach attachment mounting system
7101894	Mower, Flail Cutter 200, 2,0 m (78 in), Bob-Tach attachment mounting system
7105781	Dozer Blade, 2,4 m (96 in), Bob-Tach attachment mounting system
7165402	Vibratory Roller, 1,9 m (73 in), Smooth, Bob-Tach attachment mounting system

Adjusting The Attachment Angle Gauge

This machine may be equipped with an attachment angle gauge.

Adjust the attachment angle gauge when a different attachment is installed on the machine.

Figure 136

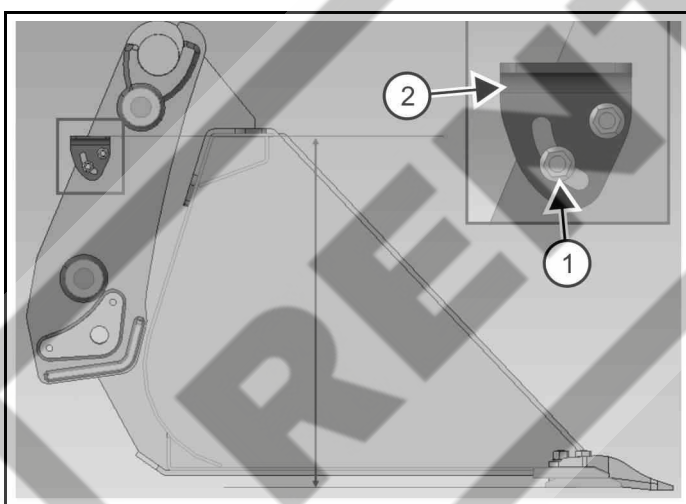
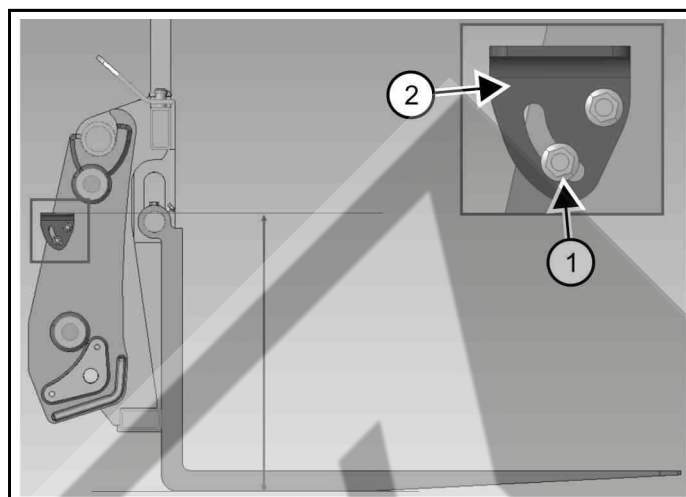


Figure 137



- Place the attachment flat on the ground [Figure 136] and [Figure 137].
- Loosen the nut and bolt (Item 1) and adjust the angle gauge (Item 2) [Figure 136] and [Figure 137] to be level with the ground.
- Tighten the nut and bolt (Item 1) [Figure 136] and [Figure 137].

Buckets

Choosing The Correct Bucket

⚠ WARNING

MODIFICATION HAZARD

Unapproved attachments / implements can cause serious injury or death. Buckets and attachments / implements for safe loads of specified densities are approved for each model. Never use attachments / implements or buckets that are not approved by Bobcat Company. ◀

W-2052

⚠ WARNING

INSTABILITY HAZARD

Excessive loads can cause tipping or loss of control. Do not exceed Rated Load Capacity. ◀

W-2393

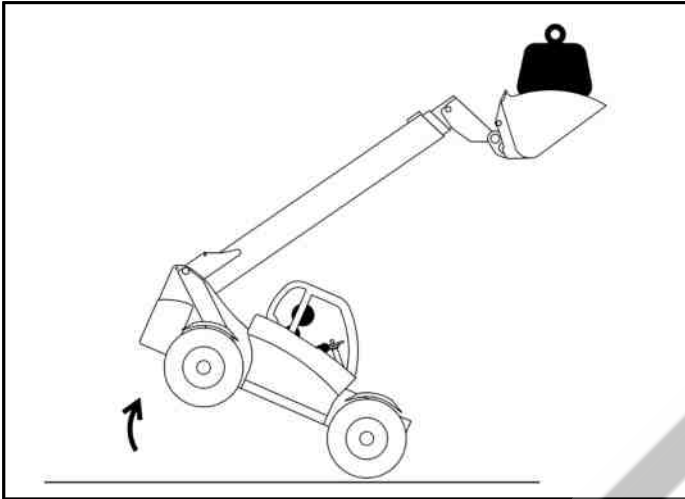
Warranty is void if non-approved attachments are used on the Bobcat Telescopic Handler.

The dealer can identify, for each model Telescopic Handler, the attachments and buckets approved by Bobcat. The buckets and attachments are approved for Rated Load Capacity (RLC) and for secure fastening.

The RLC is determined by using a bucket and material of normal density, such as dirt or dry gravel. If longer buckets are used, the load centre moves forward and reduces the RLC. If very dense material is loaded, the volume must be reduced to prevent overloading.

Use the correct bucket size for the type and density of material being handled. For safe handling of materials and avoiding machine damage, the attachment (or bucket) should handle a full load without going over the RLC for the machine.

Figure 138



Exceeding the RLC can cause the following problems:

- Steering the machine can be difficult.
- Tyres will wear faster.
- There will be a loss of stability.
- The life of the machine will be reduced.

Know the weight of the materials being handled. Avoid exceeding the RLC of the machine (as indicated on the Load Capacity Charts). Material which is very dense will be heavier than the same volume of less dense material. Reduce the size of load if handling dense material. Maximum material density is 1800 kg/m³ (112 lb/ft³) for digging buckets and 1000 kg/m³ (62 lb/ft³) for light material buckets.

Bucket Load Charts

WARNING

INSTABILITY HAZARD
Exceeding the rated load capacity can cause the machine to tip or rollover.
Always use and follow the Load Capacity Chart that is specified for each attachment / implement and telescopic handler combination. Each attachment / implement and machine combination will have its own chart.

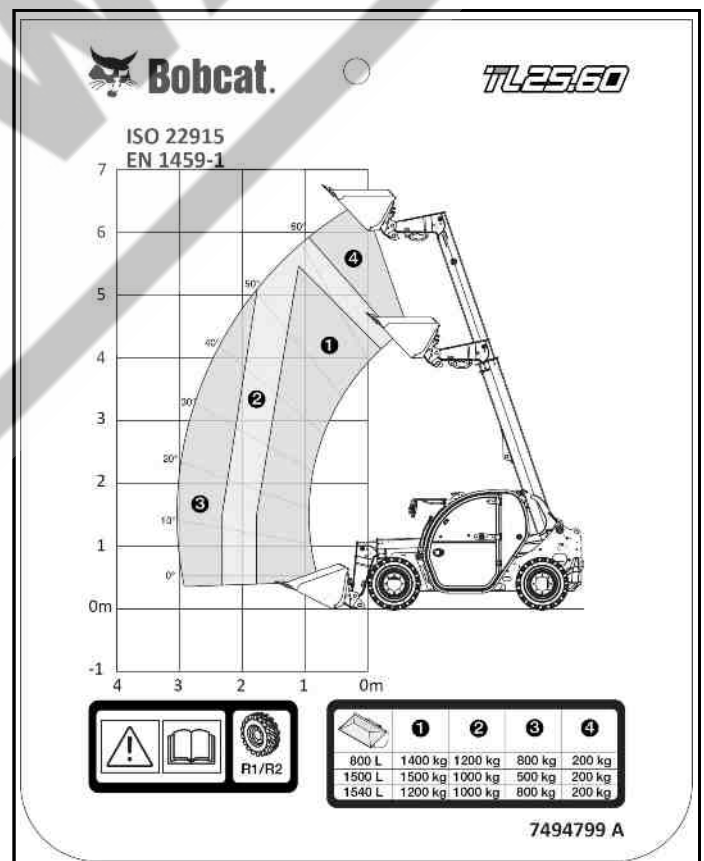
NOTE: The maximum load of an attachment can exceed the RLC of the machine.

Chart for the machine TL25.60RB equipped with digging, light material and snow buckets:

- CAMSO 12-16.5 PR12 SKS 532

- ▷ With inflation pressure of 550 kPa (5,50 bar) (80 psi).
- CAMSO 14-17,5 PR14 SKS 532
 - ▷ With inflation pressure of 550 kPa (5,50 bar) (80 psi).
- TRELLEBORG 36x14-20 BRAWLER HPS SOLIDFLEX TRACTION
- MICHELIN 300/70 R16,5 137A8/137B BIBSTEEL
 - ▷ With inflation pressure of 500 kPa (5,00 bar) (73 psi).
- ALLIANCE 400/55-17,5 16PR 149A8 A328
 - ▷ With inflation pressure of 400 kPa (4,00 bar) (58 psi).
- MICHELIN 280/80 R18 132A8/132B IND TL XMCL
 - ▷ With inflation pressure of 440 kPa (4,40 bar) (64 psi).
- ALLIANCE 300/75 R18 IND 142A8/142B A580
 - ▷ With inflation pressure of 400 kPa (4,00 bar) (58 psi).
- MICHELIN 280/80 R20 133A8/133B IND TL XMCL
 - ▷ With inflation pressure of 440 kPa (4,40 bar) (64 psi).

Figure 139

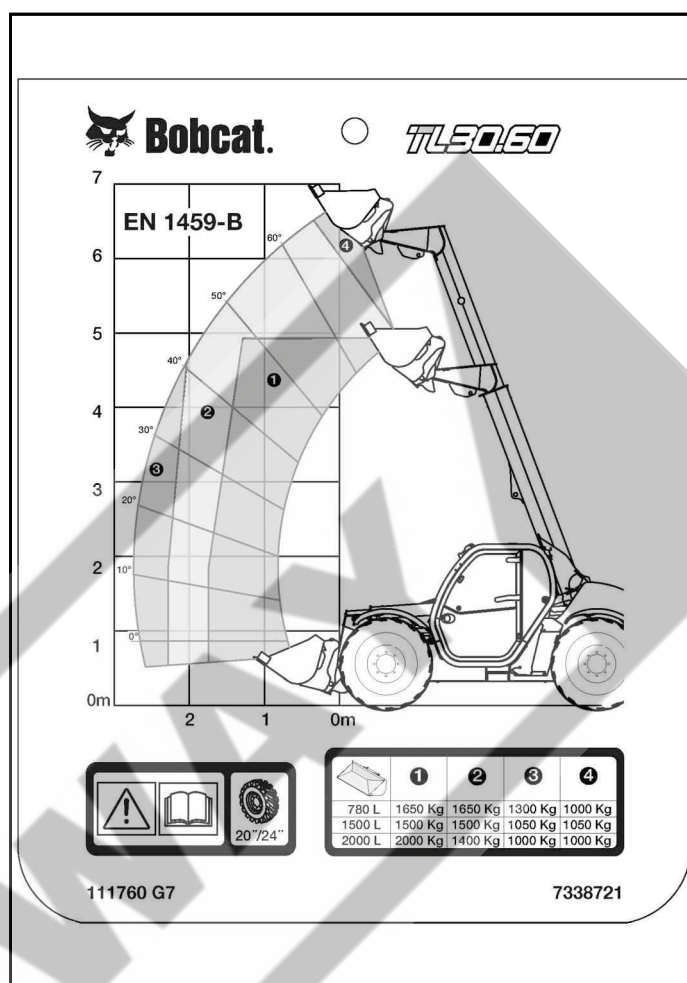
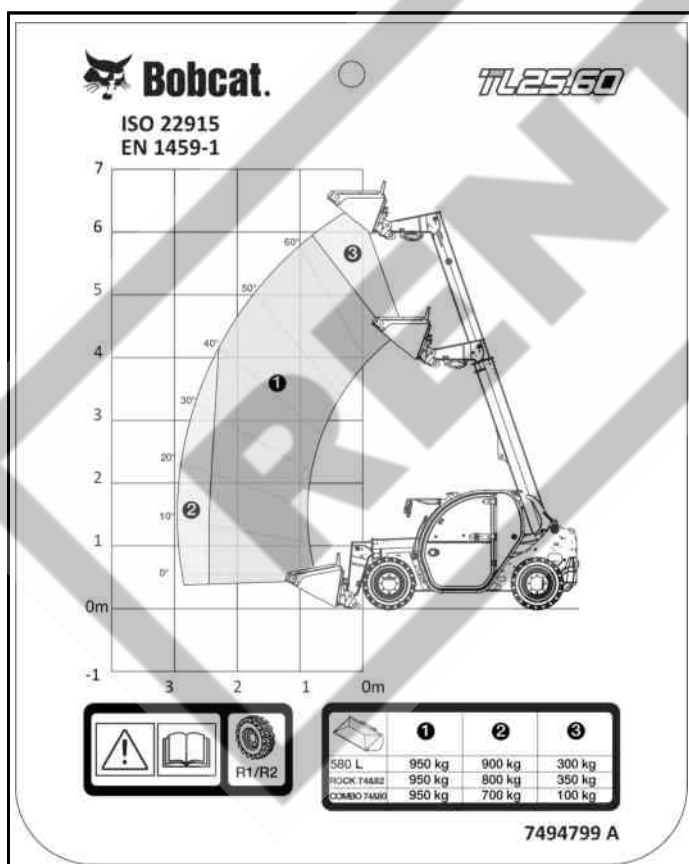


Complies with stability tests of the relevant parts of ISO 22915.

Chart for the machine TL25.60RB equipped with combination, heavy duty digging and rock buckets:

- CAMSO 12-16.5 PR12 SKS 532
 - ▷ With inflation pressure of 550 kPa (5,50 bar) (80 psi).
- CAMSO 14-17,5 PR14 SKS 532
 - ▷ With inflation pressure of 550 kPa (5,50 bar) (80 psi).
- TRELLEBORG 36x14-20 BRAWLER HPS SOLIDFLEX TRACTION
- MICHELIN 300/70 R16,5 137A8/137B BIBSTEEL
 - ▷ With inflation pressure of 500 kPa (5,00 bar) (73 psi).
- ALLIANCE 400/55-17,5 16PR 149A8 A328
 - ▷ With inflation pressure of 400 kPa (4,00 bar) (58 psi).
- MICHELIN 280/80 R18 132A8/132B IND TL XMCL
 - ▷ With inflation pressure of 440 kPa (4,40 bar) (64 psi).
- ALLIANCE 300/75 R18 IND 142A8/142B A580
 - ▷ With inflation pressure of 400 kPa (4,00 bar) (58 psi).
- MICHELIN 280/80 R20 133A8/133B IND TL XMCL
 - ▷ With inflation pressure of 440 kPa (4,40 bar) (64 psi).

Figure 140



Complies with stability tests of the relevant parts of ISO 22915.

Bucket Mass Properties

ATTACHMENT	MASS
Digging Bucket 440 L (16 ft³), Bob-Tach attachment mounting system	241,8 kg (533 lb)
Digging Bucket 580 L (20 ft³), Bob-Tach attachment mounting system	309 kg (681 lb)
Digging Bucket 800 L (28 ft³), Bob-Tach attachment mounting system	316 kg (697 lb)
Digging Bucket 800 L (28 ft³), Quick-Tach	355 kg (783 lb)
Digging Bucket 800 L (28 ft³), Mani-Tach	346 kg (763 lb)
Rock Bucket 1,9 m (74 in), Bob-Tach attachment mounting system	296 kg (873 lb)
Rock Bucket 2,1 m (82 in), Bob-Tach attachment mounting system	318 kg (701 lb)
Light Material Bucket 920 L (32 ft³), 2,2 m (88 in), Bob-Tach attachment mounting system	309 kg (681 lb)
Light Material Bucket 1500 L (53 ft³), 2,1 m (83 in), Quick-Tach	539 kg (1188 lb)
Light Material Bucket 1500 L (53 ft³), 2,1 m (83 in), Bob-Tach attachment mounting system	543 kg (1197 lb)
Snow Bucket 1540 L (54 ft³), 2,5 m (100 in), Bob-Tach attachment mounting system	398 kg (877 lb)
Combination Bucket 380 L (13 ft³), 1,9 m (74 in), Bob-Tach attachment mounting system	433 kg (955 lb)
Combination Bucket 520 L (18 ft³), 2,0 m (80 in), Bob-Tach attachment mounting system	533 kg (1175 lb)

Pallet Fork

Pallet Fork Inspection Before Use

The maximum load to be carried when using a Pallet Fork is shown on a decal located on the attachment serial number plate.

If an attachment is composed of several parts which are equipped with a serial number plate, the maximum load of the attachment will be the lowest one displayed on the serial number plates.

See your Bobcat dealer for more information about Pallet Fork inspection, maintenance and replacement. See your Bobcat dealer for RLC when using a Pallet Fork and for other available attachments.

Pallet Fork Load Charts

WARNING

INSTABILITY HAZARD

Exceeding the rated load capacity can cause the machine to tip or rollover.

Always use and follow the Load Capacity Chart that is specified for each attachment / implement and telescopic handler combination. Each attachment / implement and machine combination will have its own chart. ◀

(See Load Charts on Page 38) for more information on the RLC of the machine equipped with a rigid or floating pallet fork.

NOTE: The maximum load of an attachment can exceed the RLC of the machine.

Pallet Fork Mass Properties

ATTACHMENT	MASS
Floating Pallet Fork, 1,0 m (39 in), Quick-Tach	254 kg (560 lb)
Floating Pallet Fork, 1,0 m (39 in), Mani-Tach	248 kg (546 lb)
Floating Pallet Fork, 1,2 m (48 in), Bob-Tach attachment mounting system	408 kg (899 lb)
Floating Pallet Fork, 1,2 m (48 in), Positioner, Bob-Tach attachment mounting system	356 kg (785 lb)
Floating Pallet Fork, 1,5 m (59 in), Quick-Tach	272 kg (600 lb)
Floating Pallet Fork, 1,5 m (59 in), Mani-Tach	268 kg (591 lb)
Pallet Fork, Severe Duty, Bob-Tach attachment mounting system	228 kg (503 lb)
Rigid Pallet Fork, 2,5 T FEM II, Quick-Tach	258 kg (569 lb)
Rigid Pallet Fork, 2,5 T FEM II, Mani-Tach	239 kg (527 lb)
Rigid Pallet Fork, 2,5 T FEM II, with Side Shift, Quick-Tach	362 kg (798 lb)
Rigid Pallet Fork, with Side Shift, Bob-Tach attachment mounting system	350 kg (772 lb)

Round Bale Spike

Round Bale Spike Load Chart

 WARNING
INSTABILITY HAZARD

Exceeding the rated load capacity can cause the machine to tip or rollover.

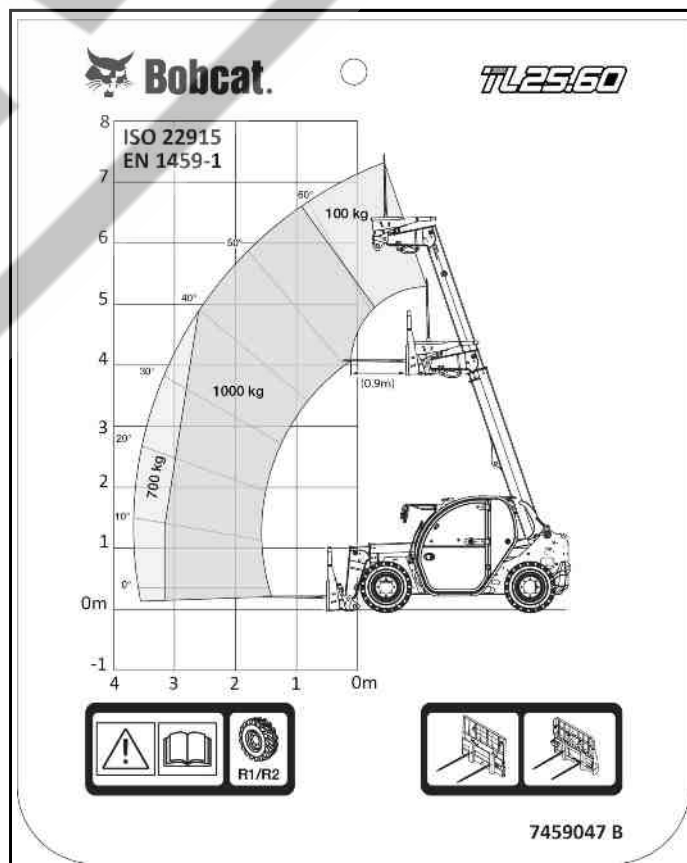
Always use and follow the Load Capacity Chart that is specified for each attachment / implement and telescopic handler combination. Each attachment / implement and machine combination will have its own chart.

NOTE: The maximum load of an attachment can exceed the RLC of the machine.

- CAMSO 12-16.5 PR12 SKS 532
 - With inflation pressure of 550 kPa (5,50 bar) (80 psi).
- CAMSO 14-17,5 PR14 SKS 532
 - With inflation pressure of 550 kPa (5,50 bar) (80 psi).
- TRELLEBORG 36x14-20 BRAWLER HPS SOLIDFLEX TRACTION
- MICHELIN 300/70 R16,5 137A8/137B BIBSTEEL
 - With inflation pressure of 500 kPa (5,00 bar) (73 psi).
- ALLIANCE 400/55-17,5 16PR 149A8 A328
 - With inflation pressure of 400 kPa (4,00 bar) (58 psi).
- MICHELIN 280/80 R18 132A8/132B IND TL XMCL
 - With inflation pressure of 440 kPa (4,40 bar) (64 psi).

- ALLIANCE 300/75 R18 IND 142A8/142B A580
 - With inflation pressure of 400 kPa (4,00 bar) (58 psi).
- MICHELIN 280/80 R20 133A8/133B IND TL XMCL
 - With inflation pressure of 440 kPa (4,40 bar) (64 psi).

Figure 141



Complies with stability tests of the relevant parts of ISO 22915.

Round Bale Spike Mass Properties

ATTACHMENT	MASS
Pallet Fork frame equipped with two round bale spikes, Bob-Tach attachment mounting system	128 kg (282 lb)
Pallet Fork frame equipped with two round bale spikes, Quick-Tach	209 kg (461 lb)

Jib

EC Declaration Of Conformity

Static Test

A static strength test has been successfully performed on the jib using a load coefficient of 1,5.

Jib Inspection Before Use

In addition to the daily inspection of the machine:

- Check if safety decals are in good condition.
 - ▷ Replace if damaged.
- Check the installation of the cotter pins.
 - ▷ Replace if damaged.
- Check if the lifting hook rotates freely.
 - ▷ Lubricate as needed.
- Check if lifting hook safety tab is intact and positions itself correctly.
- Inspect the condition of the lifting hook and shackle.
 - ▷ Replace if worn or damaged.
- Inspect the jib frame for cracks or deformation.
 - ▷ Replace complete jib if damaged.

Jib Load Charts



WARNING

INSTABILITY HAZARD

Exceeding the rated load capacity can cause the machine to tip or rollover.

Always use and follow the Load Capacity Chart that is specified for each attachment / implement and telescopic handler combination. Each attachment / implement and machine combination will have its own chart.

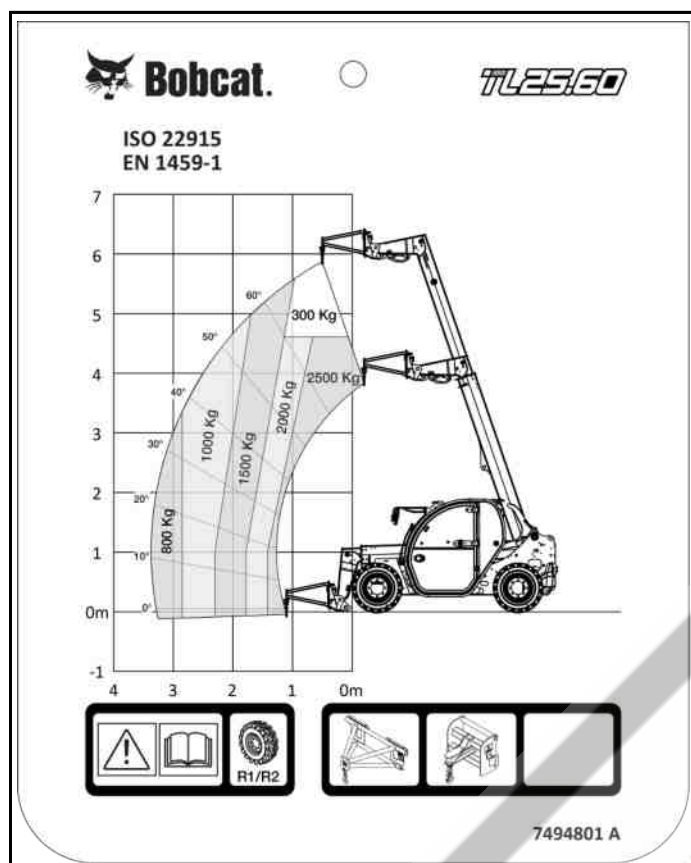
NOTE: The maximum load of an attachment can exceed the RLC of the machine.

Chart for the machine TL25.60RB equipped with short jib:

- CAMSO 12-16.5 PR12 SKS 532

- ▷ With inflation pressure of 550 kPa (5,50 bar) (80 psi).
- CAMSO 14-17,5 PR14 SKS 532
 - ▷ With inflation pressure of 550 kPa (5,50 bar) (80 psi).
- TRELLEBORG 36x14-20 BRAWLER HPS SOLIDFLEX TRACTION
- MICHELIN 300/70 R16,5 137A8/137B BIBSTEEL
 - ▷ With inflation pressure of 500 kPa (5,00 bar) (73 psi).
- ALLIANCE 400/55-17,5 16PR 149A8 A328
 - ▷ With inflation pressure of 400 kPa (4,00 bar) (58 psi).
- MICHELIN 280/80 R18 132A8/132B IND TL XMCL
 - ▷ With inflation pressure of 440 kPa (4,40 bar) (64 psi).
- ALLIANCE 300/75 R18 IND 142A8/142B A580
 - ▷ With inflation pressure of 400 kPa (4,00 bar) (58 psi).
- MICHELIN 280/80 R20 133A8/133B IND TL XMCL
 - ▷ With inflation pressure of 440 kPa (4,40 bar) (64 psi).

Figure 142



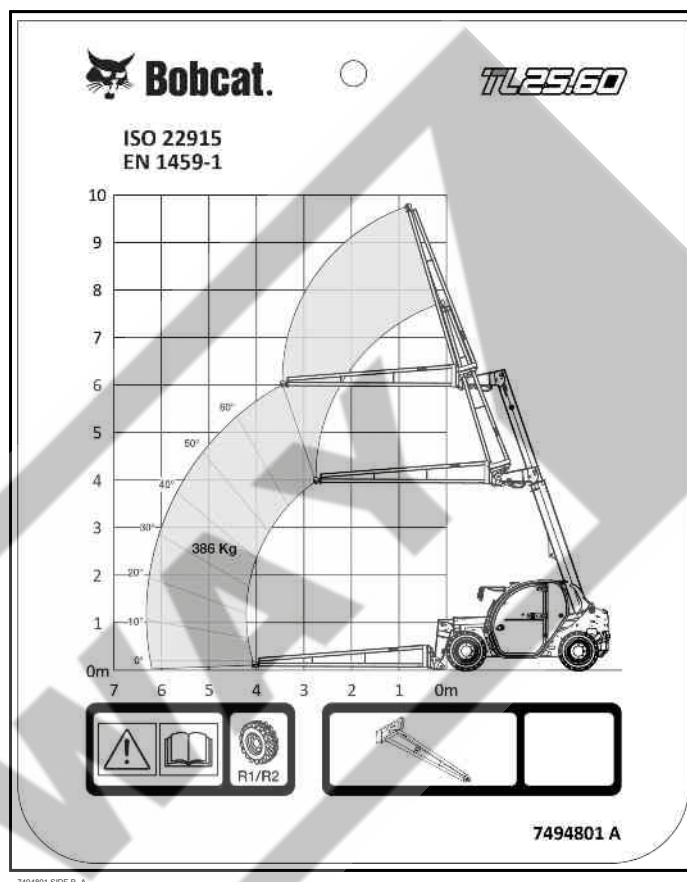
Complies with stability tests of the relevant parts of ISO 22915.

Chart for the machine TL25.60RB equipped with long jib:

- CAMSO 12-16.5 PR12 SKS 532
 - ▷ With inflation pressure of 550 kPa (5,50 bar) (80 psi).
- CAMSO 14-17,5 PR14 SKS 532
 - ▷ With inflation pressure of 550 kPa (5,50 bar) (80 psi).
- TRELLEBORG 36x14-20 BRAWLER HPS SOLIDFLEX TRACTION
- MICHELIN 300/70 R16,5 137A8/137B BIBSTEEL
 - ▷ With inflation pressure of 500 kPa (5,00 bar) (73 psi).
- ALLIANCE 400/55-17,5 16PR 149A8 A328
 - ▷ With inflation pressure of 400 kPa (4,00 bar) (58 psi).
- MICHELIN 280/80 R18 132A8/132B IND TL XMCL
 - ▷ With inflation pressure of 440 kPa (4,40 bar) (64 psi).
- ALLIANCE 300/75 R18 IND 142A8/142B A580
 - ▷ With inflation pressure of 400 kPa (4,00 bar) (58 psi).
- MICHELIN 280/80 R20 133A8/133B IND TL XMCL

- ▷ With inflation pressure of 440 kPa (4,40 bar) (64 psi).

Figure 143



Jib Mass Properties

ATTACHMENT	MASS
Jib 0,7 m (28 in), Bob-Tach attachment mounting system [A]	67 kg (148 lb)
Jib 0,7 m (28 in), Quick-Tach [A]	177 kg (390 lb)
Jib 0,7 m (28 in), Mani-Tach [A]	153 kg (337 lb)
Jib 3,7 m (146 in), Bob-Tach attachment mounting system	253 kg (558 kg)

[A] Load must be carried with the attachment (shackle pin) in a horizontal position.

Suspended Loads

Suspended loads have a dynamic and therefore unpredictable effect on the machine's stability. External working conditions such as the wind speed increase the dynamic and unpredictable effect. Follow the procedure below when operating a suspended load.

The lifting device is intended to handle vertical pull loads. With the jib, do not carry out horizontal pull and side-pull.

Carry or place special loads with the lifting device or attachment intended for this type of use.

If the suspended load or the resulting boom geometry block the visibility, alternative carrying means must be considered.

The operator must know the wind speed. Do not use the machine with wind speeds over 12,5 m/s (28 mph).

Contact your Bobcat dealer for details on applications.

Load Handling

WARNING

INSTABILITY HAZARD

Machine tipping or rollover can cause serious injury or death.

- **Do not overload the machine.**
- **DO NOT exceed ROC see decal in cab.**
- **Always use and follow the ROC chart provided.**
- **Each machine has its own chart.**

Do not carry or place roof trusses with the jib.

Do not carry hot or corrosive products.

When using a jib with a load suspended from the hook:

- Check that the jib is properly attached and locked to the attachment carrier.
- Do not operate the machine while people are under the suspended load.
- Operate on firm ground.
- Always keep lifting hook vertically aligned above the gravity centre of the load.

- Move the lifting hook and machine slowly. During picking, loading and unloading, avoid jerky movements and load oscillations.
- Move the machine with boom fully retracted and load as close as possible to the ground (transport position).
- Never shock or abruptly place loads.
- When stationary, ensure that the machine is level.

During Travelling

- Move the machine with boom fully retracted and load as close as possible to the ground (transport position). The load should not be suspended higher than 500 mm (20 in) above the ground when travelling.
- The machine should travel at speeds appropriate to the ground and load conditions, or not greater than 0,4 m/s (0.9 mph) when carrying suspended loads.
- Do not use any controls to reposition the load. Come to a gradual and complete stop before attempting to reposition the load.
- Avoid crossing, climbing or descending inclines when travelling with a suspended load.
- During starting, travelling, turning and stopping, avoid jerky movements and load oscillations.
- When travelling, the lateral and longitudinal attitude must be horizontal.

Picking Up A Load From The Ground

1. Fully retract and lower the boom and move the machine as close as possible to the load.
2. Position the lifting hook vertically aligned above the load and lower it slowly as close as possible to the lifting point of the load.
3. Put the Travel Direction Control into NEUTRAL and make sure the parking brake is engaged.
4. Turn off the engine and remove the ignition key. Exit the cab. Install the lifting hook to the lifting point of the load. Check that the lifting gear is hanging freely and is not twisted or knotted. Always turn off the engine to avoid involuntary hazardous movements,

mainly when a second operator is present to install the load.

5. Go back to operating position in the cab and start the engine.
6. Slightly lift the load from the ground by raising the boom. The machine is then in the transport position.

In case of travelling with the suspended load:

- If applicable, turn off the engine and remove the ignition key. Exit the cab.
- Install the additional lifting device (wire, cable) to secure the load to the machine lifting or towing points. It will reduce the load movement during the travel.

Placing A Raised Load

1. With the machine in transport position, move the machine as close as possible to the base of the area where to place the load.
2. Park the machine on level ground.
3. Put the Travel Direction Control into NEUTRAL and make sure the parking brake is engaged.
4. In case of travelling with the suspended load:
 - Turn off the engine and remove the ignition key. Exit the cab.
 - Remove the additional lifting device (wire, cable) to secure the load to the machine lifting or towing points.
 - Go back to operating position in the cab and start the engine.
5. Raise and extend the boom to move the load above the area where to place the load.
6. Position the load horizontally and place it on the area by lowering and retracting the boom.
7. Turn off the engine and remove the ignition key. Exit the cab.
8. Remove the lifting hook from the lifting point of the load. Always turn off the engine to avoid involuntary hazardous movements; mainly when a second operator is present to install the lifting hook to the lifting point of the load.
9. Return the boom to the transport position by raising, retracting and lowering it.

Picking Up A Raised Load

NOTE: Do not carry hot or corrosive products.

1. Fully retracted and lower the boom. Move the machine as close as possible to the load.
2. Park the machine on level ground.

3. Put the Travel Direction Control into NEUTRAL and make sure the parking brake is engaged.
4. Raise and extend the boom to position the lifting hook vertically aligned above the load and lower it slowly as close as possible to the lifting point of the load.
5. Turn off the engine and remove the ignition key. Exit the cab.
6. Install the lifting hook to the lifting point of the load. Check that the lifting gear is hanging freely and is not twisted or knotted. Always turn off the engine to avoid involuntary hazardous movements, mainly when a second operator is present to install the load.
7. Slightly lift the load by raising the boom.
8. Bring the load to transport position by fully retracting the boom and lowering the load as close as possible to the ground.

Installing And Removing Attachments (Manual Bob-Tach System)

WARNING

MODIFICATION HAZARD

Unapproved attachments / implements can cause serious injury or death.

Never use attachments / implements or buckets which are not approved by Bobcat. Buckets and attachments / implements for safe loads of specified densities are approved for each model. Read and understand the Load Capacity Charts for the attachment / implement you are using. ◀

W-2392

Warranty is void if non-approved attachments are used on the Telescopic Handler.

The dealer can identify, for each model Telescopic Handler, the attachments and buckets approved by Bobcat. The buckets and attachments are approved for Rated Load Capacity and for secure fastening to the Telescopic Handler. Contact your Bobcat dealer for more information if your attachment is not illustrated in your machine's Load Capacity Charts.

Installing And Removing The Attachment (manual Bob-Tach)

WARNING

GENERAL HAZARD

Failure to follow instructions can cause serious injury or death.

Before you leave the operator's position:

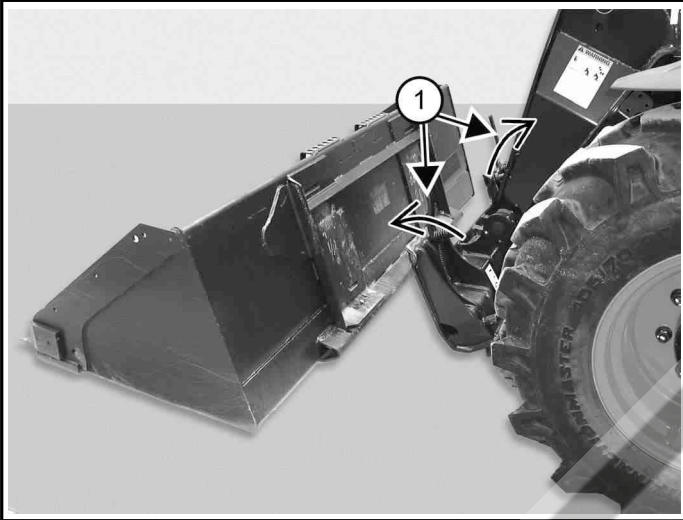
- Put the Travel Direction Control and the Joystick in neutral.
- Engage the parking brake.
- Retract and lower the boom and attachment / implement flat on the ground.
- Stop the engine. ◀

W-2907

The Bob-Tach attachment mounting system is used for fast changing of buckets and attachments. See the appropriate Attachment Operation & Maintenance Manual to install other attachments.

Installing The Attachment

Figure 144



P126597a

1. Pull the Bob-Tach attachment mounting system levers (Item 1) [Figure 144] all the way up.
2. Enter the Telescopic Handler and perform the pre-starting procedure. (See Pre-starting Procedure on Page 86)
3. Lower the boom and tilt the Bob-Tach attachment mounting system attachment frame forward.

Figure 145

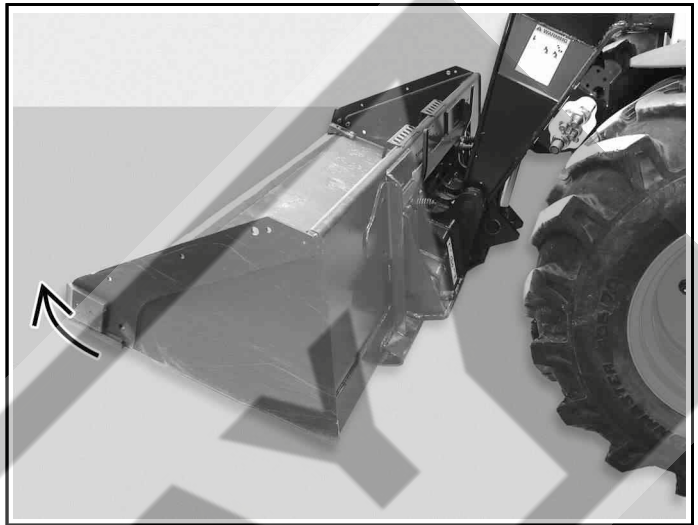


P126598a

4. Drive forward until the top edge of the Bob-Tach attachment mounting system is completely under the top flange of the bucket [Figure 145] (or other attachment).

NOTE: Make sure the Bob-Tach attachment mounting system levers do not hit the bucket (or other attachment).

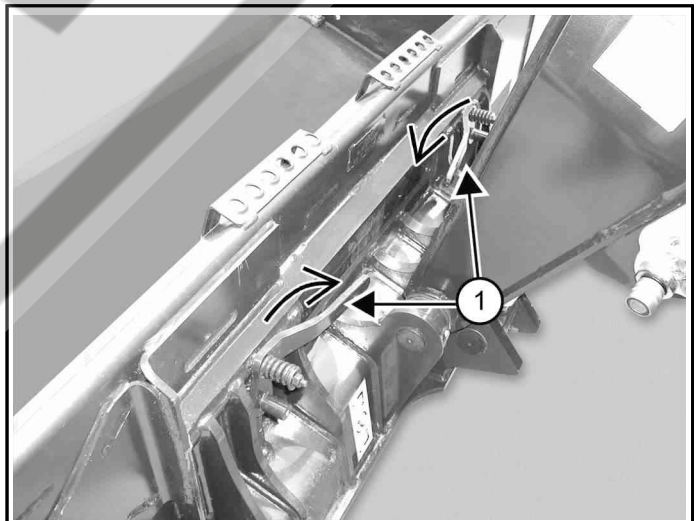
Figure 146



P126600a

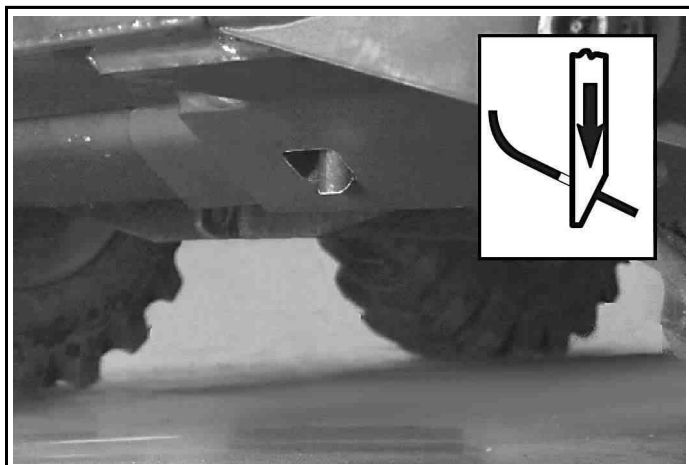
5. Tilt the Bob-Tach attachment mounting system backward until the cutting edge of the bucket (or other attachment) is slightly off the ground [Figure 146].
6. Stop the engine and exit the cab.

Figure 147



P126601a

Figure 148



7. Push down on the Bob-Tach attachment mounting system levers (Item 1) [Figure 147] until they are fully engaged in the locked position (wedges fully extended).

The wedges must extend through the holes in the mounting frame of the bucket (or attachment) [Figure 148], securely fastening the bucket to the Bob-Tach.

⚠ WARNING

CRUSHING HAZARD

Failure to secure Bob-Tach attachment mounting system wedges can allow attachment to come off and cause serious injury or death. Both wedges must extend through the holes in the attachment mounting frame. Lever(s) must be fully down and locked.

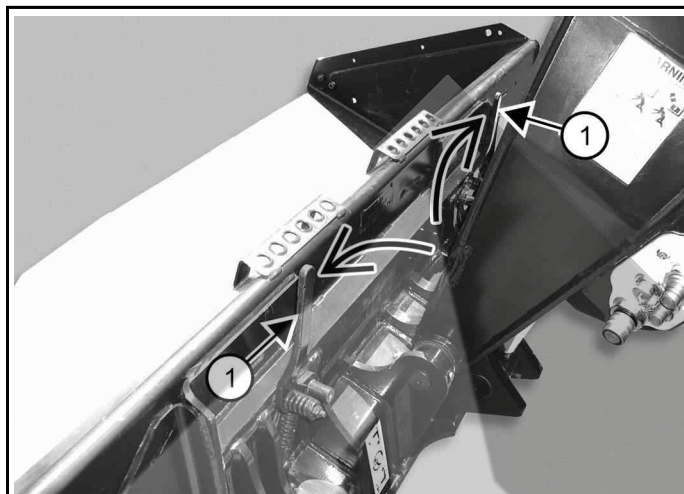
8. If the attachment is hydraulically controlled (i.e. sweeper, auger) connect the hydraulic hoses of the attachment to the Telescopic Handler.

(See Auxiliary Hydraulic Release on Page 79)

Removing The Attachment

9. Enter the Telescopic Handler and perform the pre-starting procedure.
- (See Pre-starting Procedure on Page 86)
10. Lower the boom and put the attachment flat on the ground. Lower or close the hydraulic equipment.
11. Stop the engine and exit the cab.
12. If the attachment is hydraulic and / or electrically controlled (i.e. sweeper, auger) relieve hydraulic pressure in the auxiliary circuit.
- (See Auxiliary Hydraulic Release on Page 79)
- Disconnect the hydraulic hoses and / or electrical connector.

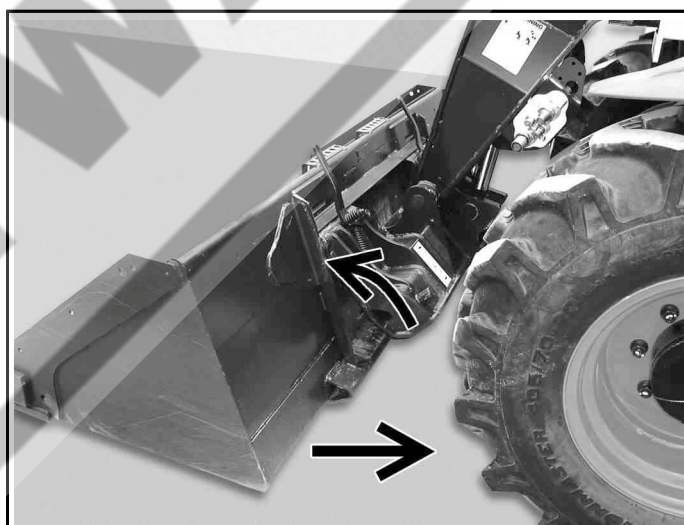
Figure 149



13. Pull both Bob-Tach attachment mounting system levers (Item 1) [Figure 149] all the way up.
14. Enter the Telescopic Handler and perform the pre-starting procedure.

(See Pre-starting Procedure on Page 86)

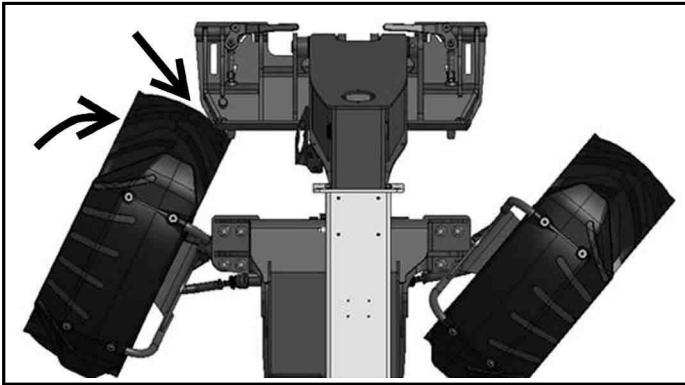
Figure 150



15. Tilt the Bob-Tach attachment mounting system forward.
16. Move backward, away from the bucket or attachment [Figure 150].

NOTE: In muddy conditions or to prevent the attachment from freezing to the ground, put the attachment on planks or blocks before removing it from the machine.

Figure 151



Do not tilt the Bob-Tach attachment mounting system fully forward. With the Bob-Tach attachment mounting system tilted fully forward, the boom fully lowered and retracted and the tyres turned fully to the left or right, the tyre can contact the Bob-Tach attachment mounting system and cause damage [Figure 151]. Always tilt the Bob-Tach attachment mounting system back fully before operating the Telescopic Handler when no attachment is installed.

⚠ IMPORTANT

MACHINE DAMAGE HAZARD

Failure to follow directions may result in machine damage.

The tyres can contact the Bob-Tach attachment mounting system and cause damage when the Bob-Tach attachment mounting system is tilted fully forward, the boom is fully lowered and retracted and the tyres are turned to the left or right.

Installing And Removing Attachments (Power Bob-Tach System)

⚠ WARNING

MODIFICATION HAZARD

Unapproved attachments / implements can cause serious injury or death.

Never use attachments / implements or buckets which are not approved by Bobcat. Buckets and attachments / implements for safe loads of specified densities are approved for each model. Read and understand the Load Capacity Charts for the attachment / implement you are using.

Follow the procedure below if this machine is equipped with the option for hydraulic locking of attachments.

Warranty is void if non-approved attachments are used on the Telescopic Handler.

The dealer can identify, for each model Telescopic Handler, the attachments and buckets approved by Bobcat. The buckets and attachments are approved for Rated Load Capacity and for secure fastening to the Telescopic Handler. Contact your Bobcat dealer for more

information if your attachment is not illustrated on your machine's Load Capacity Charts.

Installing And Removing The Attachment (Power Bob-Tach)

⚠ WARNING

GENERAL HAZARD

Failure to follow instructions can cause serious injury or death.

Before you leave the operator's position:

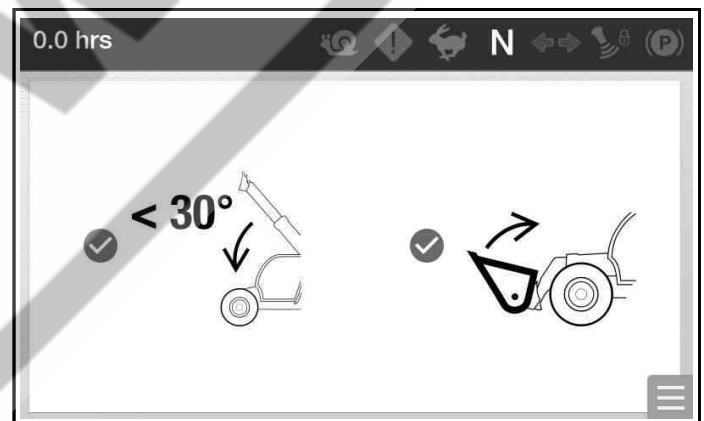
- Put the Travel Direction Control and the Joystick in neutral.
- Engage the parking brake.
- Retract and lower the boom and attachment / implement flat on the ground.
- Stop the engine.

The Bob-Tach attachment mounting system is used for fast changing of buckets and attachments. See the appropriate Attachment Operation & Maintenance Manual to install other attachments.

Installing The Attachment

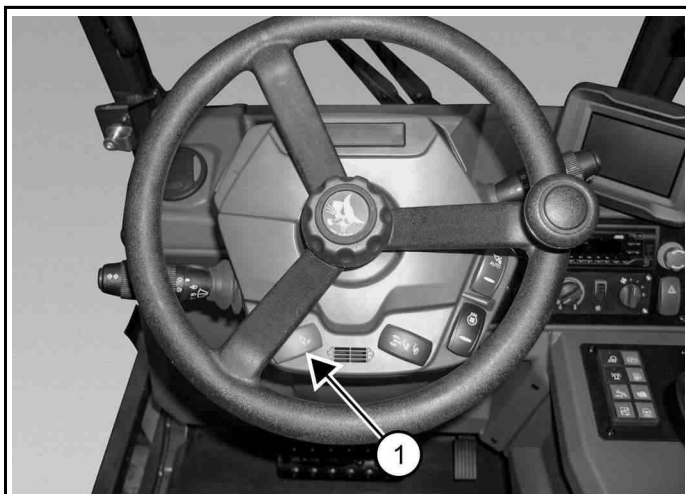
1. Enter the Telescopic Handler and perform the pre-starting procedure.
(See Pre-starting Procedure on Page 86)

Figure 152



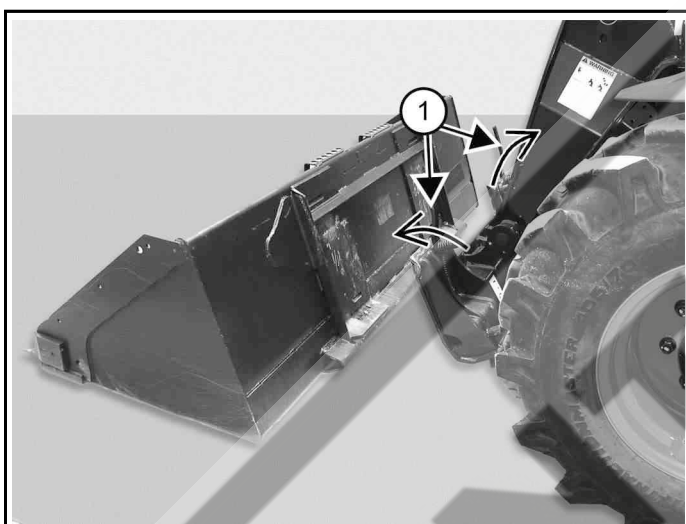
2. Follow the instructions shown on the display screen [Figure 160] to ensure the installation procedure is followed correctly.
3. Tilt the Bob-Tach attachment mounting system fully backward.

Figure 153



C211799f

Figure 154



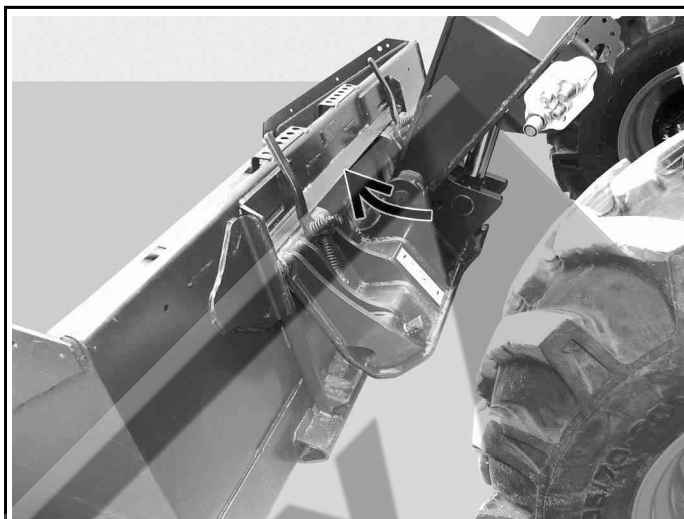
P126597a

4. Push and hold the bottom of the hydraulic attachment lock switch (Item 1) [Figure 153] to unlock the Bob-Tach attachment mounting system [Figure 154] wedges.

NOTE: Unlocking the Bob-Tach attachment mounting system will make the alarm sound, and the attachment unlocked symbol will show on the display screen.

5. Lower the boom and tilt the Bob-Tach attachment mounting system attachment frame forward.

Figure 155



P126599a

6. Drive forward until the top edge of the Bob-Tach attachment mounting system is completely under the top flange of the bucket [Figure 155] (or other attachment).

NOTE: Make sure the Bob-Tach attachment mounting system levers do not hit the bucket (or other attachment).

Figure 156

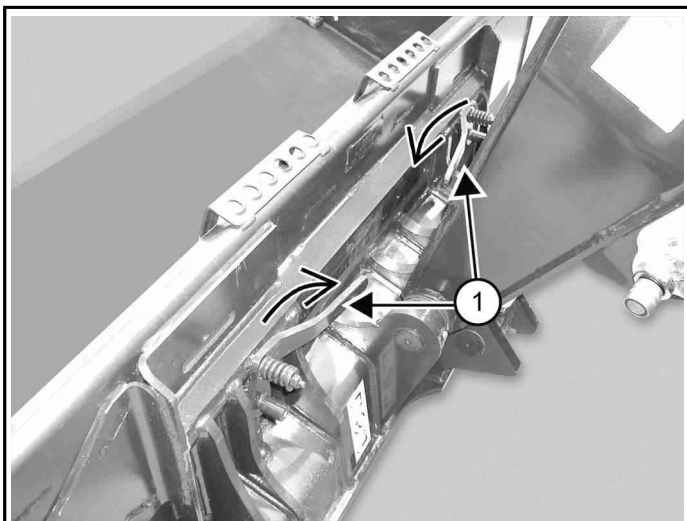


P126600a

7. Tilt the Bob-Tach attachment mounting system backward until the cutting edge of the bucket (or other attachment) is slightly off the ground [Figure 156].

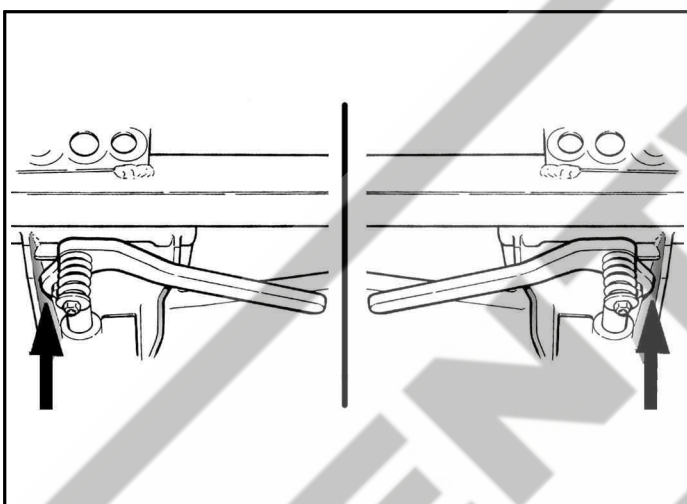
This procedure will cause the attachment mounting frame to fit up against the front of the Bob-Tach attachment mounting system frame.

Figure 157



8. Press the top of the hydraulic attachment lock switch (Item 1) [Figure 153] to lock the Bob-Tach attachment mounting system [Figure 157].

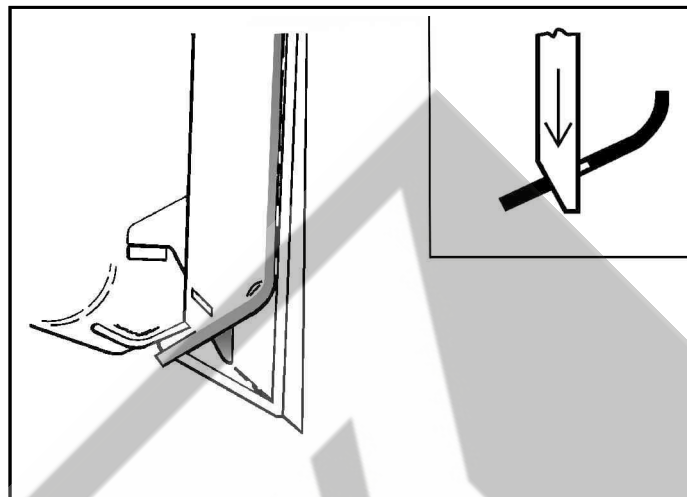
Figure 158



9. Both levers must contact the frame as shown when locked [Figure 158].

If both levers do not engage in the locked position, see your Bobcat dealer for maintenance.

Figure 159



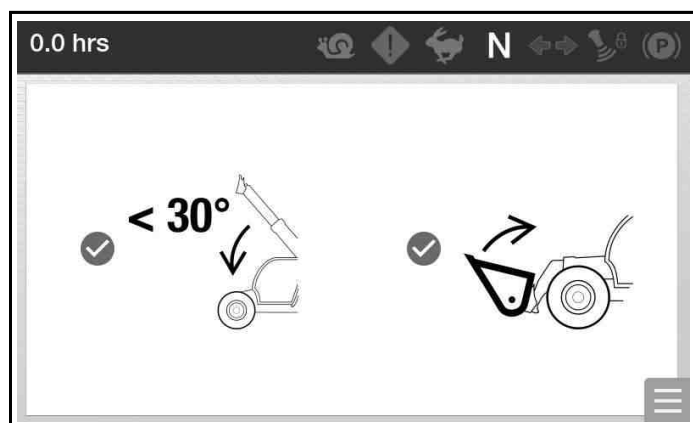
10. Make sure that the wedges extend through the holes in the mounting frame of the attachment, securely fastening the attachment to the Bob-Tach attachment mounting system frame [Figure 159].
11. If the attachment is hydraulically controlled (i.e. sweeper, auger) connect the hydraulic hoses of the attachment to the Telescopic Handler. (See Auxiliary Hydraulic Release on Page 79)

Removing The Attachment

12. Enter the Telescopic Handler and perform the pre-starting procedure. (See Pre-starting Procedure on Page 86)
13. Lower the boom and put the attachment flat on the ground. Lower or close the hydraulic equipment.

NOTE: In muddy conditions or to prevent the attachment from freezing to the ground, put the attachment on planks or blocks before removing it from the machine.
14. Put the Travel Direction Control in neutral. (See Travel Direction on Page 42)
15. Make sure the parking brake is engaged. (See Parking Brake on Page 67)
16. Stop the engine and exit the machine. (See Stopping The Engine And Leaving The Machine on Page 92)
17. If the attachment is hydraulic and / or electrically controlled (i.e. sweeper, auger) relieve hydraulic pressure in the auxiliary circuit. (See Auxiliary Hydraulic Release on Page 79) Disconnect the hydraulic hoses and / or electrical connector.
18. Enter the machine and perform the pre-starting procedure. (See Pre-starting Procedure on Page 86)
19. Start the engine. (See Starting the Engine on Page 89)

Figure 160



20. Follow the instructions shown on the display screen [Figure 160] to ensure the installation procedure is followed correctly.
21. Tilt the Bob-Tach attachment mounting system fully backward.

Figure 161

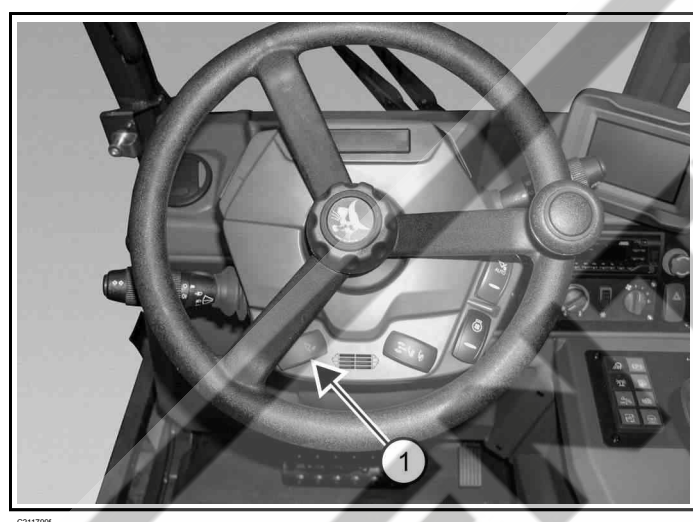
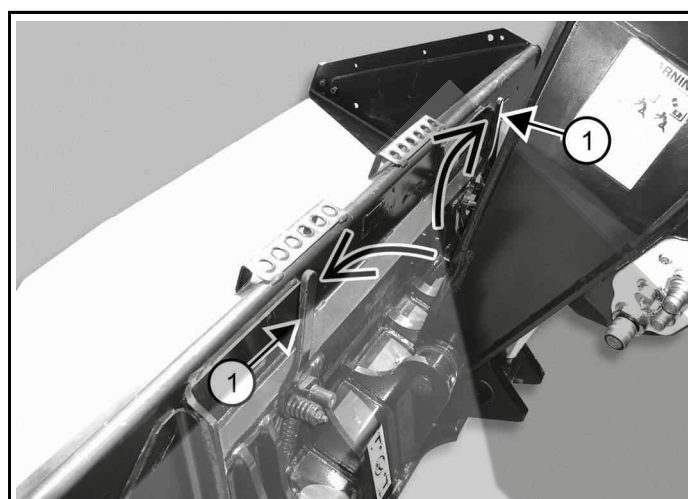
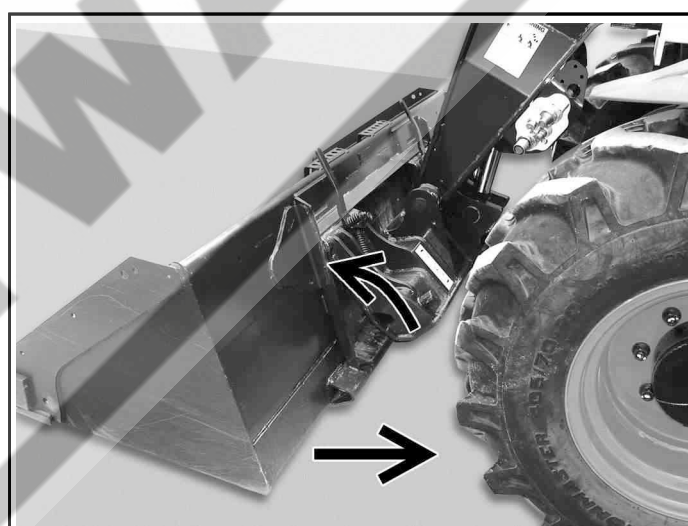


Figure 162



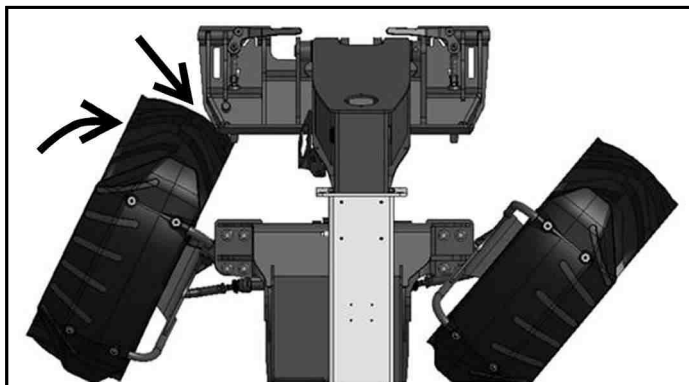
22. Push and hold the bottom of the hydraulic attachment lock switch (Item 1) [Figure 161] to unlock the Bob-Tach attachment mounting system [Figure 162].

Figure 163



23. Lower the boom and tilt the Bob-Tach attachment mounting system forward.
 24. Move backward, away from the bucket or attachment [Figure 163].
- NOTE:** In muddy conditions or to prevent the attachment from freezing to the ground, put the attachment on planks or blocks before removing it from the machine.
25. Press the top of the hydraulic attachment lock switch (Item 1) to extend the locking pins.

Figure 164



Do not tilt the Bob-Tach attachment mounting system fully forward. With the Bob-Tach attachment mounting system tilted fully forward, the boom fully lowered and retracted and the tyres turned fully to the left or right, the tyre can contact the Bob-Tach attachment mounting system and cause damage [Figure 164]. Always tilt the Bob-Tach attachment mounting system back fully before operating the Telescopic Handler when no attachment is installed.

⚠ IMPORTANT

MACHINE DAMAGE HAZARD

Failure to follow directions may result in machine damage.

The tyres can contact the Bob-Tach attachment mounting system and cause damage when the Bob-Tach attachment mounting system is tilted fully forward, the boom is fully lowered and retracted and the tyres are turned to the left or right. ◀

Installing And Removing Attachments (Manual Quick-Tach Or Mani-Tach System)

⚠ WARNING

MODIFICATION HAZARD

Unapproved attachments / implements can cause serious injury or death.

Never use attachments / implements or buckets which are not approved by Bobcat. Buckets and attachments / implements for safe loads of specified densities are approved for each model. Read and understand the Load Capacity Charts for the attachment / implement you are using. ◀

Warranty is void if non-approved attachments are used on the machine.

The dealer can identify the attachments and buckets approved by Bobcat. The buckets and attachments are approved for Rated Load Capacity and for secure fastening to the Telescopic Handler. Contact your Bobcat dealer for more information if your attachment is not illustrated in your machine's Load Capacity Charts.

Installing Attachments (Manual Quick-Tach System Or Mani-Tach System)

⚠ WARNING

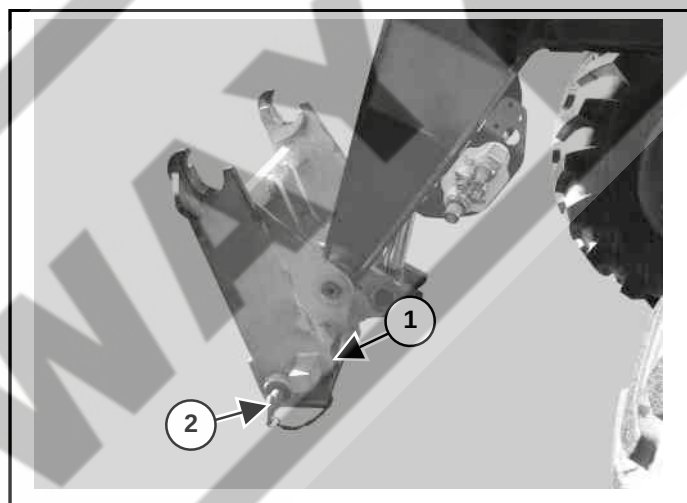
GENERAL HAZARD

Failure to follow instructions can cause serious injury or death.

Before you leave the operator's position:

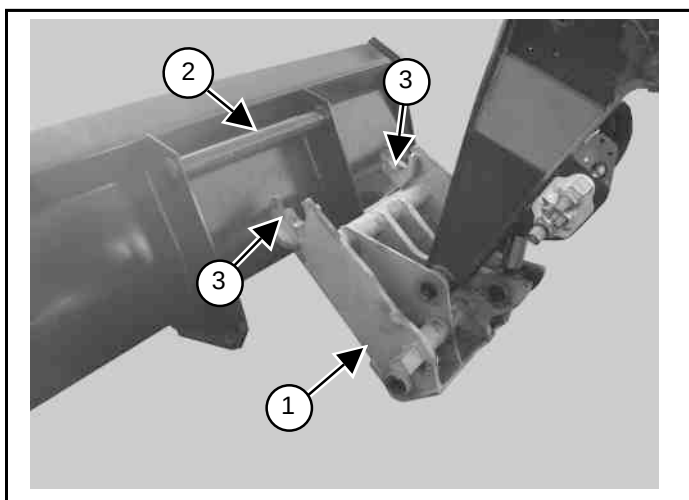
- Put the Travel Direction Control and the Joystick in neutral.
- Engage the parking brake.
- Retract and lower the boom and attachment / implement flat on the ground.
- Stop the engine. ◀

Figure 165



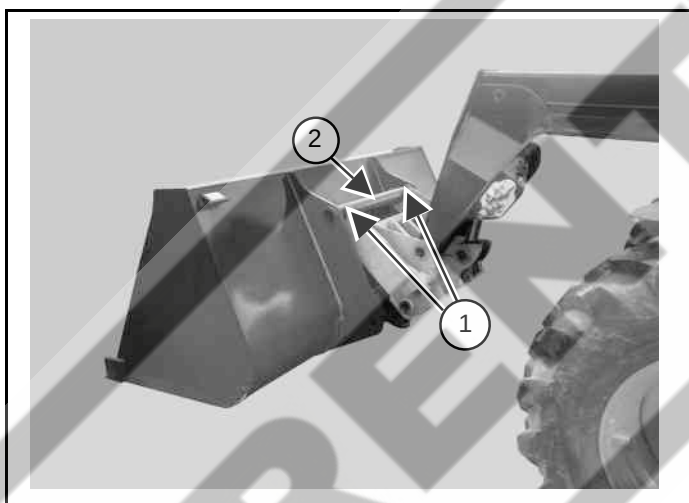
1. Remove the locking bar safety pin (Item 1), and remove the locking bar (Item 2) [Figure 165] from the attachment carrier.
2. Enter the machine and perform the pre-starting procedure. (See Pre-starting Procedure on Page 86)
3. Start the engine. (See Starting the Engine on Page 89)
4. Lower and retract the boom.

Figure 166



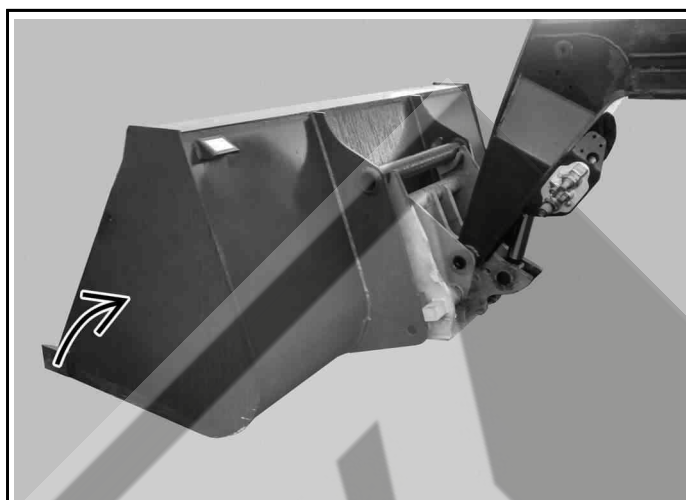
5. Position the machine so that the attachment carrier (Item 1) is parallel to the attachment tube (Item 2) [Figure 166]. Drive the machine forward until the attachment carrier is at a distance of about 1 m (3 ft) from the attachment.
6. Tilt the attachment carrier (Item 1) forward until the two hooks (Item 3) are lower than the attachment tube (Item 2) [Figure 166].

Figure 167



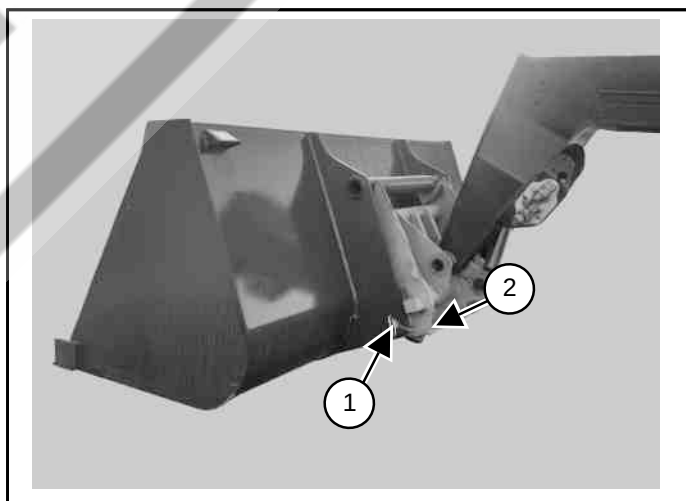
7. Drive forward until the two hooks (Item 1) are right below the attachment tube (Item 2) [Figure 167].
8. Engage the attachment tube (Item 2) in the two hooks (Item 1) [Figure 167] by raising the boom; tilt the attachment carrier backward if necessary.

Figure 168



9. When the attachment tube is properly engaged in the two hooks and the attachment is no longer touching the ground, tilt the attachment carrier fully backward [Figure 168].
10. Put the Travel Direction Control in neutral. (See Travel Direction on Page 42)
11. Make sure the parking brake is engaged. (See Parking Brake on Page 67)
12. Stop the engine and exit the machine. (See Stopping The Engine And Leaving The Machine on Page 92)

Figure 169



13. Fully insert the locking bar (Item 1) through the holes in the attachment and the attachment carrier. Install the safety pin (Item 2) [Figure 169] into the locking bar.
14. Make sure the locking bar (Item 1) [Figure 169] extends through the holes on both sides of the attachment and the attachment carrier. Make sure the attachment is securely fastened.

15. Install attachment electrical harness and hydraulic lines, if applicable, on the machine and the attachment carrier.

Removing Attachments (Manual Quick-Tach Or Mani-Tach System)

⚠ WARNING

GENERAL HAZARD

Failure to follow instructions can cause serious injury or death.

Before you leave the operator's position:

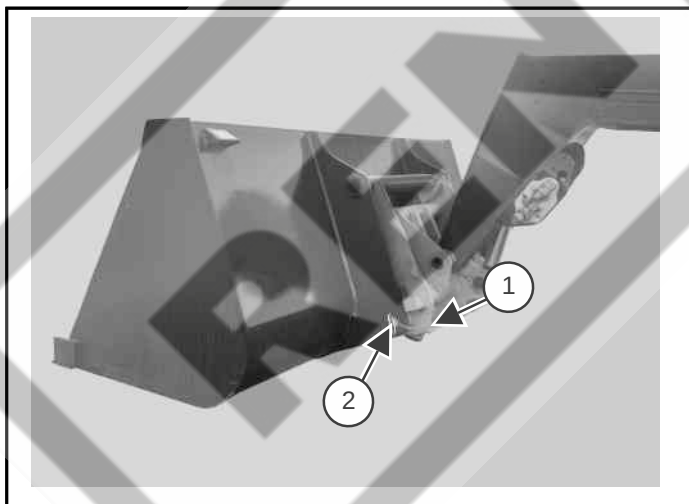
- Put the Travel Direction Control and the Joystick in neutral.
- Engage the parking brake.
- Retract and lower the boom and attachment / implement flat on the ground.
- Stop the engine.

1. Lower the boom and put the attachment flat on the ground.

In muddy conditions or to prevent the attachment from freezing to the ground, put the attachment on planks or blocks before removing it from the machine.

2. Put the Travel Direction Control in neutral. (See Travel Direction on Page 42)
3. Make sure the parking brake is engaged. (See Parking Brake on Page 67)
4. Stop the engine and exit the machine. (See Stopping The Engine And Leaving The Machine on Page 92)

Figure 170



5. Disconnect attachment electrical harness and hydraulic lines, if applicable, from the machine. Remove the safety pin (Item 1), and remove the locking bar (Item 2) [Figure 170].
6. Enter the machine and perform the pre-starting procedure. (See Pre-starting Procedure on Page 86)

7. Start the engine. (See Starting the Engine on Page 89)
8. Tilt the attachment carrier forward until the attachment tube is disengaged. Move the machine backward away from the attachment.
9. Put the Travel Direction Control in neutral. (See Travel Direction on Page 42)
10. Make sure the parking brake is engaged. (See Parking Brake on Page 67)
11. Stop the engine and exit the machine. (See Stopping The Engine And Leaving The Machine on Page 92)

Figure 171



12. Fully insert the locking bar (Item 1) into the holes in the attachment carrier. Install the safety pin (Item 2) [Figure 171] into the locking bar.

Installing And Removing Attachments (Power Quick-Tach Or Mani-Tach System)

⚠ WARNING

MODIFICATION HAZARD

Unapproved attachments / implements can cause serious injury or death.

Never use attachments / implements or buckets which are not approved by Bobcat. Buckets and attachments / implements for safe loads of specified densities are approved for each model. Read and understand the Load Capacity Charts for the attachment / implement you are using.

Follow the procedure below if this machine is equipped with the option for hydraulic locking of attachments.

Warranty is void if non-approved attachments are used on the .

The dealer can identify, for each model , the attachments and buckets approved by Bobcat. The buckets and attachments are approved for Rated Load Capacity and

for secure fastening to the . Contact your Bobcat dealer for more information if your attachment is not illustrated on your machine's Load Capacity Charts.

Installing Attachments (Power Quick-Tach Or Mani-Tach System)

⚠ WARNING

GENERAL HAZARD

Failure to follow instructions can cause serious injury or death.

Before you leave the operator's position:

- Put the Travel Direction Control and the Joystick in neutral.
- Engage the parking brake.
- Retract and lower the boom and attachment / implement flat on the ground.
- Stop the engine. ◀

W-2907

⚠ WARNING

CRUSHING HAZARD

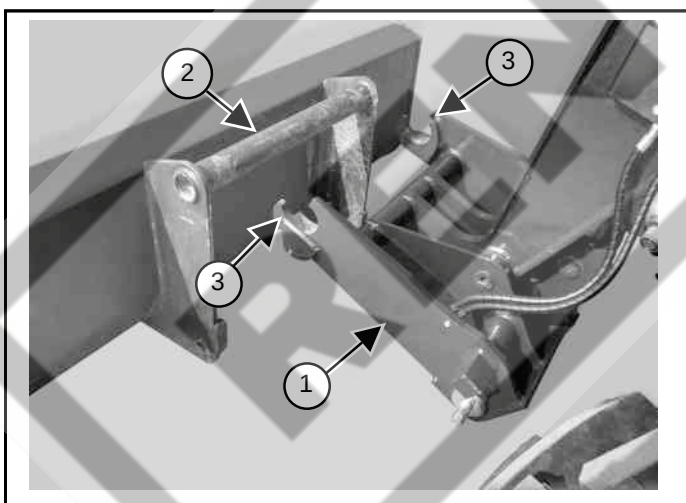
Failure to fully engage locking pins can allow attachment to come off and cause serious injury or death.

Locking pins must extend through the attachment mounting frame holes. ◀

W-2913

1. Enter the machine and perform the pre-starting procedure. (See Pre-starting Procedure on Page 86)
2. Start the engine. (See Starting the Engine on Page 89)
3. Lower and retract the boom.

Figure 172

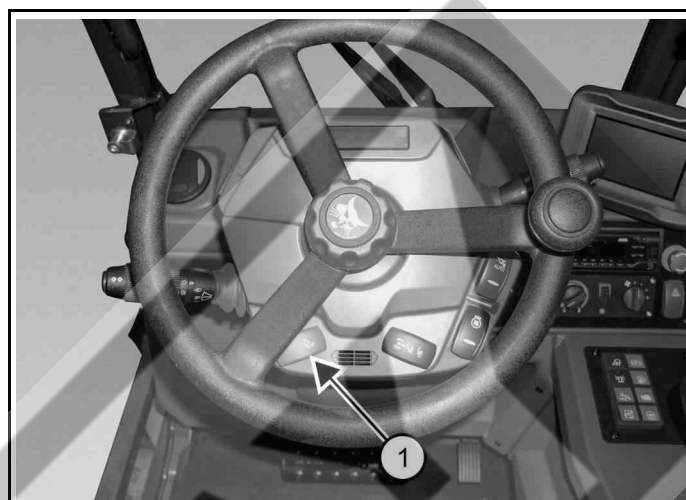


P119749a

4. Position the machine so that the attachment carrier (Item 1) is parallel to the attachment tube (Item 2) [Figure 172]. Drive the machine forward until the attachment carrier is at a distance of about 1 m (3 ft) from the attachment.

5. Tilt the attachment carrier (Item 1) forward until the two hooks (Item 3) are lower than the attachment tube (Item 2) [Figure 172].

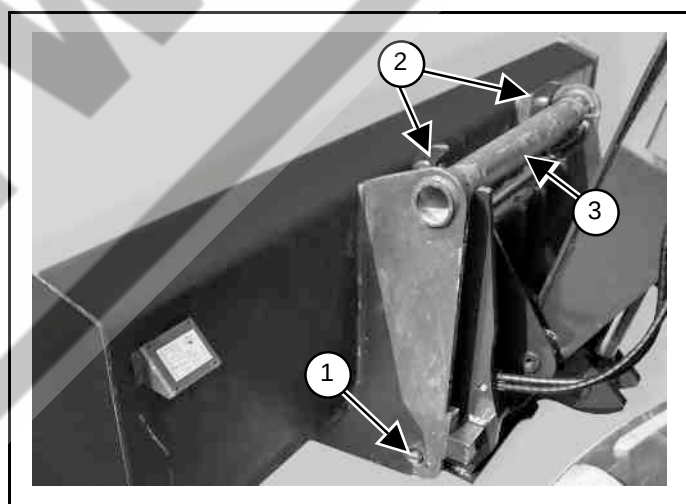
Figure 173



C211799f

6. Push and hold the bottom of the hydraulic attachment lock switch (Item 1) [Figure 173] to retract the locking pins (Item 1) [Figure 174] on the attachment carrier.

Figure 174



P119750a

7. Drive forward until the two hooks (Item 2) are right below the attachment tube (Item 3) [Figure 174].
8. Engage the attachment tube (Item 3) in the two hooks (Item 2) [Figure 174] by raising the boom; tilt the attachment carrier backward if necessary.
9. When the attachment tube (Item 3) is properly engaged in the two hooks (Item 2) [Figure 174] and the attachment is no longer touching the ground, tilt the attachment carrier fully backward.
10. Release the switch (Item 1) [Figure 173], the locking pins (Item 1) [Figure 174] will extend automatically.

11. Put the Travel Direction Control in neutral.
(See Travel Direction on Page 42)
12. Make sure the parking brake is engaged.
(See Parking Brake on Page 67)
13. Stop the engine and exit the machine.
(See Stopping The Engine And Leaving The Machine on Page 92)
14. Make sure the locking pins (Item 1) [Figure 174] extend through the holes of the attachment carrier.
15. Make sure that the attachment is securely fastened.
16. Install attachment electrical harness and hydraulic lines (if equipped) on the machine and the attachment carrier.

Removing Attachments (Power Quick-Tach Or Mani-Tach System)

⚠ WARNING

GENERAL HAZARD

Failure to follow instructions can cause serious injury or death.

Before you leave the operator's position:

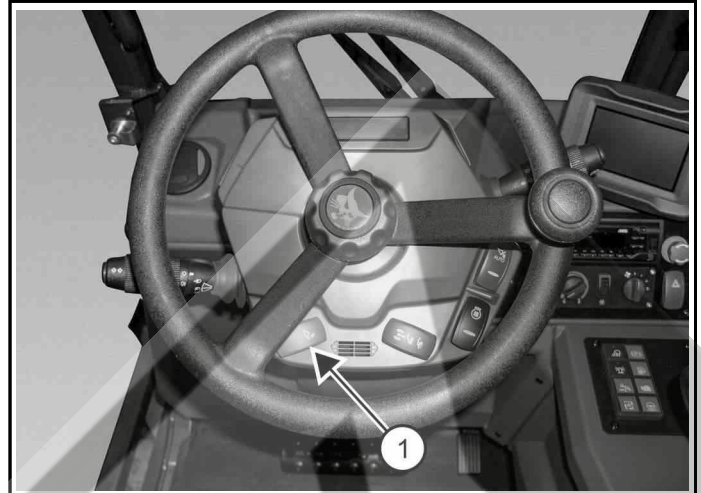
- **Put the Travel Direction Control and the Joystick in neutral.**
- **Engage the parking brake.**
- **Retract and lower the boom and attachment / implement flat on the ground.**
- **Stop the engine.**

1. Lower the boom and put the attachment flat on the ground.

In muddy conditions or to prevent the attachment from freezing to the ground, put the attachment on planks or blocks before removing it from the machine.

2. Put the Travel Direction Control in neutral.
(See Travel Direction on Page 42)
3. Make sure the parking brake is engaged.
(See Parking Brake on Page 67)
4. Stop the engine and exit the machine.
(See Stopping The Engine And Leaving The Machine on Page 92)
5. Disconnect attachment electrical harness and hydraulic lines, if applicable, from the machine.
6. Enter the machine and perform the pre-starting procedure. (See Pre-starting Procedure on Page 86)
7. Start the engine.
(See Starting the Engine on Page 89)

Figure 175



8. Push and hold the hydraulic attachment lock switch (Item 1) [Figure 175] to retract the locking pins on the attachment carrier.
9. Tilt the attachment carrier forward until the attachment tube is disengaged. Move the machine backward away from the attachment.
10. Release the hydraulic attachment lock switch (Item 1) [Figure 175] to extend the locking pins.

OPERATING PROCEDURE

Longitudinal Load Moment Controller (LLMC)

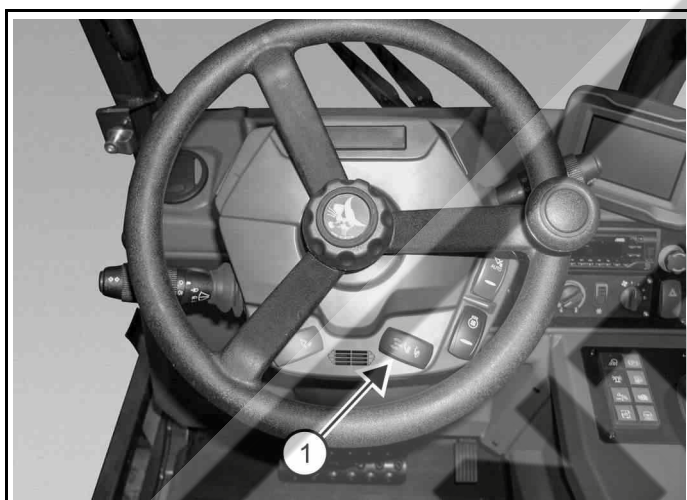
The LLMC limits the following movements when the machine stability level is critical:

- Lowering of the boom
- Extending the telescopic boom
- Forward tilt of attachment
- Backward tilt of attachment
- Auxiliary hydraulic functions.

Longitudinal Load Moment Controller (LLMC) Override Switch

The LLMC override switch should only be enabled when necessary and is automatically disabled after a running period of 60 seconds.

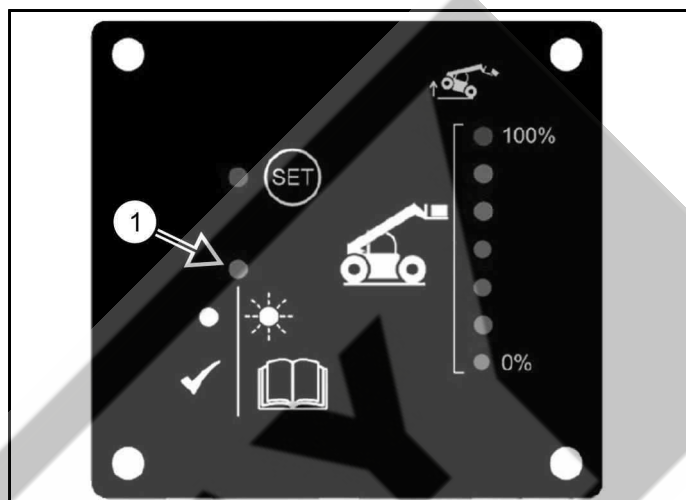
Figure 176



- Press the bottom of the LLMC override switch (Item 1) [Figure 176] to override the LLMC.

The control indicator light (ORANGE) (Item 1) [Figure 177] flashes when the LLMC override mode is activated.

Figure 177



The switch returns to the original position as soon as the switch is released. The LLMC will become active again.

Inspecting The Work Area

Before beginning operation, inspect the work area for unsafe conditions.

- Look for sharp drop-offs or rough terrain. Have underground utility lines (gas, electrical, water, sewer, irrigation, etc.) located and marked. Work slowly in areas of underground utilities.
- Remove objects or other construction material that could damage the machine or cause personal injury.
- Always check ground conditions before starting your work:
 - Look for signs of instability such as cracks or settlement.
 - Be aware of weather conditions that can affect ground stability.
 - Check for adequate traction if working on a slope.
- Know and do not exceed the maximum weight capacity of the work areas and routes, especially when crossing or working on bridges.

Basic Operating Instructions

IMPORTANT

MACHINE DAMAGE

Machines warmed up with moderate engine speed and light load have longer life. ◀

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When operating on a public road or motorway, always follow local regulations. For example: A slow moving vehicle (SMV) sign, or direction signals may be required.

Run the engine at low idle speed to warm the engine and hydraulic system before operating the Telescopic Handler.

Noise at the operator position can be reduced by running the engine at low idle and closing the windows.

New operators must operate the Telescopic Handler in an open area without bystanders. Operate the controls until the Telescopic Handler can be handled at an efficient and safe rate for all conditions of the work area.

Water filled tyres are not authorised on these machines. Only tyres recommended in this Operation & Maintenance Manual are approved. Use of non approved tyres will void the warranty.

Visibility During Operation

The operator has to operate the machine according to the visibility diagram (See Visibility Diagrams on Page 315) provided in the Operator & Maintenance Manual. In case a suspended load or the boom prevents any visibility and creates a substantial blockage, the operator has to consider alternative carrying means.

Operating Near An Edge Or Water

Keep the machine as far back from the edge as possible and the wheels perpendicular to the edge so that if the edge collapses, the machine can be moved back.

Always move the machine back at any indication the edge can be unstable.

Operating On Slopes

⚠ WARNING

INSTABILITY HAZARD

Tipping or rollover can cause serious injury or death.

- Do not drive across or up slopes that are over 10 degrees to the side, or 25 degrees to the front.
- Do not drive down or back up slopes that exceed 25 degrees.
- Keep boom as low as possible when driving on slopes or in rough conditions.

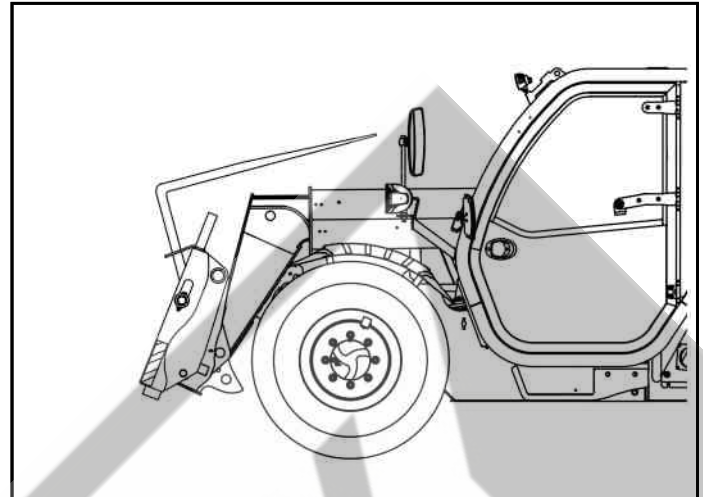
Drive slowly and do not travel on excessive slopes.

The above list of overturning hazards is not exhaustive.

Road Position

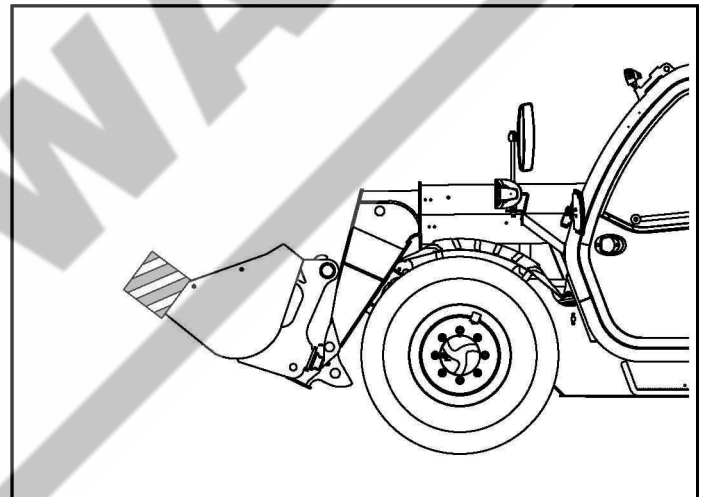
When travelling on the road, observe the recommended road position for the following attachments:

Figure 178



1. Floating pallet fork: place the fork on back of guard to avoid sharp edges in travel direction [Figure 178].

Figure 179



2. Digging bucket: install bucket teeth protection [Figure 179].

Movement Restrictions For Attachments

Certain attachments like buckets and forks require more careful movement to avoid causing damage to the machine or the attachment.

To avoid this, make sure to:

- Do not fully tilt the attachment down when the boom is raised and retracted.
- Do not retract the boom fully. Keep the boom extended for a minimum of 300 mm (12 in) to avoid damage.

Operating With A Full Bucket

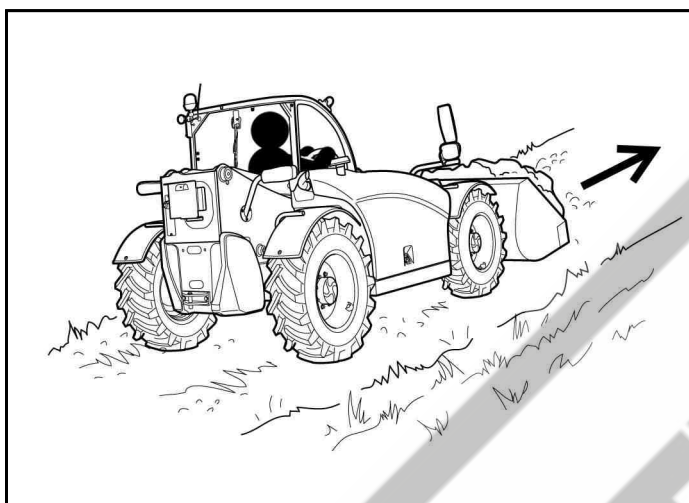
⚠ WARNING

INSTABILITY HAZARD

Failure to obey warnings can cause the machine to tip or rollover and cause serious injury or death.

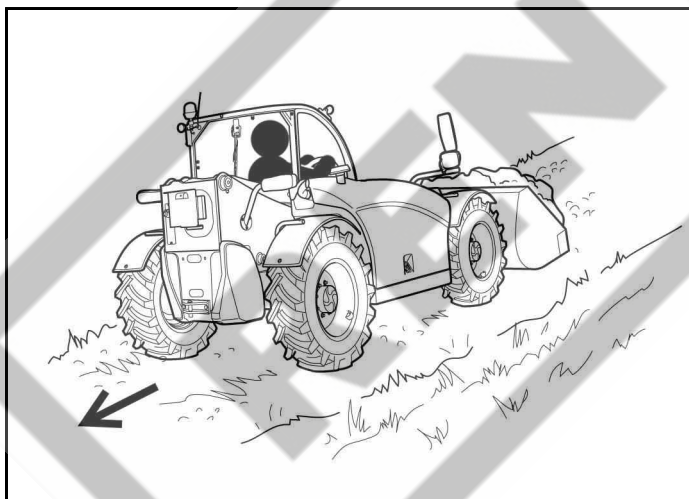
- Do not overload the machine.
- Keep the boom as low as possible.
- Do not travel or turn with the boom up.
- Turn on level ground and slow down when turning.
- Go up and down slopes, not across them.
- Keep the heavy end of the machine uphill. ◀

Figure 180



NA24153

Figure 181

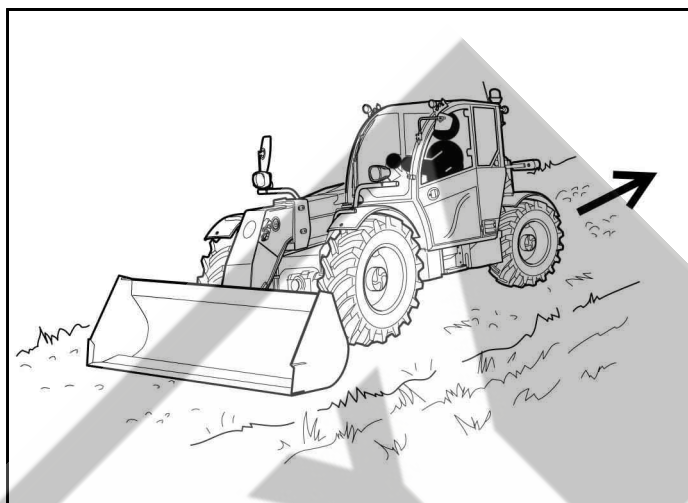


NA24154

- With a full bucket, go up or down the slope with the heavy end toward the top of the slope [Figure 180] and [Figure 181].

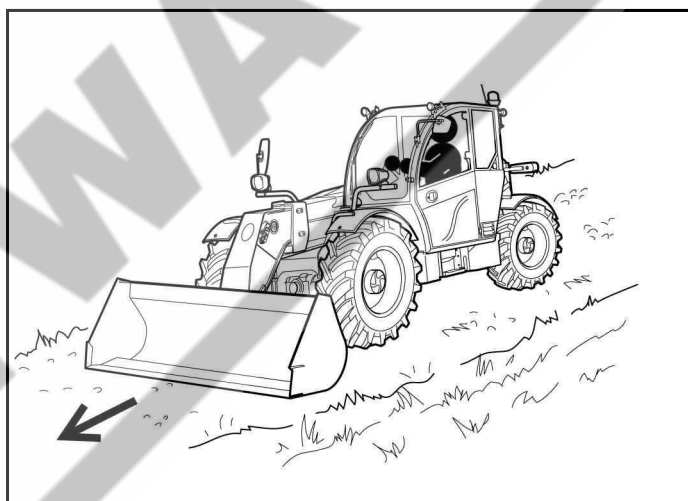
Operating With An Empty Bucket

Figure 182



NA24155

Figure 183



NA24156

- With an empty bucket, go up or down the slope with the heavy end toward the top of the slope [Figure 182] and [Figure 183].

Filling And Emptying The Bucket

⚠ WARNING

INSTABILITY AND CRUSHING HAZARD

Machine tip or rollover and falling objects can cause serious injury or death.

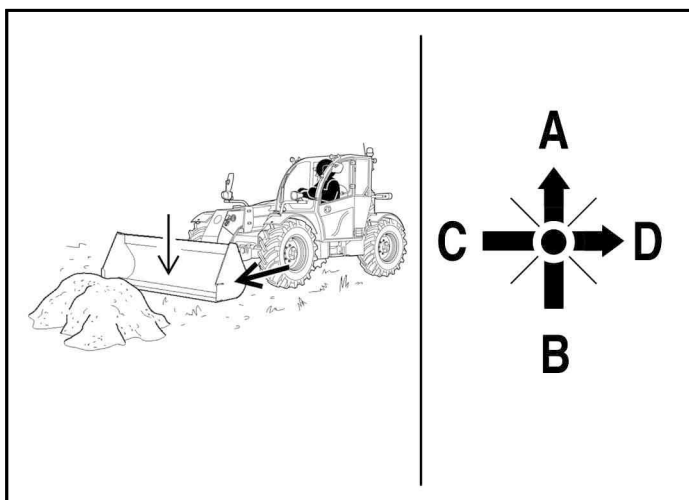
- Do not overfill the bucket.
- Do not exceed the rated load capacity shown on the Load Charts in the cab.
- Load, unload, and turn on flat level ground. ◀

W-2651

Filling the Bucket

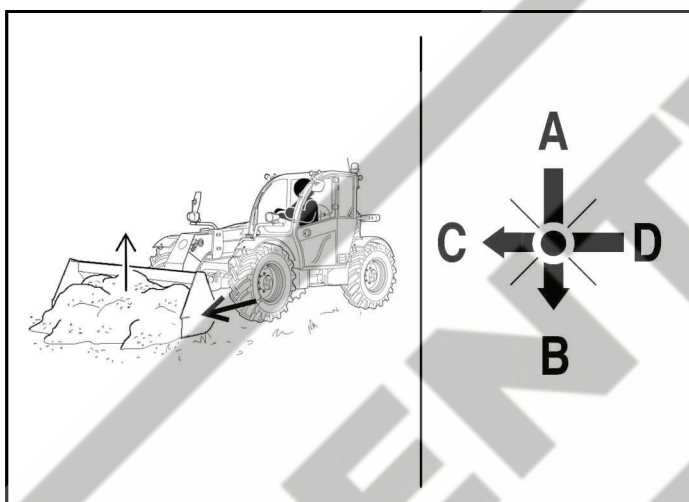
Always fully retract the boom during filling. To fill the bucket, the machine must be pushing with the centre of the bucket.

Figure 184



1. Lower the bucket (A) [Figure 184] until it slightly touches the ground.
2. Tilt the bucket forward (D) [Figure 184] until the cutting edge of the bucket is on the ground.

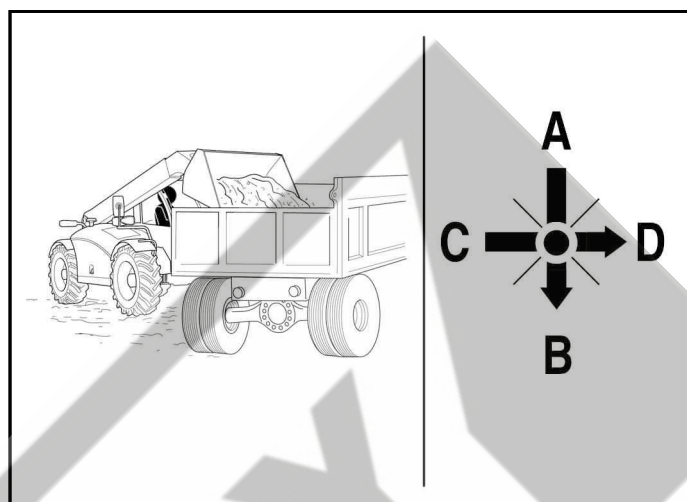
Figure 185



3. Drive slowly forward into the material.
4. Lift the boom (B) and tilt the bucket backward (C) [Figure 185] all the way when the bucket is full.
5. Drive backward away from the material.

Emptying the Bucket

Figure 186



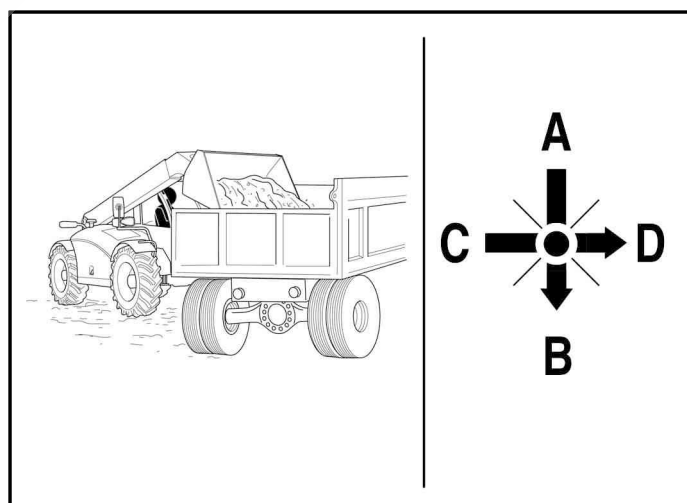
1. Keep the bucket low and the boom retracted when moving to the area where you want to empty the bucket.
2. Raise the boom (B). If necessary, level the bucket (D) [Figure 186] while raising the boom to help prevent material from falling off the bucket.
3. Drive forward slowly until the bucket is over the top of the truck box or bin.
4. Tilt the bucket all the way forward (D) [Figure 186] to empty the bucket.

If all the material is near the side of the truck or bin, use the bucket tilt to move it to the other side.

Emptying the Bucket using Bucket Shaking

The machine can be equipped with a bucket shaking function to empty the bucket more efficiently.

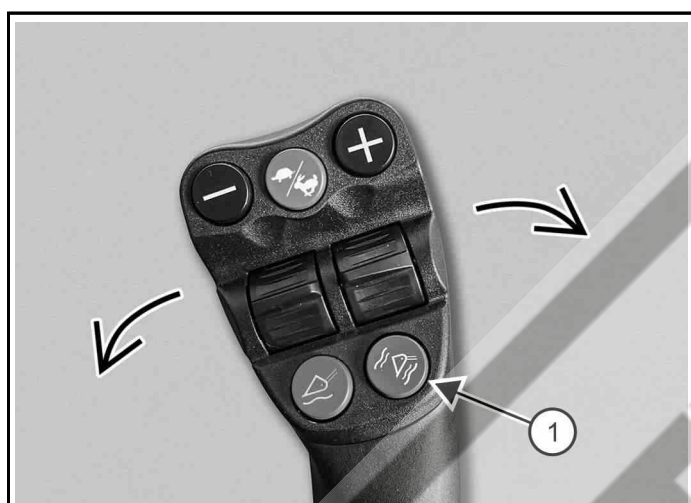
Figure 187



1. Keep the bucket low and the boom retracted when moving to the area where you want to empty the bucket.
2. Raise the boom (B). If necessary, level the bucket (D) [Figure 187] while raising the boom to help prevent material from falling off the bucket.
3. Drive forward slowly until the bucket is over the top of the truck box or bin.
4. Tilt the bucket all the way forward (D) [Figure 187] to empty the bucket.

If all the material is near the side of the truck or bin, use the bucket tilt to move it to the other side.

Figure 188



5. While emptying the bucket, press and hold the bucket shaking button (Item 1) [Figure 188] on the joystick and move the joystick left or right.

Tilt up and down are supplied alternatively to shake the bucket.

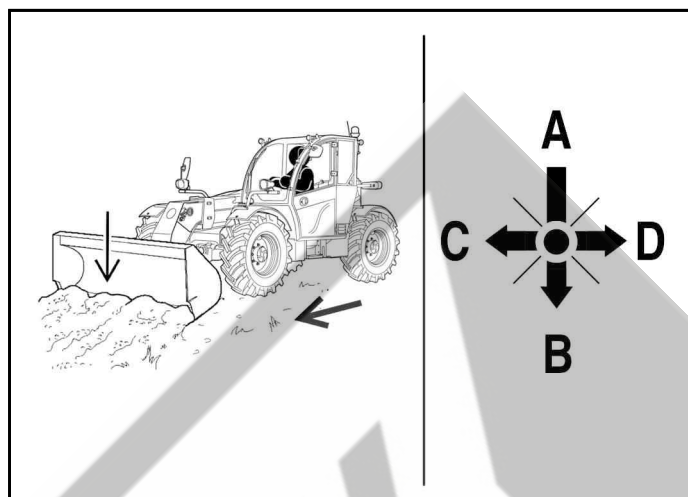
- If the joystick is moved to the left, the bucket will shake with more backward movement.
- If the joystick is moved to the right, the bucket will shake with more forward movement.

Digging And Filling A Hole

Digging a Hole

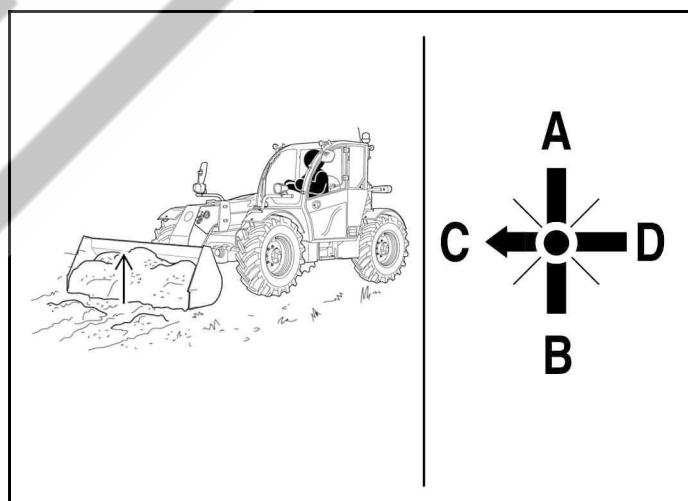
Always fully retract the boom during digging.

Figure 189



1. Lower the bucket until it slightly touches the ground (A). Put the cutting edge of the bucket on the ground (D) [Figure 189].
2. Drive forward slowly and continue to tilt the bucket down (D) [Figure 189] until it enters the ground.
3. Raise the cutting edge a small amount (C) [Figure 189] to increase traction and keep an even digging depth.
4. Continue to drive forward until the bucket is full. When the ground is hard, raise and lower the cutting edge of the bucket (D) [Figure 189] while driving forward slowly.

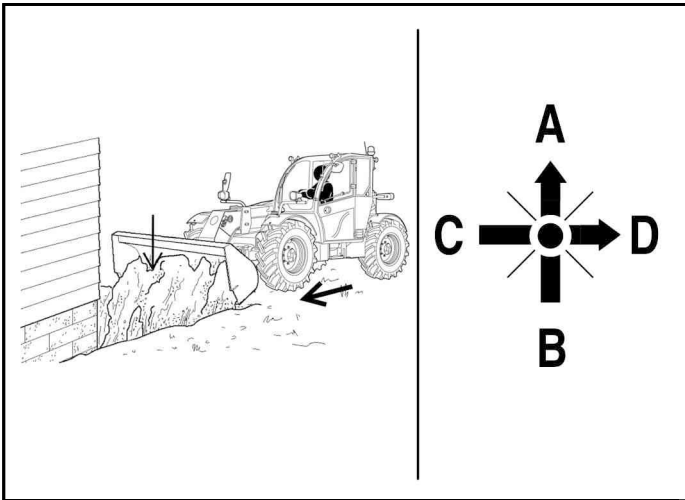
Figure 190



5. Tilt the bucket backward (C) [Figure 190] as far as it will go when the bucket is full.

Filling a Hole

Figure 191



1. Lower the boom (A) and put the cutting edge of the bucket on the ground (D) [Figure 191]. Drive forward to the edge of the hole to push the material into the hole.
2. Tilt the bucket forward (D) [Figure 191] as soon as it is past the edge of the hole.
3. If necessary, raise the boom to empty the bucket.

Raising A Load And Extending The Boom

⚠ WARNING

CRUSHING HAZARD

Falling load can cause serious injury or death.

- Never go under or reach under raised load.
- Never move a load over other personnel.

⚠ DANGER

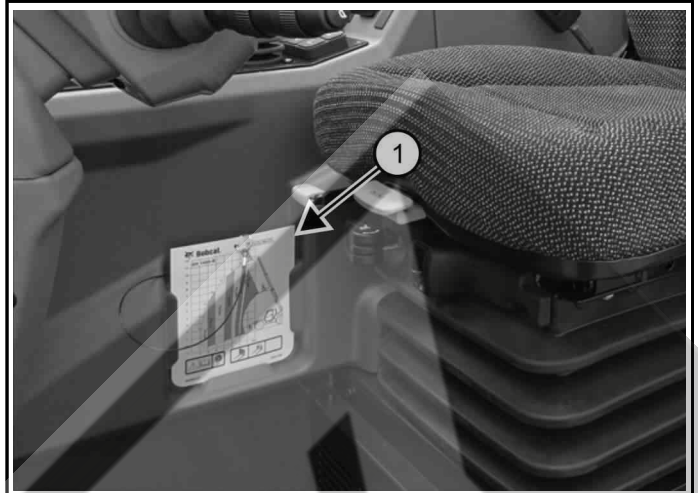
EXPLOSION AND ELECTROCUTION HAZARDS

Contact with high voltage electricity will cause death, serious injury, or property damage.

- Check the work area for overhead or exposed electrical power lines.
- Keep a safe distance from energised electrical power lines. Maintain at least 3m (10 ft) from high voltage electrical sources. Great distances may be required depending on voltage levels or environmental conditions.
- Follow all local rules and regulations regarding working near energised electrical power lines.

1. Perform the pre-starting procedure before using the machine. (See Pre-starting Procedure on Page 86)

Figure 192



2. Read and understand the load capacity charts (Item 1) [Figure 192] to learn the rated load capacity at different extension and heights of the telescoping boom.

Use only attachments that are approved for this machine. All approved attachments must be shown in the load capacity charts. Contact your dealer if an approved attachment is not illustrated in the charts.

Use only approved tyres at correct pressure for this machine. All four tyres must be the same type.

3. Move the machine to the load to be lifted.
4. Make sure that the machine is on level ground. (See Sight Level Gauge on Page 53)
5. Be sure the load is centred on the attachment. Fasten the load to the attachment if load can shift.
6. Raise the boom slightly to clear the ground and tilt the attachment back.
7. Start slowly and drive the machine with the load as low as possible.
8. Stop the machine on flat, solid and level ground. Put the Travel Direction Control in NEUTRAL and make sure the parking brake is engaged before raising or extending the boom.
9. Slowly raise and extend the boom to put the load in the desired location. **DO NOT DRIVE THE MACHINE WITH THE LOAD RAISED.**
10. Place the load, then retract and lower the boom.
11. Slowly move the machine backward.

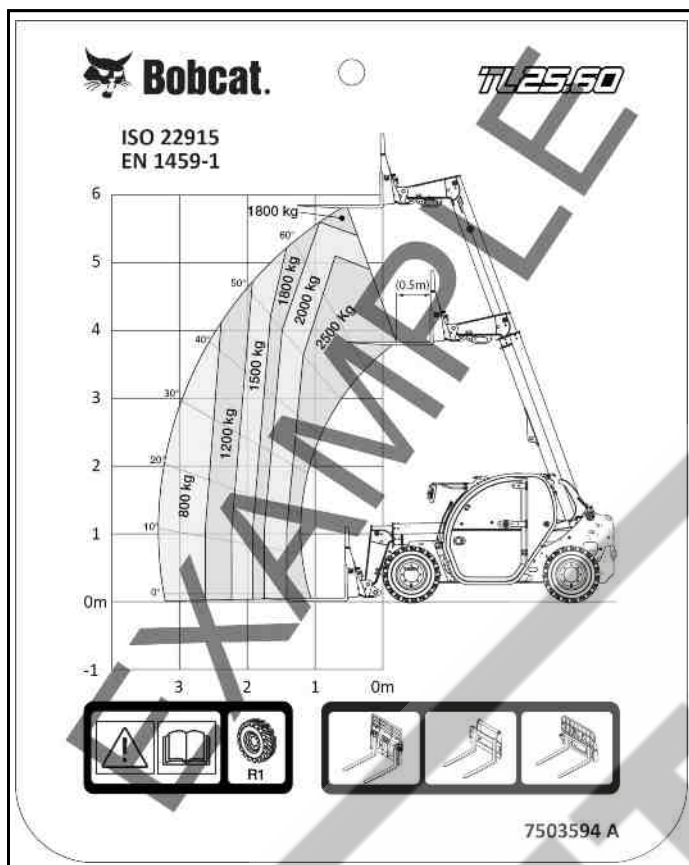
Load Capacity Charts

The load capacity charts are designed with the machine on flat, level ground. If the machine is positioned up or down a slope, the values of the load capacity chart will no

longer be accurate. Always lift and extend the boom when the machine is on flat, level and solid ground.

NOTE: When the boom is fully retracted, the machine will lift more weight than when extended.

Figure 193



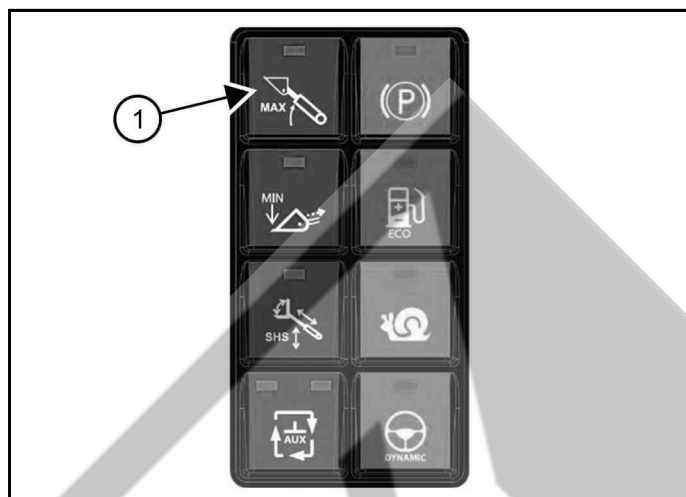
1. Always lift the load first; then extend the boom as needed, staying within the Rated Load Capacity for the height and extension.
2. Place the load, then retract and lower the boom.

Operating With Maximum Boom Angle

The Maximum Boom Angle function (If equipped) allows the operator to raise the boom until a preset boom angle is reached. The boom movement stops at the preset boom angle. This limits the working area in applications such as working in low buildings or loading a trailer.

1. Lift the boom until the desired boom angle is reached.

Figure 194



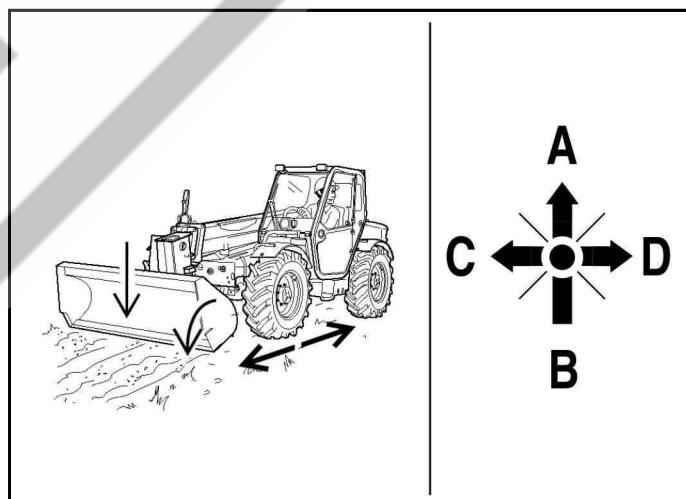
2. Press the switch (Item 1) [Figure 194] to set the maximum boom angle. The LED will be illuminated.

The boom movement will stop at the preset boom angle while operating the machine.
3. Press the switch (Item 1) [Figure 194] again to disable the maximum boom angle function.

Levelling The Ground Using Float

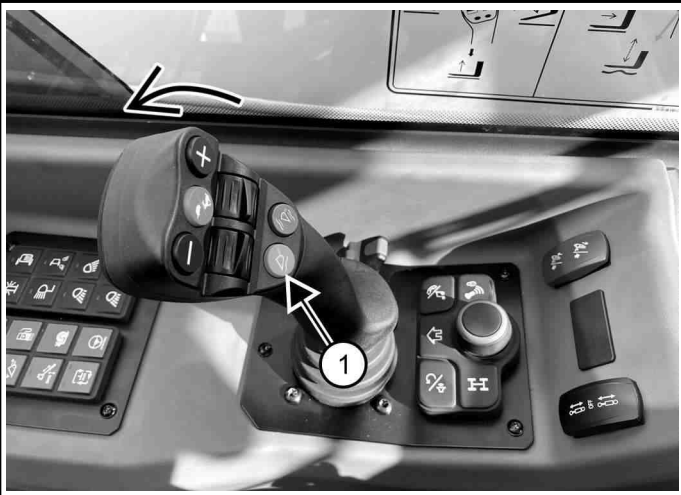
For machines equipped with the boom float function, follow the procedure below to level the ground.

Figure 195



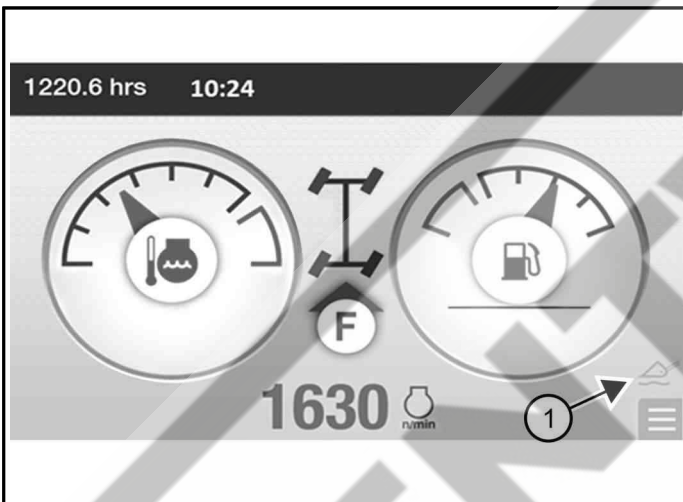
1. Lower the boom (A) until the bucket (or attachment) is flat on the ground.

Figure 196



2. Press and hold the Boom Float button (Item 1) and push the joystick down [Figure 196].

Figure 197



The Boom Float icon (Item 1) [Figure 197] on the display will turn ON.

While boom float is engaged, the boom can only be moved up.

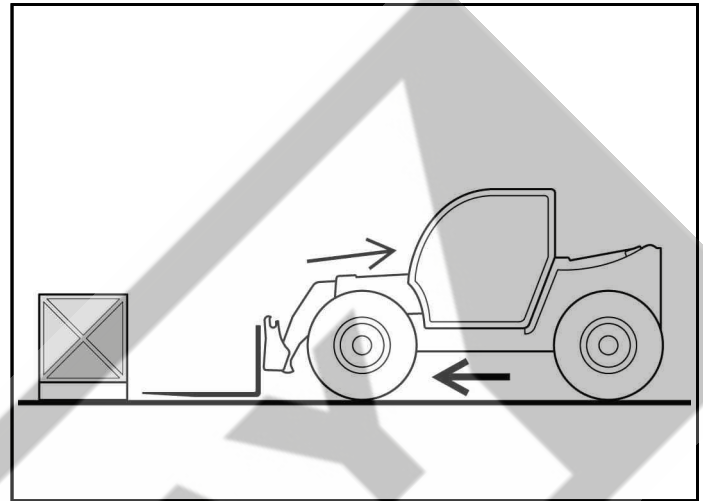
3. Release the button (Item 1) [Figure 196].
4. Drive the machine.
5. To deactivate the boom float, press the button (Item 1) [Figure 196] or pull the joystick up.

Boom float will be released and the icon on the display (Item 1) [Figure 197] will turn OFF.

Handling Loads With Pallet Fork

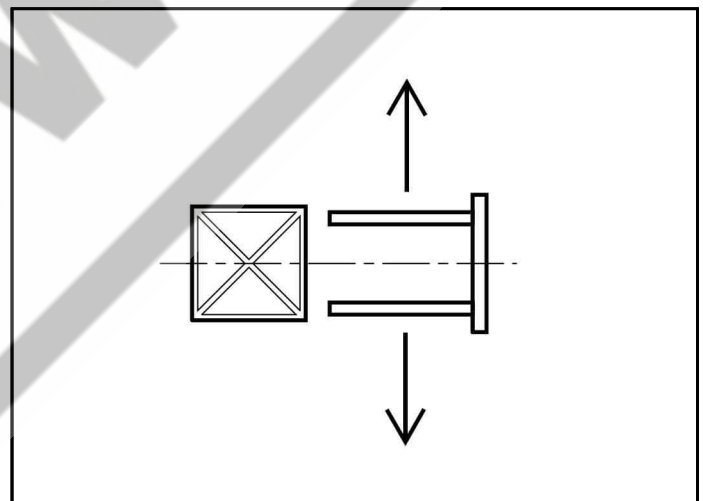
Picking Up A Load From The Ground With Pallet Fork

Figure 198



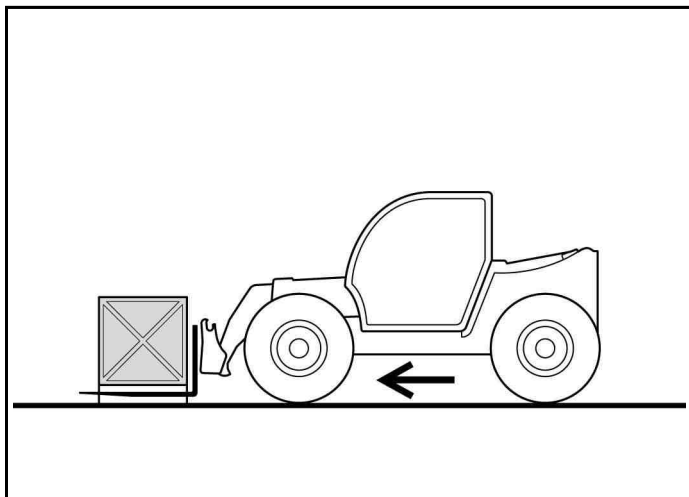
1. Move the machine perpendicular to the load with the boom fully retracted and the pallet fork parallel to the ground [Figure 198].

Figure 199



2. Adjust the pallet fork clearance and their centring in relation to the load [Figure 199].
3. Adjust the height of the pallet fork so that they can slide under the load [Figure 200].

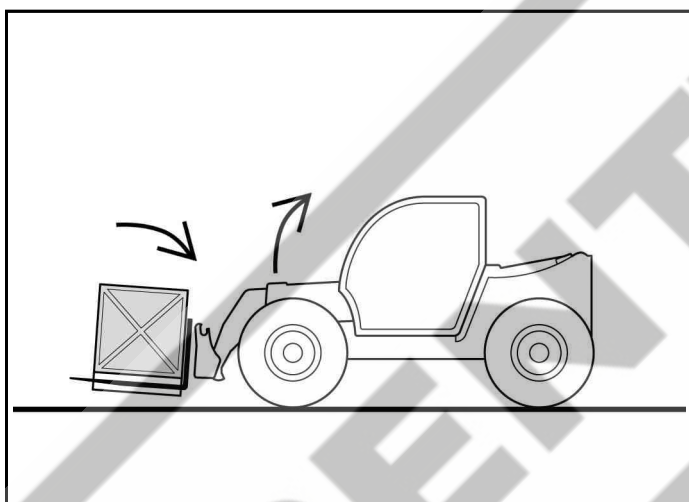
Figure 200



EM8013

4. Move the machine forward or extend the boom to bring the heel of the pallet fork in contact with the load .
5. Put the Travel Direction Control in NEUTRAL and make sure the parking brake is engaged.

Figure 201

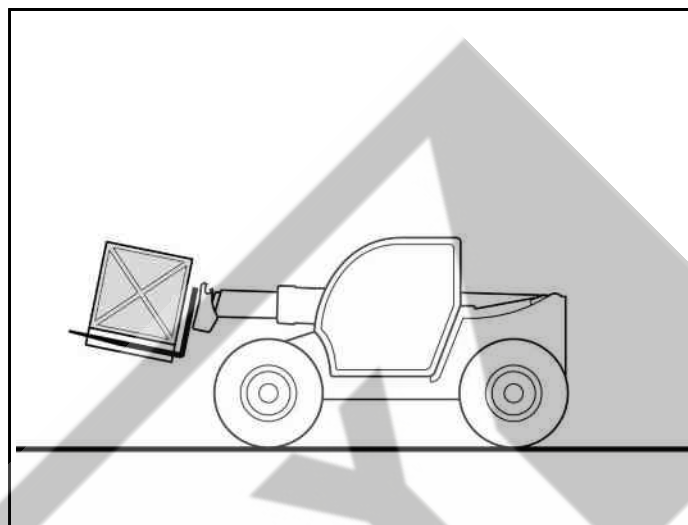


EM8014

6. Raise the boom so that the ground clearance under the pallet fork is approximately 300 mm (12 in), tilt the forks fully backward and retract the boom fully. The machine is now in transport position [Figure 201].

Placing A Load On The Ground With Pallet Fork

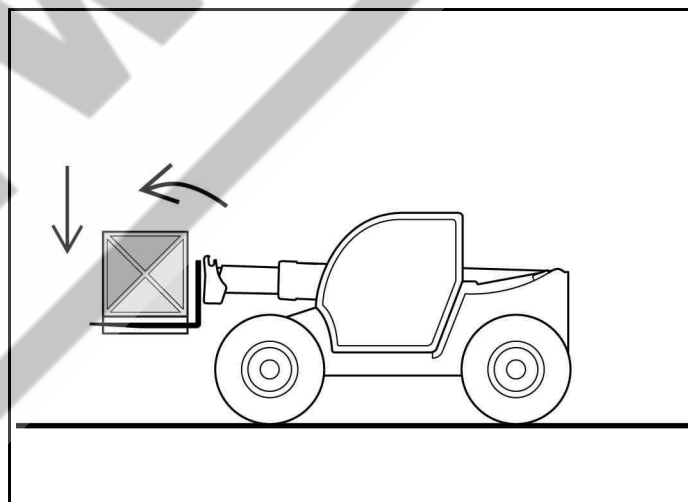
Figure 202



EM8019

1. Move the load into the position where it is to be placed [Figure 202].
2. Tilt the pallet fork into a position parallel to the ground [Figure 203].

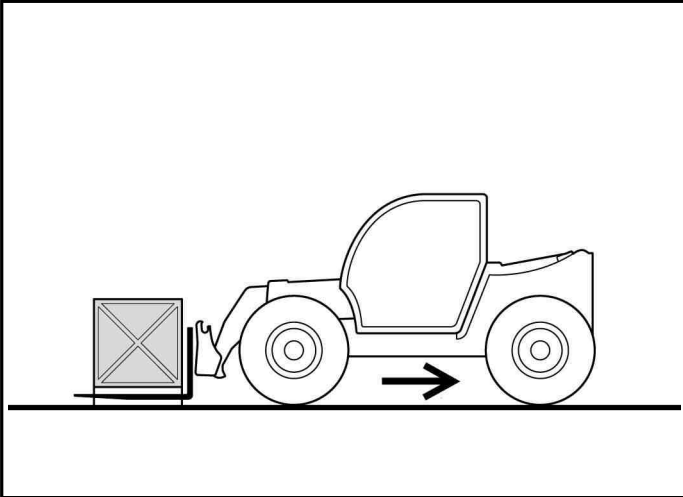
Figure 203



EM8020

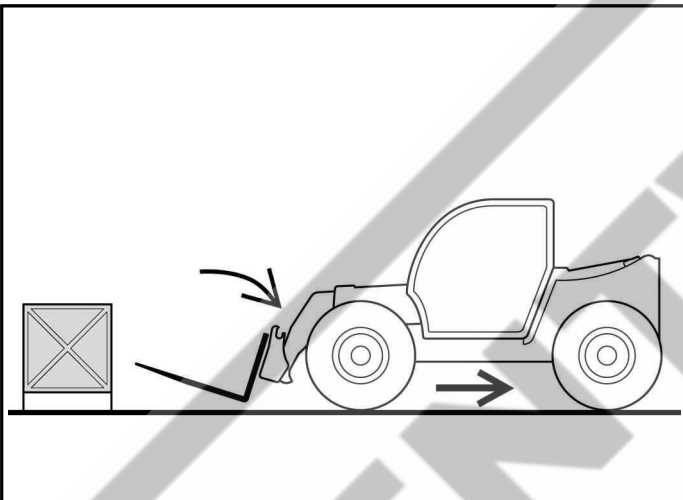
3. Lower the load until it is resting on the ground and the pallet fork are no longer in contact with the load [Figure 203].

Figure 204



4. Move the machine back in order to release the pallet fork from the load completely [Figure 204].

Figure 205



5. Return the boom and the pallet fork to the transport position [Figure 205].

Picking Up A Raised Load With Pallet Fork

⚠ WARNING

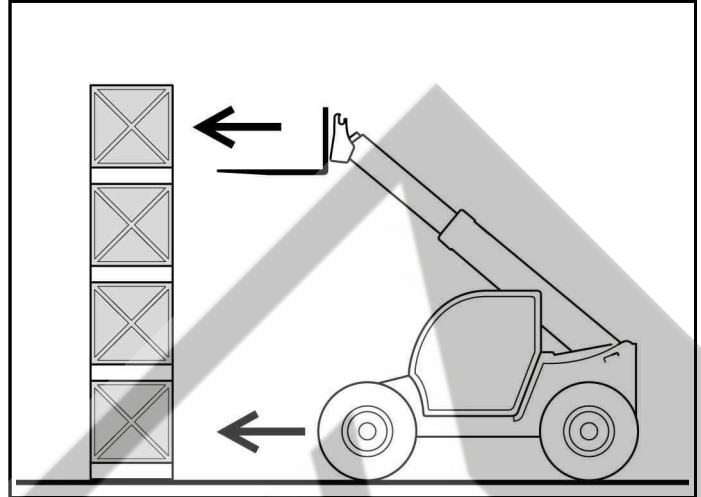
CRUSHING HAZARD

Falling load can cause serious injury or death.

- Never go under or reach under raised load.
- Never move a load over other personnel. ◀

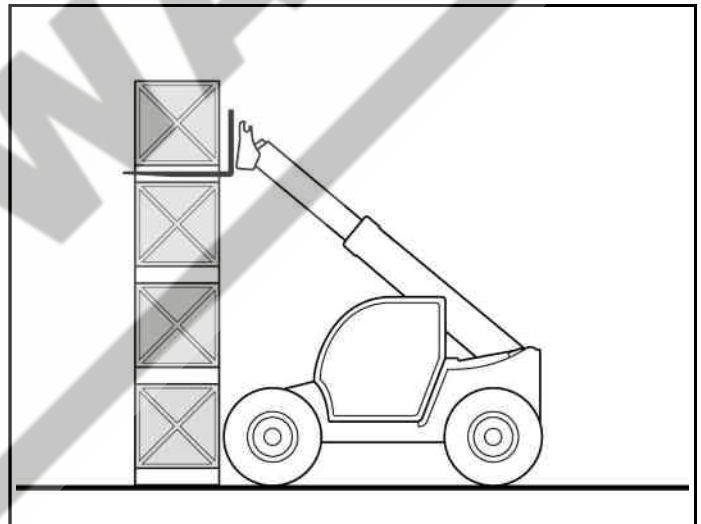
1. Before starting this manoeuvre, make sure that the pallet fork can easily slide under the load and that their clearance and centering in relation to the load is correct.

Figure 206



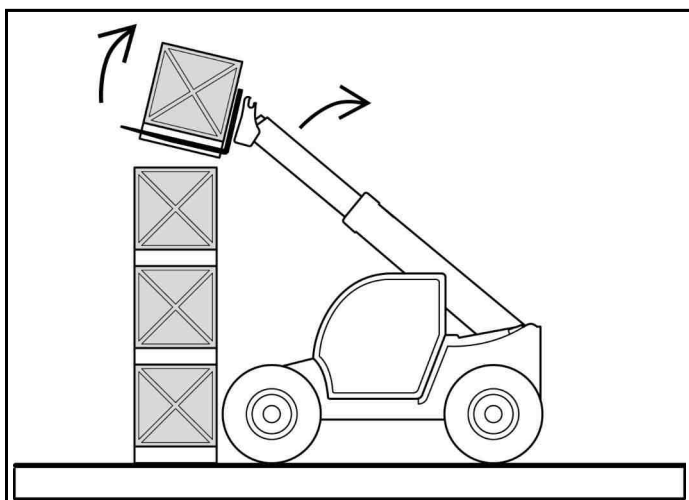
2. Move the machine perpendicular to the load with the pallet fork horizontal at the height of the load [Figure 206].

Figure 207



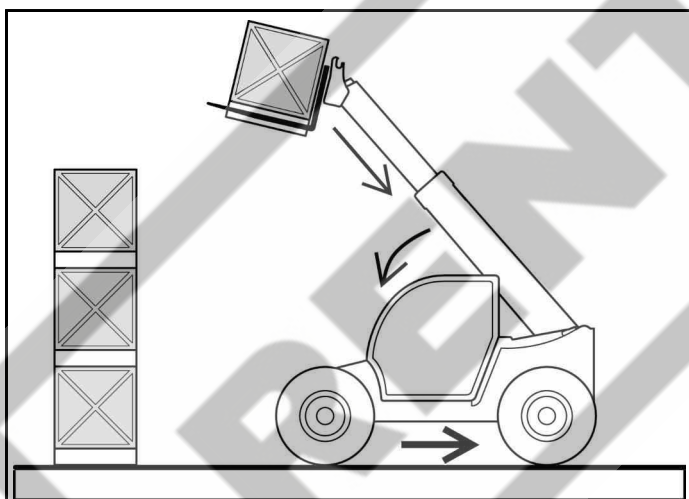
3. Move the machine forward as slowly as possible until the heel of the pallet fork is in contact with the load [Figure 207].
4. Put the Travel Direction Control into NEUTRAL and make sure the parking brake is engaged.

Figure 208



5. Raise the boom slightly and tilt the pallet fork partially backward to stabilise the load [Figure 208].
6. Put the Travel Direction Control in REVERSE and release the parking brake.
7. Move the machine back as slowly as possible so as to release the load on top of the stack, in such a way that the boom can be lowered without the load touching the pile [Figure 209].
8. Retract the boom fully. (See on Page 128)

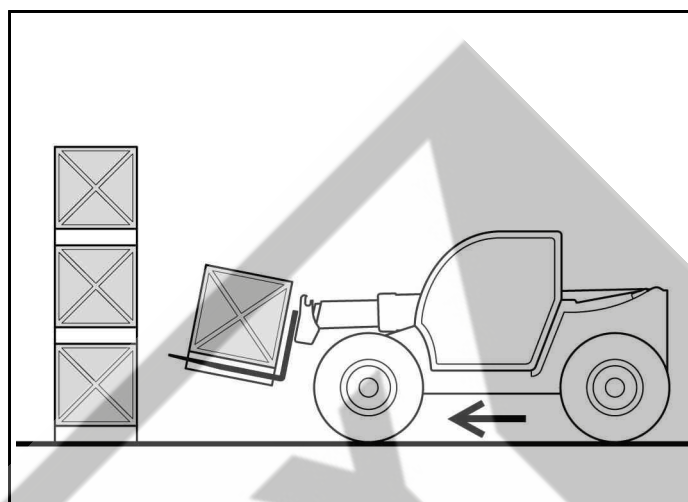
Figure 209



9. Lower the boom until the ground clearance under the pallet fork is approximately 300 mm (12 in), then tilt the fork fully backward. The machine is now in transport position [Figure 209].

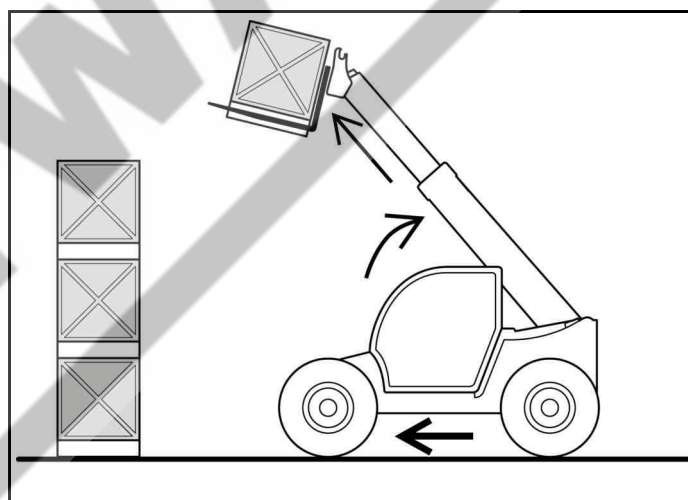
Placing A Raised Load With Pallet Fork

Figure 210



1. With the machine in transport position, move the load closer to the stack and into the position where it is to be placed [Figure 210].

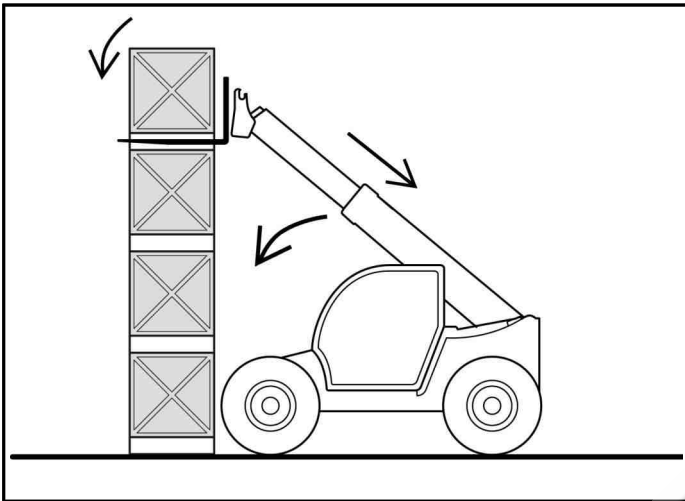
Figure 211



2. Raise the boom, then extend it to place the load above the stack. If necessary, move the machine forward [Figure 211].
3. Put the Travel Direction Control into NEUTRAL and make sure the parking brake is engaged.
4. Tilt the load into a horizontal position [Figure 212].
5. Place the load down on the stack by lowering and retracting the boom [Figure 212].
6. Once the load has been placed down, release the pallet fork so that they are no longer in contact with the load using short, successive boom lowering and retracting manoeuvres.

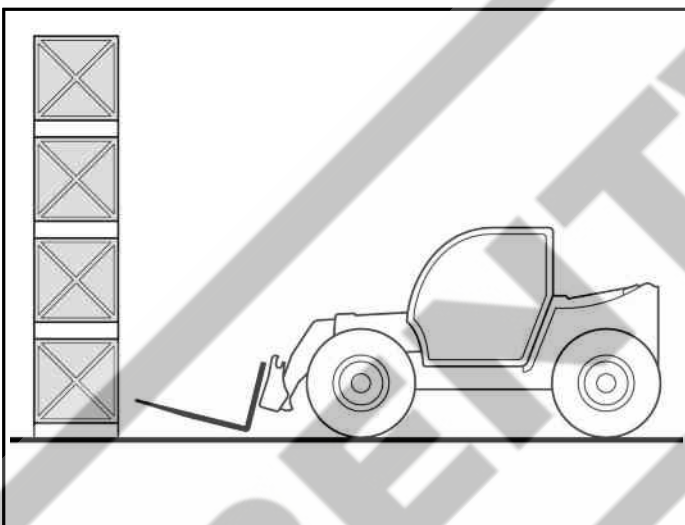
7. Put the Travel Direction Control in REVERSE and release the parking brake.

Figure 212



8. Move the machine back as slowly as possible so as to release the pallet fork from the load completely [Figure 212].

Figure 213



9. Return the boom and fork to transport position [Figure 213].

Towing the Machine

Towing The Machine Procedure

⚠ WARNING

UNINTENDED MACHINE MOVEMENT HAZARD
Failure to follow instructions can cause serious injury or death.

- Block wheels to prevent roll away before adjusting screws to bypass the parking brake system.
- Return adjustment screws to the operating position before operating the machine.*

W-2808

The machine can be towed a short distance such as removing it from mud or loading onto a transport vehicle.

The towing procedure must be executed in two steps:

1. Disengaging the parking brake.
(See Disengaging The Park Brake on Page 129)
2. Disengaging the transmission.
(See Disengaging The Transmission on Page 130)

Both steps are mandatory before any towing is authorised.

- Tow the machine at a slow speed, not exceeding 5 km/h (3 mph). Do not tow the machine for more than 3 minutes.
- Block the wheels to prevent the machine from rolling.

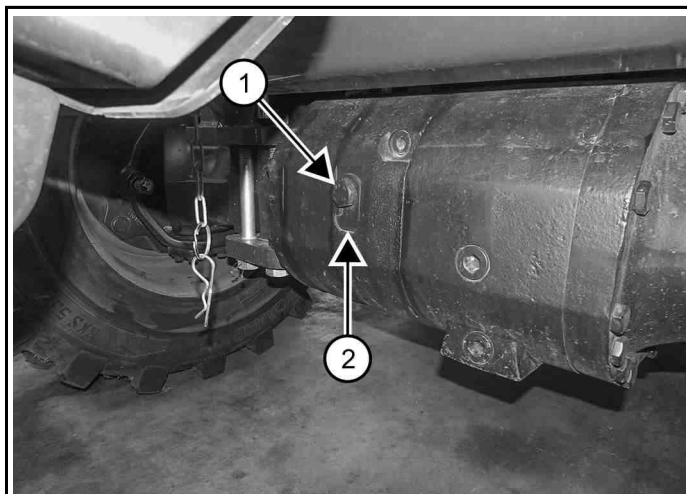
Disengaging The Park Brake

Use service wrench 24 to perform this procedure. Depending on your local regulation these tools can be available in the net or container behind the seat.

The brakes are engaged by spring pressure and released by hydraulic pressure. The park brake must be released manually before towing. Only the front axle has brakes.

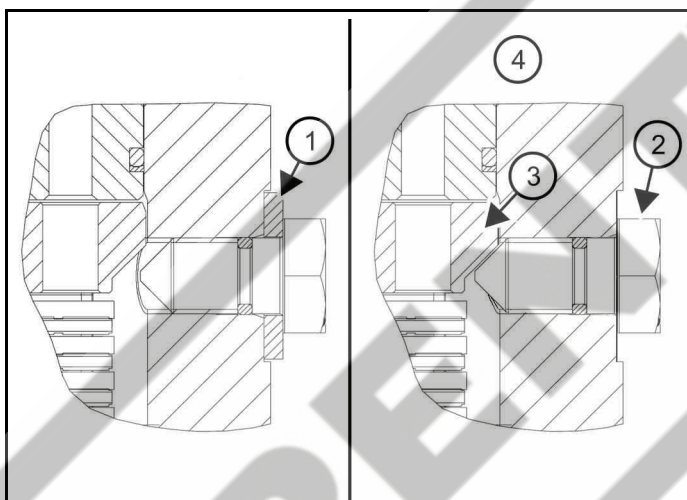
The following procedure describes how to release the brakes:

Figure 214



1. Loosen the two bolts (Item 1) (the bolts and spacers are located on both the front and rear side of the front axle) until the slotted spacers (Item 2) [Figure 214] can be removed from under the bolt heads.
2. Remove the spacers (Item 2) [Figure 214] and save for reuse.

Figure 215



3. After removing the spacers (Item 1), evenly tighten the front and rear bolts (Item 2) to hold the park brake piston (Item 3) in the released position (Item 4) [Figure 215].

The brakes are now released for towing the machine.

The park brake will not work until the adjustment screw is returned to the original position.

Disengaging The Transmission

Use a 10 mm and 22 mm wrench to perform this procedure. Depending on your local regulation these

tools can be available in the net or container behind the seat.

WARNING

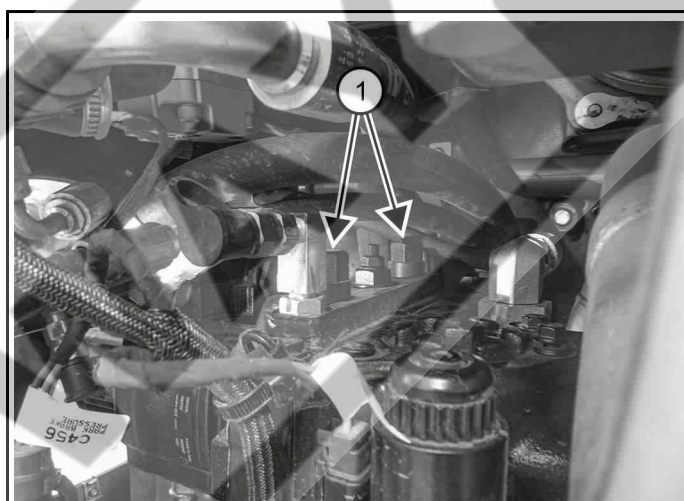
UNINTENDED MACHINE MOVEMENT HAZARD
Failure to follow instructions can cause serious injury or death.

- Block wheels to prevent roll away before adjusting screws to bypass the parking brake system.
- Return adjustment screws to the operating position before operating the machine.*

W-2808

1. Open the engine cover.
(See Engine Cover on Page 147)

Figure 216



2. Locate the two identical multi-function valves (Item 1) [Figure 216] on the hydrostatic transmission pump.
3. Loosen the valves (Item 1) [Figure 216] by turning them three full turns anticlockwise.

Do not turn more than three full turns. This can result in leakage.

This action will bypass the hydraulic fluid flow of the hydrostatic transmission.

4. Tow the machine at a slow speed, not exceeding 5 km/h (3 mph). Do not tow the machine for more than three minutes.

Engaging The Transmission

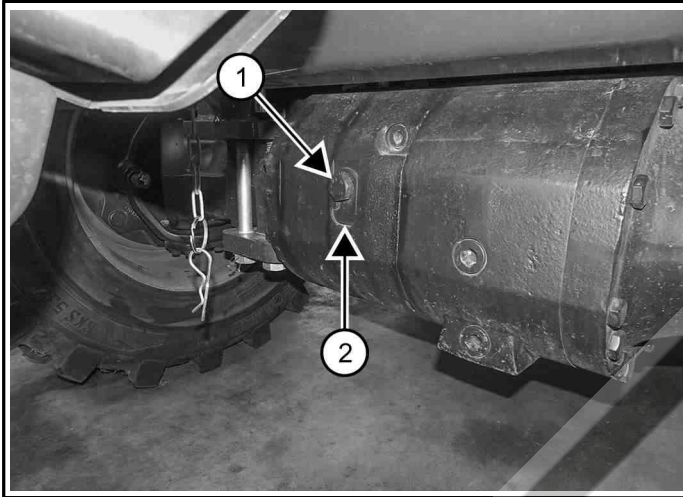
1. After towing is completed, block the wheels to prevent the machine from rolling.
2. Loosen the two bolts (Item 1) and remove the cover (Item 2) from the front side of the engine bay assembly.
3. Tighten the valves (Item 1) to 70 N•m (52 ft-lb) torque to re-engage the hydrostatic transmission.

- Engage the park brake.
(See Engaging The Park Brake on Page 131)

Engaging The Park Brake

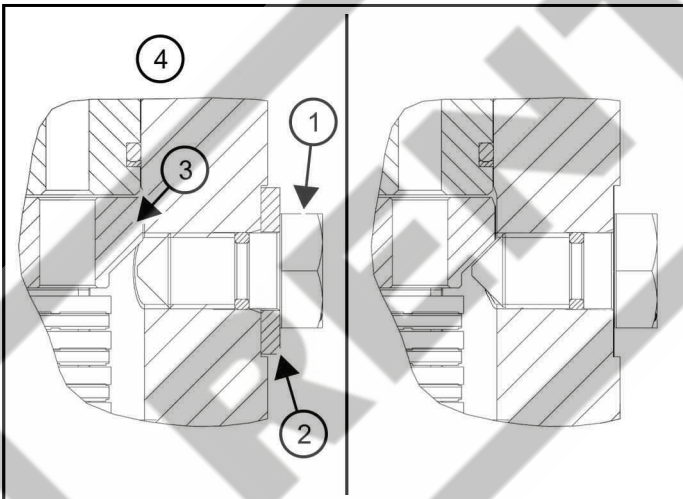
Use service wrench 24 to perform this procedure.
Depending on your local regulation these tools can be available in the net or container behind the seat.

Figure 217



- Loosen the two bolts (Item 1) until the spacers (Item 2) [Figure 217] can be installed under the bolt heads (the bolts and spacers are located on both the front and rear side of front axle).

Figure 218



- Evenly tighten the front and rear bolts (Item 1) to hold the spacers (Item 2) [Figure 217] and [Figure 218].

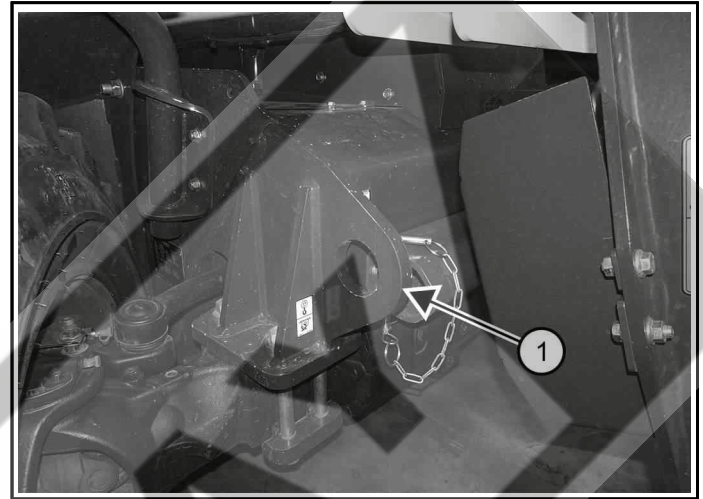
Tighten the bolts to 95 - 115 N•m (70 - 85 ft-lb) torque.

This will allow the park brake piston (Item 3) to be active again (Item 4) [Figure 218].

- Engage the parking brake
(See Parking Brake on Page 67) and make sure it functions correctly.

Towing And Retrieving The Machine

Figure 219



- Use the front tow point (Item 1) [Figure 219] for towing and for retrieving the machine out of a hole or ditch.

The retrieval point is rated for 1,5 times mass of the machine.

Keep traction within an angle of 20° with the longitudinal axis.

Lifting the Machine

Lifting The Machine Procedure

⚠ WARNING

CRUSHING HAZARD

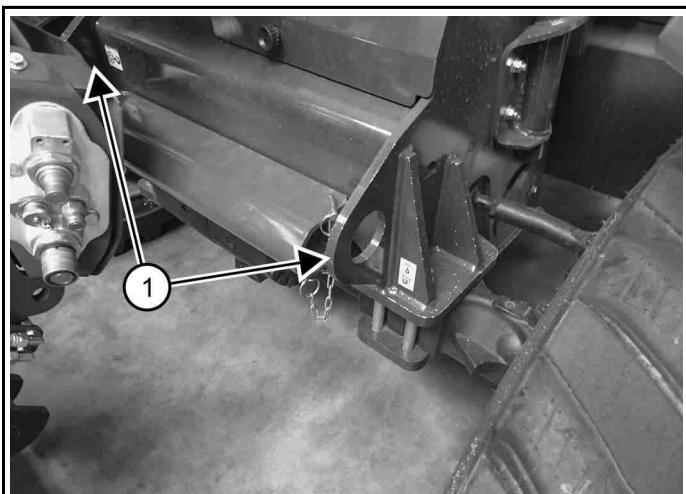
Falling machine can cause serious injury or death.

- Before lifting, check fasteners on four point lift.
- Never allow riders in the cab or bystanders within 5 m (15 ft) while lifting the machine. ◀

W-2160

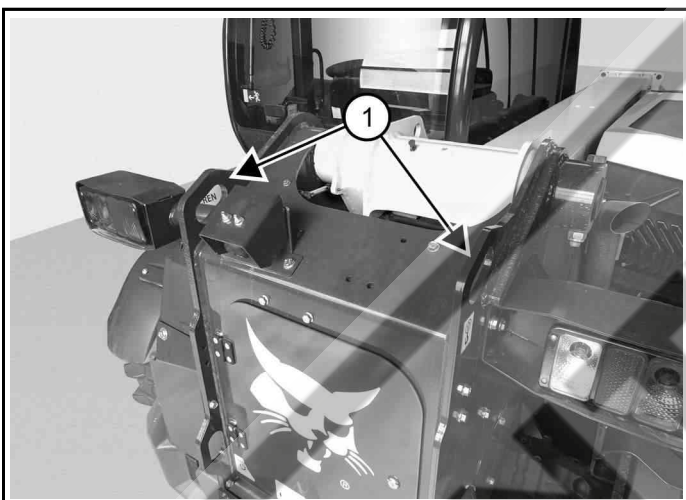
- Before lifting: Remove all attachments, lower boom fully, position wheels straight forward and stop the machine.
- Inspect visually the lifting points. If there are signs of damage or overloading, do not transport the machine.
- Remove the wheel wedge.

Figure 220



C215918a

Figure 221



C215918a

4. Attach the lift hooks to the following lifting points (Items 1) [Figure 220] and [Figure 221]:

Be sure to attach the lift hooks to the lifting points on the frame, not the boom.

5. Take into account the position of the machine's centre of gravity. (See Lifting on Page 312)

Transporting the Machine On a Trailer

Loading And Unloading

WARNING

INSTABILITY HAZARD
Wood ramps can break and cause personal injury. Use adequately designed ramps of sufficient strength to support the weight of the machine loading onto a transport vehicle.

W-2058

Be sure the transport and towing vehicles are of adequate size and capacity for the weight of the machine. (See Weights on Page 307)

Be sure that the contact areas with machine tyres are clean and free from ice, snow, and other slippery materials.

1. Inspect visually the tie-down points. If there are signs of damage or overloading, do not transport the machine.

Figure 222



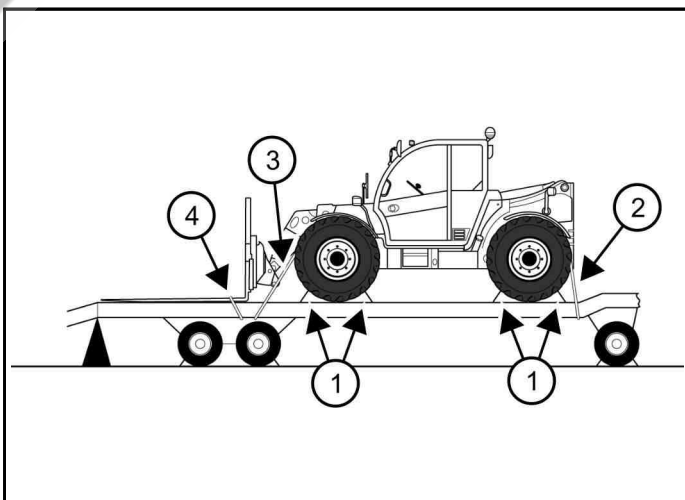
C216008

2. Block or support the rear of the trailer (Item 1) [Figure 222] when loading or unloading the machine to prevent the front end of the trailer from raising up.
3. Load the machine backward on the trailer.

Fastening

Fasten the machine to the transport vehicle to prevent it from moving during sudden stops or when going up or down slopes.

Figure 223



EM7143a

1. Block the wheels (Item 1) [Figure 223].
2. Use chains to fasten the machine frame to the transport vehicle (Items 2 and 3) [Figure 223]. Use chain binders to tighten the chains.
(See Tie Down on Page 313)
3. Attach the fork or bucket attachment to the transport vehicle (Item 4) [Figure 223].

Towing a Trailer with the Machine

This machine can be equipped with a rear hitch for towing.

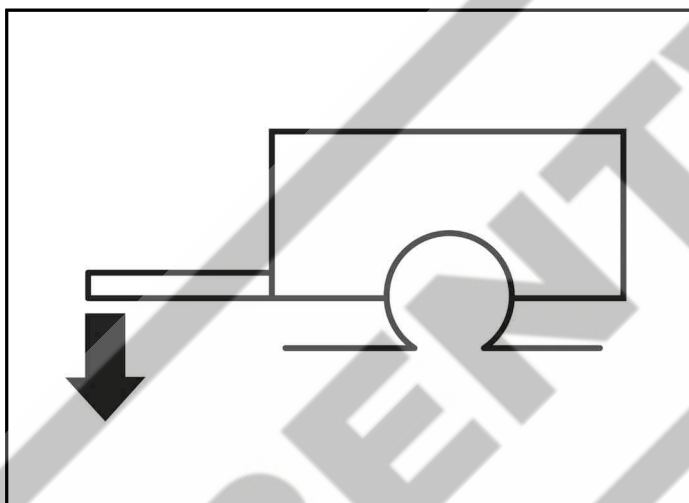
Make sure the machine and rear hitch or hydraulic hook have sufficient towing capabilities.
(See Performance on Page 307)

Rear Hitch Applications And Capacities

The hitches listed below are designed to meet the Annex XXXIV of directive (EU) 2015/208 for use on all approved applications described in the Operation & Maintenance manual of your machine.

Bobcat trailer coupling is approved to be used at the maximum speed reached by your machine.
(See Performance on Page 307)

Figure 224



MODEL	EC TYPE-APPROVAL	MAXIMUM PERMITTED VERTICAL LOAD @ max speed (kg / lb)	MAXIMUM PERMITTED TRAILER MASS for machine with inertia trailer brake (kg / lb)	MAXIMUM PERMITTED TRAILER MASS for machine without trailer brake (kg / lb)
Basic Tow Hitch	e1*2009/144*2013/15*0656*00	200 / 440	3500 / 7710	3500 / 7710
Rotating Tow Hitch	e1*2015/208*2018/829ND*00395*01	620 / 1360	17000 / 37570	3500 / 7710

Rear Hitch Installation

The rear hitch can only be installed at standard available fixation points of your machine.

Contact your Bobcat Dealer for installation of a rear hitch on your machine.

Rear Hitch Inspection Before Use

In addition to the daily inspection of the machine:

- Check safety decals are in good condition. Replace if damaged.
- Inspect cotter pin installation. Replace if damaged.
- Check that the pins rotate freely. Lubricate as needed.
- Inspect the draw bar condition. Replace if damaged.
- Inspect the trailer and trailer draw bar condition. Replace if worn or damaged.

Rear Hitch

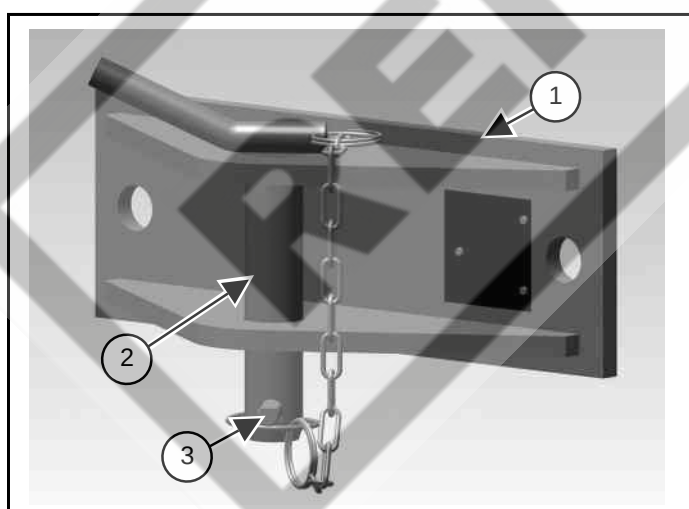
For towing always use a drawbar eyes that meets the following certifications:

MODEL	RECOMMENDED TRAILER COUPLING
Basic tow hitch	ISO 5692-3 shape X
Rotating tow hitch (Drawbar coupler tow hitch)	ISO 5692-2 ISO 8755 ISO 1102

In horizontal position of tractor and trailer, the connecting system (e.g. towing hook / drawbar eye) must be level to the roadway (angle deviation compared to the horizontal towards the top and below may not exceed 3 degrees) to ensure that the customary swinging draw bar angle between the connecting system is not impeded.

Basic Tow Hitch Description

Figure 225



P122708a

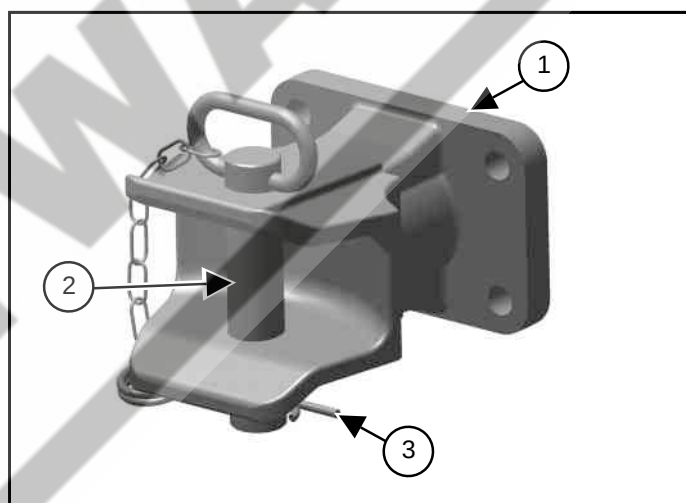
REF	DESCRIPTION
1	BASIC TOW HITCH
2	HITCH PIN
3	COTTER PIN

Basic Tow Hitch Operation

1. Remove the cotter pin (Item 3) from the hitch pin (Item 2) [Figure 225].
2. Remove the hitch pin (Item 2) from the hitch (Item 1) [Figure 225].
3. Install the drawbar eye in the hitch (Item 1) [Figure 225].
Only use self-rotating drawbar eyes.
4. Install the hitch pin (Item 2) and secure with the cotter pin (Item 3) [Figure 225].

Rotating Tow Hitch Description

Figure 226



P122578a

REF	DESCRIPTION
1	ROTATING TOW HITCH
2	PIN
3	COTTER PIN

Rotating Tow Hitch Operation

WARNING

CRUSHING HAZARD

Failure to follow instructions can cause serious injury or death.

Never enter the area between the telescopic handler and the trail vehicle when operating the machine. Before entering the area between the telescopic handler and the trail vehicle:

- Put the Travel Direction Control and the Joystick in neutral.
- Engage the parking brake.
- Retract and lower the boom and attachment / implement flat on the ground.
- Stop the engine. ◀

W-2980

1. Remove the cotter pin (Item 3) from the hitch pin (Item 2) .
2. Remove the hitch pin (Item 2) from the hitch (Item 1) .
3. Install the towing hook or drawbar eye in the hitch (Item 1) .
4. Install the hitch pin (Item 2) and secure with the cotter pin (Item 3) .

Rear Hitch Maintenance

- Lubricate the contact areas of the hitch pin and hitch.
- Check the torque value of the mounting bolts. Torque value should be 390 N•m (288 ft-lb).
- Replace the hitch pin if damaged or exceeding the abrasion limit (diameter < 26,5 mm [1.04 in]).

Connecting The Electrics

WARNING

CRUSHING HAZARD

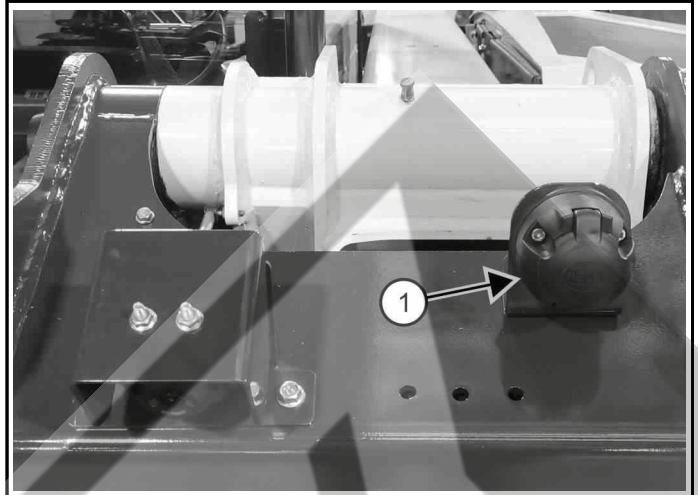
Failure to follow instructions can cause serious injury or death.

Never enter the area between the telescopic handler and the trail vehicle when operating the machine. Before entering the area between the telescopic handler and the trail vehicle:

- Put the Travel Direction Control and the Joystick in neutral.
- Engage the parking brake.
- Retract and lower the boom and attachment / implement flat on the ground.
- Stop the engine. ◀

W-2980

Figure 227

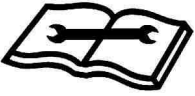


EM11333a

- Connect the electrical cable (if equipped) from the trailer to the 7-pin electrical plug (Item 1) [Figure 227] on the machine.

If the electrical cable is not connected to the machine, the trailer brake lights will not function.

MAINTENANCE SAFETY WARNINGS



- Never service the Bobcat machine without instructions. Read and understand the Operation & Maintenance Manual, Operator's Handbook and signs (decals) on machine.
- Follow warnings and instructions in manuals when making repairs, adjustments or servicing. Check for correct function after adjustments, repairs or service. Untrained operators and failure to follow instructions can cause injury or death.

Maintenance procedures which are given in the Operation & Maintenance Manual can be performed by the owner/operator without any specific technical training. Maintenance procedures which are not in the Operation & Maintenance Manual must be performed **ONLY BY QUALIFIED SERVICE PERSONNEL**. Always use genuine Bobcat replacement parts. The Service Safety Training Course is available from your Bobcat dealer.



This check mark means: "Follow instructions for proper operations." Carefully read the message that follows.

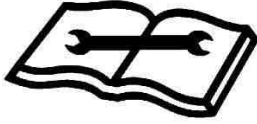


- Have good ventilation when welding or grinding painted parts.
- Wear dust mask when grinding painted parts. Toxic dust and gas can be produced.

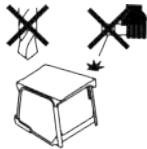
MAINTENANCE SAFETY WARNINGS



This Safety Alert Symbol means: "Attention! Be Alert! Your Safety is Involved!" Carefully read the message that follows.



- Cleaning and maintenance are required daily.



- Never modify equipment.
- Use only attachments approved by Bobcat Company for this machine model.



- Vent exhaust to outside when engine must be run for service.
- Exhaust system components and connections must be tightly sealed. Exhaust fumes can kill without warning.



- Use the correct procedure to lift and support the machine.
- Disconnecting or loosening any hydraulic tubeline, hose, fitting, component or a part failure can cause boom to drop. Do not go under boom when raised unless supported by an approved boom stop. Replace if damaged.



- Keep body, jewelry, and clothing away from moving parts, electrical contact, hot parts, and exhaust.
- Wear eye protection to guard from battery acid, compressed springs, fluids under pressure, and flying debris when engines are running or tools are used. Use eye protections approved for type of welding.



- Stop, cool, and clean engine of flammable materials before checking fluids.
- Never service or adjust machine with the engine running unless instructed to do so in the manual.
- Avoid contact with leaking hydraulic fluid or diesel fuel under pressure. It can penetrate the skin or eyes.
- Never fill fuel tank with engine running, while smoking, or when near open flame.



- Lead-acid batteries produce flammable and explosive gases.
- Keep arcs, sparks, flames, and lighted tobacco away from batteries.
- Batteries contain acid that burns eyes or skin on contact.
- Wear protective clothing. If acid contacts body, flush well with water. For eye contact, flush well and get immediate medical attention.

SERVICE SCHEDULE

Maintenance Intervals

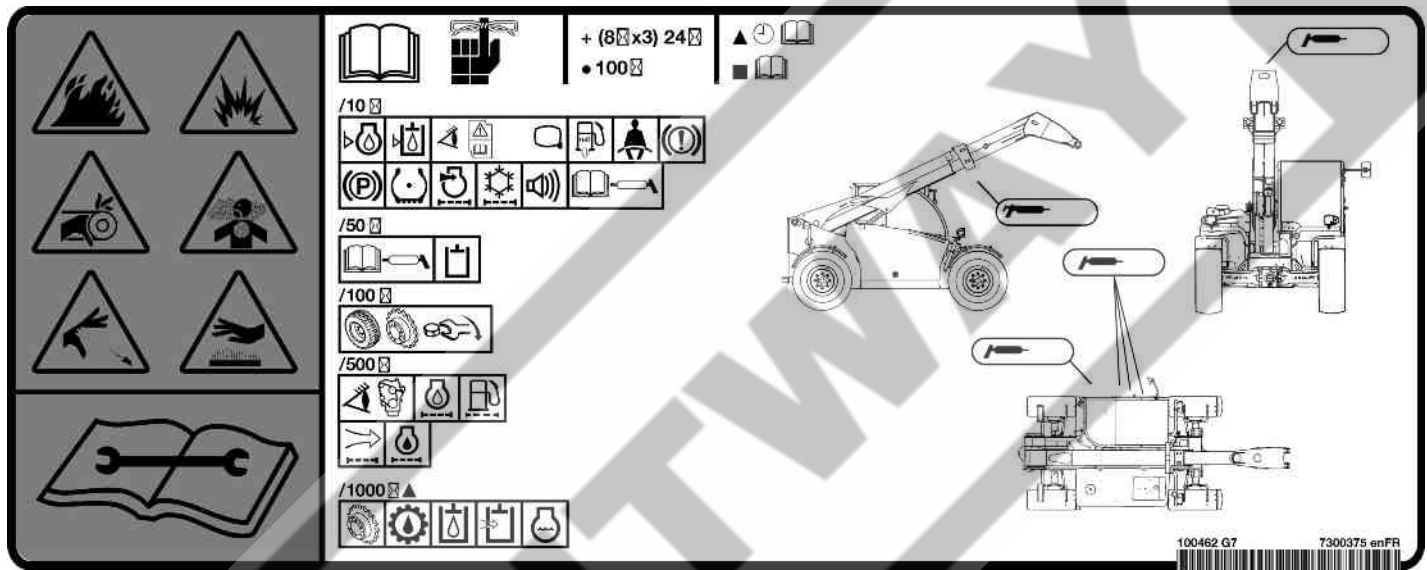
Maintenance work must be done at regular intervals. Failure to do so will result in excessive wear and early failures.

The maintenance items listed under the maintenance intervals on the following pages are the required tasks to be performed. Those items provide additional details and include maintenance that is not shown on the decal.

All maintenance intervals are for machines operating in general environmental conditions. Keep in mind that filter and oil life can be reduced:

- When machines are operating in high dust environments or extreme temperature applications.
- When fuel is taken from uncontrolled storage tanks.
- When other non-standard conditions exist.

For more details, contact your Bobcat dealer.



WARNING

INSUFFICIENT INSTRUCTIONS HAZARD

Untrained operators or failure to follow instructions can cause serious injury or death.

- Read and understand the Operation & Maintenance Manual, Operator's Handbook and decals on machine.
- Follow warnings and instructions in the manuals when making repairs, adjustments or servicing.
- Check for correct function after adjustments, repairs or service.

Service Schedule

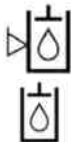
Explanation of the service intervals:

- **10:** Every 10 hours or daily (before starting the machine).
- **50:** Every 50 hours.
- **100:** Every 100 hours.
- **250:** Every 250 hours.
- **500:** Every 500 hours or every 12 months, whichever comes first.
- **1000:** Every 1000 hours or every 12 months, whichever comes first.
- **2000:** Every 2000 hours or every 24 months, whichever comes first.

- **3000:** Every 3000 hours or every 36 months, whichever comes first.

Service Schedule										
O	Check condition / proper operation. Adjust or replace as needed.		V	Refill as needed						
D	Check the display. Service only when required.		C	Clean						
W	Drain water		R	Replace						
F	First time only.		G	Grease						
Item		Service Required	Service Interval (hours)							
			10	50	100	250	500	1000	2000	3000
Tyres		Condition and pressure. Use only approved tyres. (See Tyre Maintenance on Page 181)	O							
Engine Oil		(See Engine Lubrication System on Page 157) • Engine Oil 10W30 (7341377) • Engine Oil 15W40 (7395725)	V					R		
Engine Oil Filter		(See Engine Lubrication System on Page 157) • Engine Oil Filter (7343102)						R		
Exhaust system		Check exhaust system and exhaust aftertreatment components for leaks.	CO							
Cooling System		Oil, charge air coolers and air conditioning condenser (if equipped). Keep cooling system free from debris. (See Cooling System on Page 159) Clean debris from radiator, air cooler, hydraulic fluid cooler, air conditioning condenser (if equipped), and grid.	VC-O							
		Check coolant concentration (with a refractometer). Replace as needed.						O		
		Coolant (check cold). (See Cooling System on Page 159) • Engine Coolant: ▷ Concentrated (6987803) ▷ Premixed (6987804)	V						R	
Heater Coil and Air Conditioning Evaporator		Contact your Bobcat dealer.							C	

Service Schedule									
O	Check condition / proper operation. Adjust or replace as needed.	V	Refill as needed						
D	Check the display. Service only when required.	C	Clean						
W	Drain water	R	Replace						
F	First time only.	G	Grease						
Item	Service Required	Service Interval (hours)							
		10	50	100	250	500	1000	2000	3000
Grease Fittings	Tilt cylinder rod end. (See Lubricating the Machine on Page 183)	G							
	Articulation pins, axle oscillation (front / rear), boom pivot, boom cylinder, self levelling (compensation) cylinder. (See Lubricating the Machine on Page 183)		G						
Telescopic Boom Wear Pads 	(See Lubricating the Machine on Page 183)		G			O			
Attachment Carrier	(See Attachment Carrier on Page 186)	G							
LLMC System	Test the LLMC calibration. (See LLMC Calibration Test on Page 144)			FO	O				
Engine Air System and Air Filters	Empty dust extractor. (See Cleaning The Dust Extractor on Page 150)	O				O			
	(See Replacing The Outer Filter on Page 150) • Outer Air Filter (7412642)	DO				O	R		
	(See Replacing The Inner Filter on Page 150) • Inner Air Filter (7412641)	DO				O		R	
Fuel Filter 	(See Fuel Filter on Page 154) • Main Fuel Filter (7336334)	DW				R			
	(See Fuel System on Page 152) • Fuel Pre-Filter (7348032) • Fuel Tank Breather (7373582)						R		
Back-up Alarm and Horn 	Check for proper function. (See Multi-function Lever on Page 43) and (See Back-up Alarm System on Page 68)	O							

Service Schedule										
O	Check condition / proper operation. Adjust or replace as needed.			V	Refill as needed					
D	Check the display. Service only when required.			C	Clean					
W	Drain water			R	Replace					
F	First time only.			G	Grease					
Item		Service Required	Service Interval (hours)							
			10	50	100	250	500	1000	2000	3000
Seat Belt		Check condition. Clean or replace seat belt retractors as needed. Clean dirt and debris from moving parts. (See Seat Belt on Page 143)	OC							
Hydraulic / Hydrostatic Fluid and Filter		(See Removing And Replacing Hydraulic / Hydrostatic Filters on Page 174) • Hydraulic Main Filter (7225338)			FR		R			
		(See Checking And Adding Fluid on Page 171) and (See Removing And Replacing Hydraulic Fluid on Page 172) • Hydraulic Fluid (6987791B)	V					R		
		(See Removing And Installing The Fill / Breather Cap on Page 175) • Hydraulic Fill / Breather Cap (6727475)					R			
Hydraulic Hoses and Tubelines		Contact your Bobcat dealer to replace any damaged hoses or tubelines.		O						
Parking Brake / Service Brake		Check For Proper Function. (See Parking Brake on Page 67) and (See Service Brake Pedal And Inching Control on Page 53)	O							
Safety Signs, Treads And Mirrors		Check for damaged signs (decals), safety treads and mirrors. Replace any signs, safety treads or mirrors that are damaged or worn. (See Machine Signs (Decals) on Page 25)	O							
Articulated Steering Links		Rubber protection. Contact your Bobcat dealer if damaged.		O						
Wheel Nut Torque		(See Wheel Nuts on Page 181)	FO		O					

Service Schedule									
O	Check condition / proper operation. Adjust or replace as needed.			V	Refill as needed				
D	Check the display. Service only when required.			C	Clean				
W	Drain water			R	Replace				
F	First time only.			G	Grease				
Item		Service Required	Service Interval (hours)						
			10	50	100	250	500	1000	2000
Alternator		Belt. (See Alternator Belt on Page 179)				O			R
Air-Conditioning (if equipped)		Belt. (See Air Conditioning Belt on Page 180)				O			R
Axle Central Housing, Differential, Planetary Carriers and Reduction Box		(See Axles (Front and Rear) on Page 175) • Axle Oil (6987794)			FR	V		R [A]	
Cab Air Filter		(See Heating, Ventilation and Air Conditioning System (HVAC) on Page 148) • Cab Air Filter(7228497)					OC		
Battery		Cables and electrical connections. (See Battery Maintenance on Page 168) • Battery (7288629)					O		
Engine Mounts								O	
Fastenings, Hose Unions and Clips								O	

[A] Half fluid change intervals must be applied in at least one of these use cases:

- More than 700H/12 months
- Cooperatives of multiple owners
- Recycling application
- Biogas application
- Forestry application

Inspection Checkbook

Maintenance work must be done at regular intervals. Failure to do so will result in excessive wear and early failures.

The service schedule is a guide for correct maintenance of the Bobcat Telescopic Handler.

The Inspection Checkbook contains the following information:

- Doosan Bobcat EMEA s.r.o. Warranty Policy
- Doosan Bobcat EMEA s.r.o. Extended Warranty Policy

The Inspection Checkbook has to be filled in by the Dealer for any maintenance and service work of your Bobcat machine. This book may be required anytime by an authorised dealer or by Bobcat Europe, should a breakdown occur on the Bobcat equipment. Your local dealer can order the Inspection Checkbook.

Part number: 7296478

SEAT BELT

Inspection And Maintenance

⚠ WARNING

GENERAL HAZARD

Failure to properly inspect and maintain the seat belt can cause lack of operator restraint resulting in serious injury or death.

W-2466

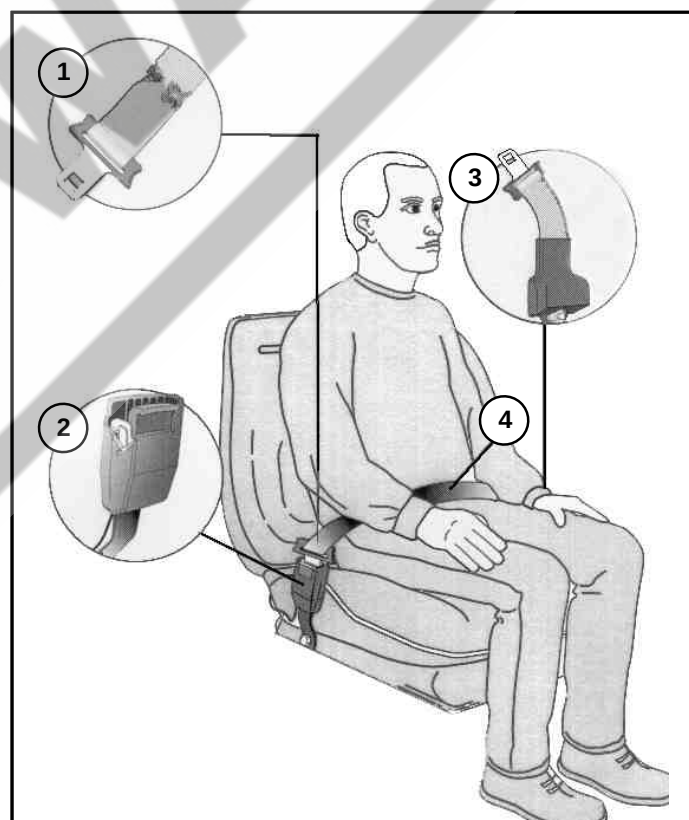
Check the seat belt daily for correct function.

Inspect the seat belt system thoroughly at least once each year or more often if the machine is exposed to severe environmental conditions or applications.

Any seat belt system that shows cuts, fraying, extreme or unusual wear, significant discolourations due to ultraviolet UV exposure, dusty / dirty conditions, abrasion to the seat belt webbing, or damage to the buckle, latch plate, retractor (if equipped), hardware or any other obvious problem should be replaced immediately.

The items below are referenced in [Figure 228].

Figure 228



1. Check the webbing. If the system is equipped with a retractor, pull the webbing completely out and inspect the full length of the webbing. Look for cuts, wear, fraying, dirt and stiffness.
2. Check the buckle and latch for correct operation. Make sure latch plate is not excessively worn,

deformed or buckle is not damaged or casing broken.

3. Check the retractor web storage device (if equipped) by extending webbing to determine if it looks correct and that it spools out and retracts webbing correctly.
4. Check webbing in areas exposed to ultraviolet (UV) rays from the sun or extreme dust or dirt. If the original colour of the webbing in these areas is extremely faded and / or the webbing is packed with dirt, the webbing strength can have deteriorated.

See your Bobcat dealer for seat belt system replacement parts for your machine.

LLMC CALIBRATION TEST

LLMC Calibration Test Procedure

⚠ WARNING

INSTABILITY HAZARD

Tipping can cause serious injury or death.

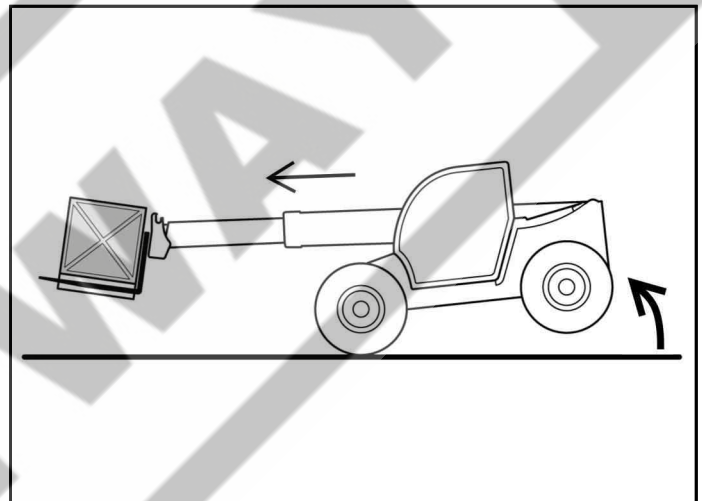
Keep the boom low, only raise the load 500 mm (20 in) when testing or calibrating the LLMI / LLMC system.*

W-2929

The LLMC system calibration can be tested by performing the following procedure:

1. Pick up a load and park the machine on flat level ground and align the front and rear wheels straight ahead.

Figure 229

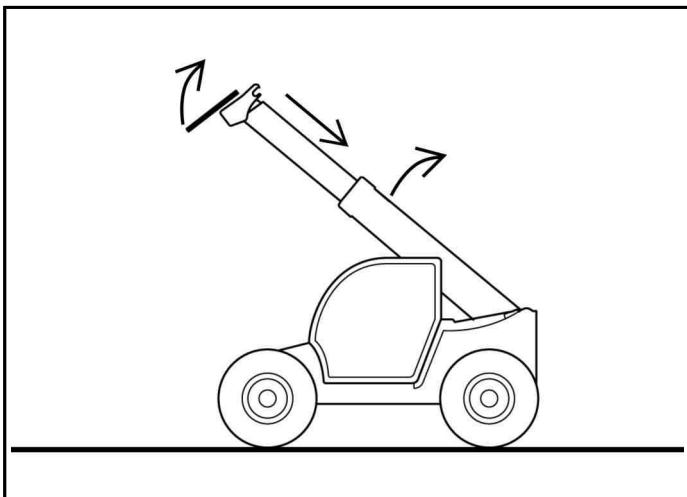


2. Using the LLMC override switch, decrease the rear axle load pressure by extending the boom until the machine's rear wheels lift off the ground slightly [Figure 229].

Do not move or reposition the machine after decreasing the rear axle load pressure.

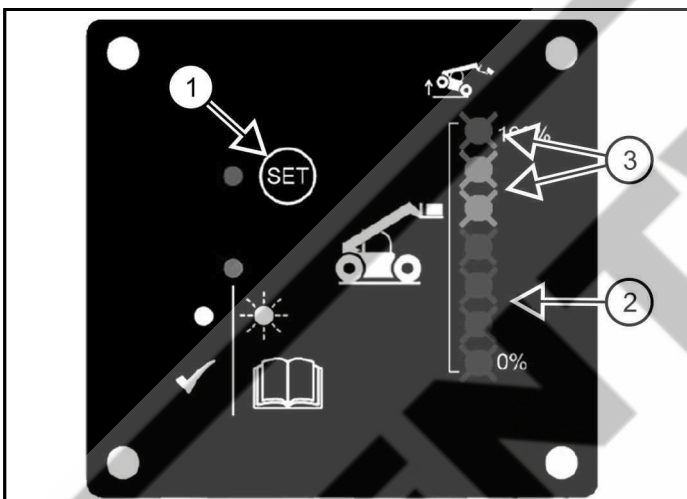
3. Retract the boom and place the load on the ground.

Figure 230



4. Without attachment and with the attachment carrier fully tilted up, fully retract and raise the boom [Figure 230].

Figure 231

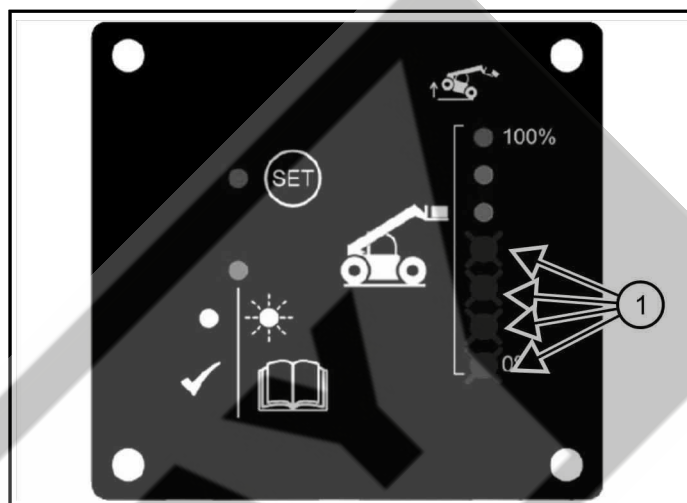


5. Push and hold the **[SET]** button (Item 1) [Figure 231] during the complete procedure. Keep holding the test button for default test result confirmation.

All the LEDs (Item 2 and 3) light up, and the buzzer sounds discontinuously during 3 seconds.

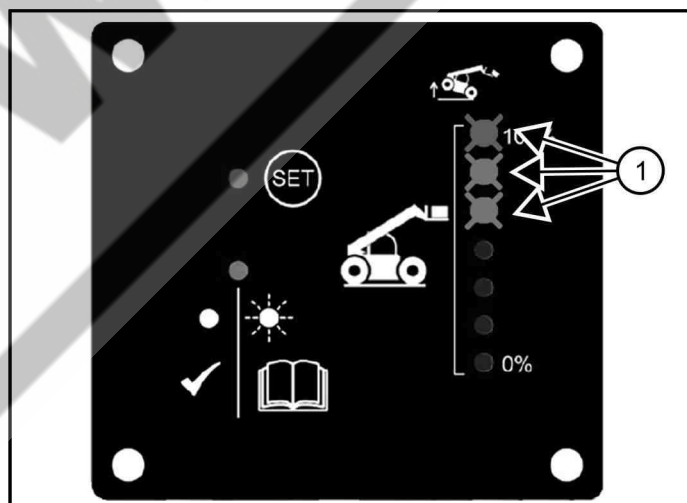
Two test results are possible:

Figure 232



- If the four green LEDs (Item 1) [Figure 232] light up, calibration is OK.

Figure 233



- If the orange and red LEDs (Item 1) [Figure 233] light up, calibration is out of range. Please redo calibration of the LLMI / LLMC system. (See your Bobcat dealer for calibration).

6. Release the **[SET]** button (Item 1) [Figure 231].

The calibration test is finished.

After pressing the **[SET]** button (Item 1) [Figure 231] longer than 60 seconds, the procedure will automatically end and the system will return to normal mode.

The system always returns to normal mode when the **[SET]** button (Item 1) [Figure 231] is released during the procedure.

APPROVED BOOM STOP

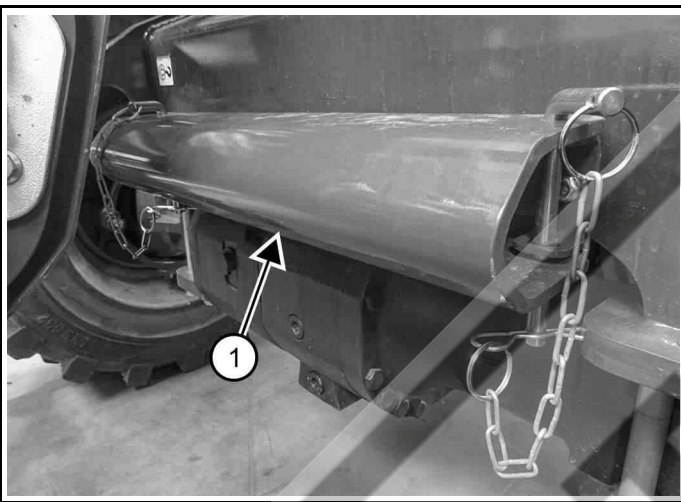
This machine may be equipped with an approved boom stop.

If the boom is raised for service or maintenance, use the following procedure to install and remove the approved boom stop.

Installing The Approved Boom Stop

1. Park the machine on a flat, solid and level surface.
2. With the operator in the seat, the seat belt fastened, travel direction switch / control lever (optional) in neutral and the parking brake engaged, start the engine, raise the boom and stop the engine.

Figure 234



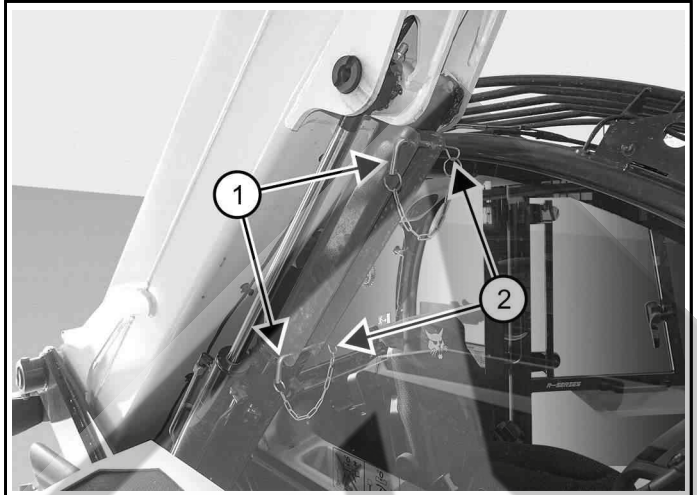
3. Remove the approved boom stop (Item 1) [Figure 234] from the storage position.

Figure 235



4. Operating from the left back side of the machine, install the approved boom stop (Item 1) [Figure 235] over the boom cylinder rod.

Figure 236



5. Install the pins (Item 1) and secure with retainer pins (Item 2) [Figure 236].
6. Start the engine and lower the boom slowly until the approved boom stop is held securely.

Removing The Approved Boom Stop

⚠ WARNING

INSTABILITY HAZARD

Failure to use an approved boom stop can allow the boom to drop and cause injury or death. Using a damaged boom stop or with missing parts can cause boom to drop causing injury or death. Never work on a machine with the boom up unless the boom is held by an approved boom stop. Service boom stop if damaged or if parts are missing. †

1. Start the engine and raise the boom. Stop the engine.
2. Operating from the left back side of the machine, remove the retainer pins (Item 2), pins (Item 1) [Figure 236] and approved boom stop (Item 1) [Figure 235].
3. Reinstall the approved boom stop in the storage position (Item 1) [Figure 234].

BACK-UP ALARM SYSTEM

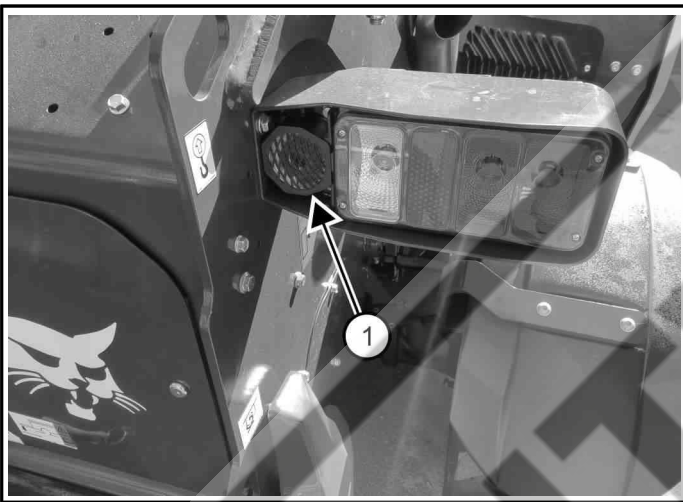
Back-up Alarm System Description

The back-up alarm will sound when the operator moves the travel direction control into the reverse position AND the engine is running.

Inspecting The Back-up Alarm System

1. Sit in the seat and fasten the seat belt. Start the engine and disengage the parking brake.
2. Move the travel direction switch / control lever (optional) into the reverse position. The back-up alarm must sound.
3. Turn the switch to the OFF position and make sure the parking brake is engaged.

Figure 237

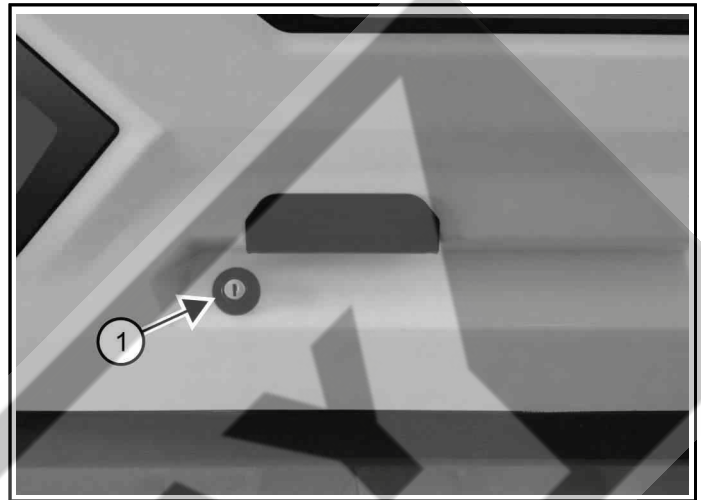


4. The back-up alarm (Item 1) is located at the rear of the machine, next to the right rear road light.
5. Inspect the back-up alarm electrical connection (Item 2) [Figure 237] and the wire harness for tightness and damage. Repair or replace any damaged components.

ENGINE COVER

Opening And Closing The Engine Cover

Figure 238

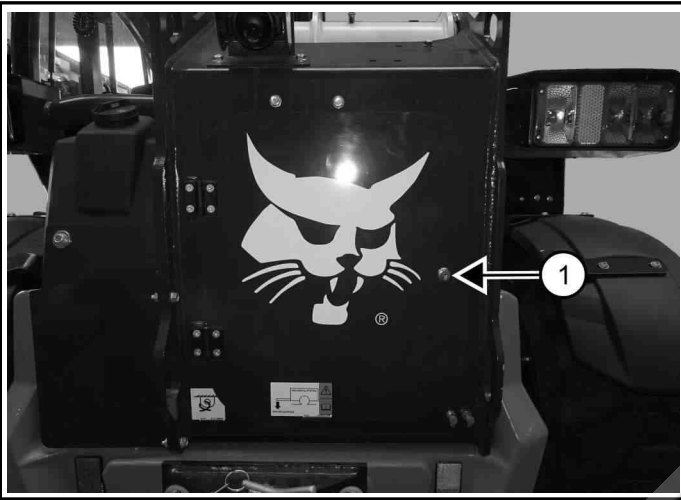


- Turn the key switch (Item 1) [Figure 238] clockwise to unlock. Remove the key and push the key switch. Raise the engine cover to provide access to the engine compartment for maintenance.

REAR DOOR

Opening And Closing The Rear Door

Figure 239



EM11315a

- Turn the key switch (Item 1) [Figure 239] anticlockwise and pull to open the rear door.

HEATING, VENTILATION AND AIR CONDITIONING SYSTEM (HVAC)

This machine may be equipped with a heating, ventilation and air conditioning system.

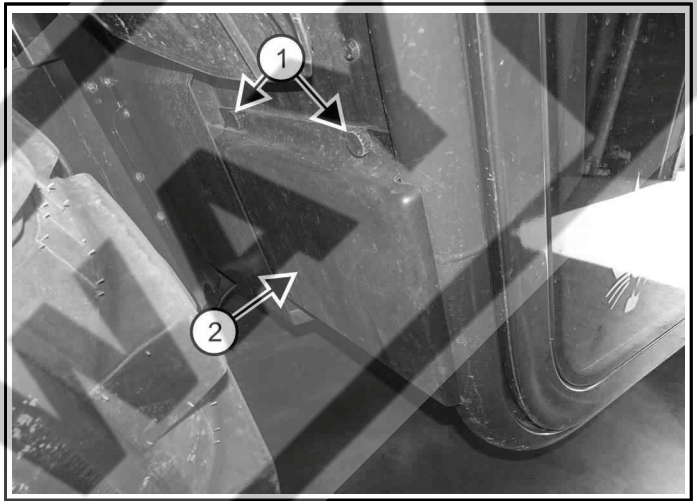
Cleaning And Maintenance

The HVAC system requires regular inspection and maintenance. (See Service Schedule on Page 138)

Cab Filter

The fresh air filter is located on the front of the operator cab.

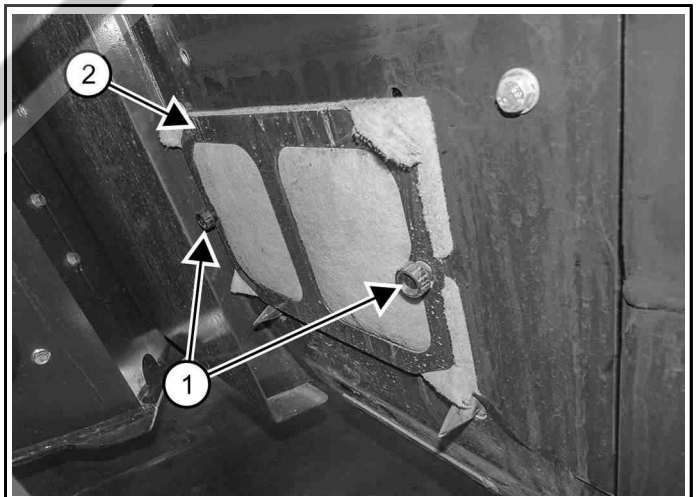
Figure 240



C219524a

1. Remove the two screws (Item 1) and the cover (Item 2) [Figure 240].

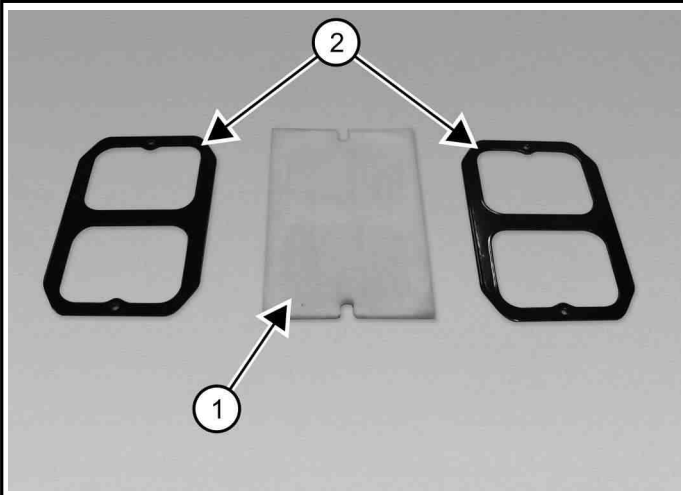
Figure 241



C219525a

2. Remove the two screws (Item 1) and the filter assembly (Item 2) [Figure 241].

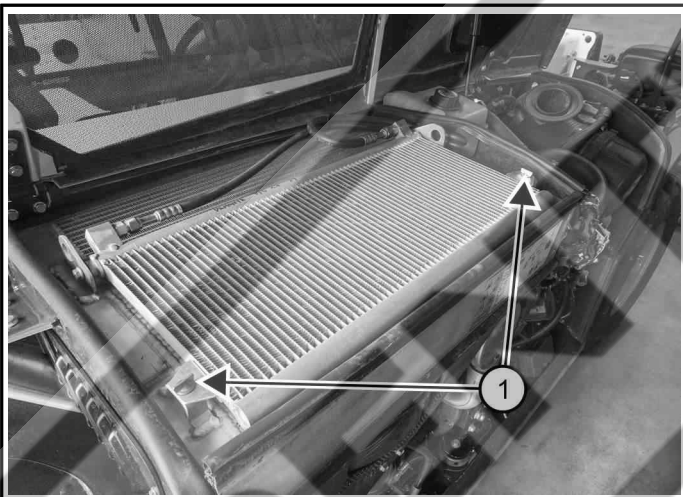
Figure 242



3. Remove the filter (Item 1) from in between the filter holders (Item 2) [Figure 242].
4. Clean or replace the filter as necessary.

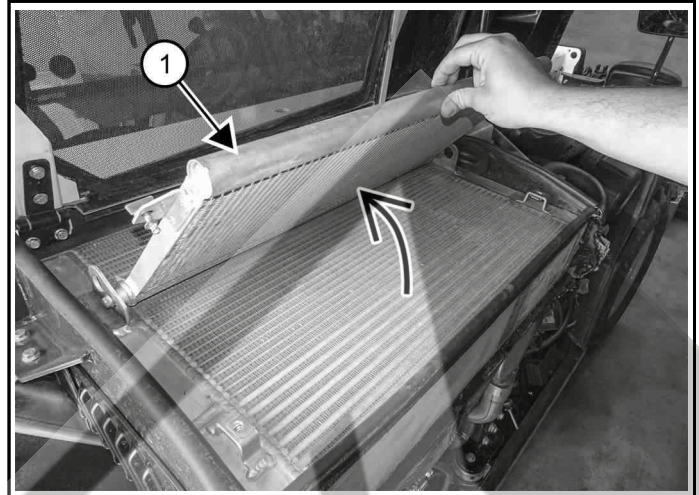
Cleaning The Condenser

Figure 243



1. Loosen the two screws (Item 1) [Figure 243].

Figure 244



2. Raise the condenser (Item 1) [Figure 244].
3. Use low pressure air to clean the condenser (Item 1) [Figure 244]. Be careful not to damage fins.
4. Lower the condenser and tighten the two screws (Item 1) [Figure 243].

Air Conditioning Lubrication

- Run the air conditioning for about five minutes every week to lubricate the internal components.

Air Conditioning Troubleshooting

- If the fan does not run, or the air conditioning does not turn on, check the fuse. (See Fuses And Relays Location / Identification on Page 162)
- If the air conditioning system circulates warm air, the refrigerant may need to be recharged. Contact your Bobcat dealer for recharging the air conditioning system.

AIR CLEANER SERVICE

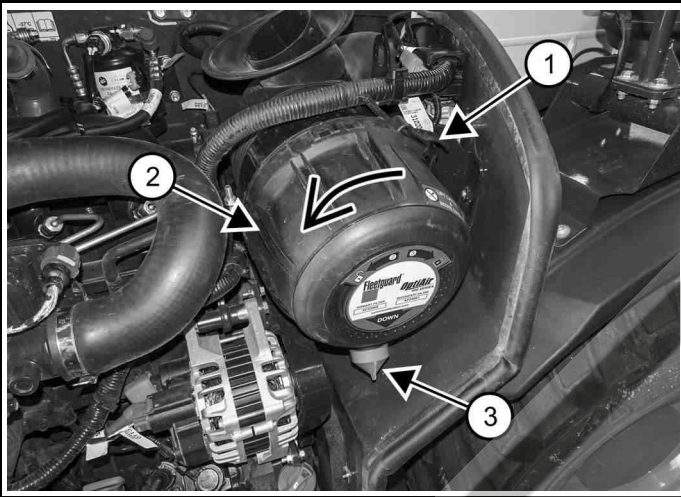
Replacing Filter Elements

Replacing The Outer Filter

Replace the inner filter every second time the outer filter is replaced or as indicated.
(See Service Schedule on Page 138)

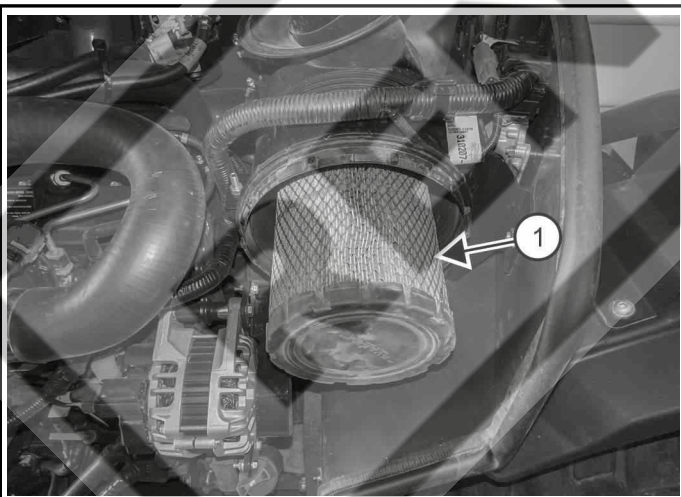
1. Stop the engine and open the engine cover.

Figure 245



2. Open the clip (Item 1) [Figure 245] to unlock the cover.
3. Rotate the cover (Item 2) [Figure 245] anticlockwise a small amount to remove.

Figure 246



4. Remove the outer filter (Item 1) [Figure 246] and discard.

NOTE: Make sure the filter housing is free of dirt and debris. Verify that sealing surfaces are clean. DO NOT use compressed air.

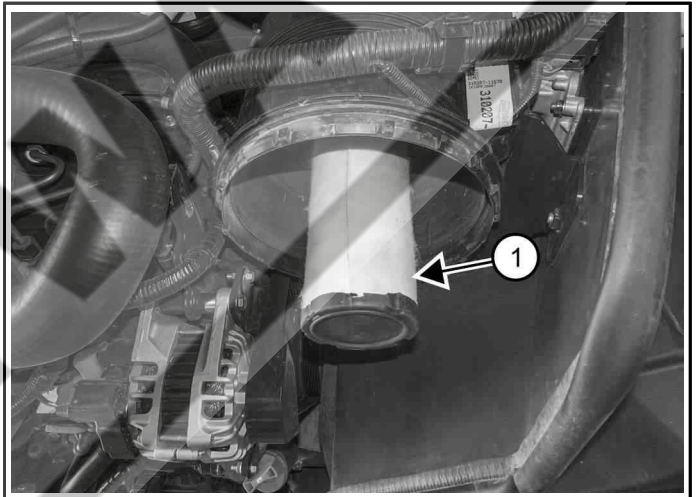
5. Install a new outer filter. Push in until the filter contacts the base of the housing.
6. Install the cover (Item 2) so that the rubber evacuator (Item 3) [Figure 245] is pointed downward.
7. Rotate the cover clockwise a small amount.
8. Close the clip (Item 1) [Figure 245] in to lock the cover in place.
9. Close the engine cover.

Replacing The Inner Filter

Replace the inner filter element every second time the outer filter is replaced or as indicated.
(See Service Schedule on Page 138)

1. Stop the engine and open the engine cover.
2. Remove the outer filter.
(See Replacing The Outer Filter on Page 150)

Figure 247



3. Remove the inner filter (Item 1) [Figure 247] and discard.

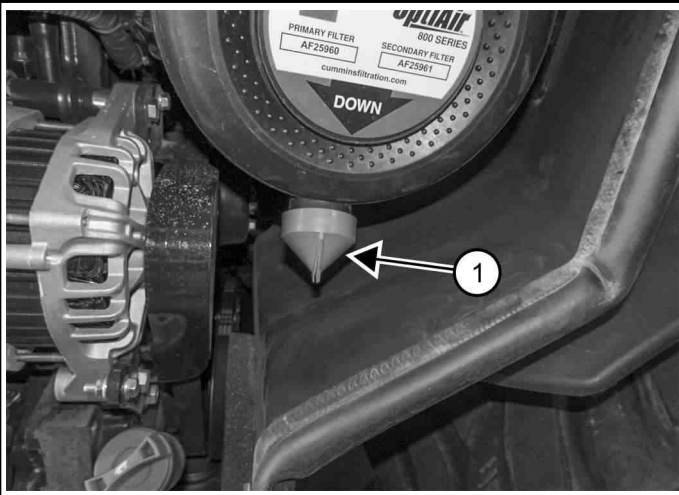
NOTE: Make sure the filter housing is free of dirt and debris. Verify that sealing surfaces are clean. DO NOT use compressed air.

4. Install the new inner filter. Push in until the filter contacts the base of the housing.
5. Install the new outer filter.
(See Replacing The Outer Filter on Page 150)
6. Close the engine cover.

Cleaning The Dust Extractor

1. Stop the engine and open the engine cover.

Figure 248



2. Clean the dust extractor (Item 1) [Figure 248] underneath the air filter housing. If needed, remove the dust extractor for complete cleaning.
3. Close the engine cover.

DIESEL PARTICULATE FILTER (DPF) SYSTEM

DPF Service Description

The engine exhaust system is equipped with a DPF. The DPF is an emissions reduction device that removes diesel particulate matter (soot) from the exhaust gases of the diesel engine. The DPF will trap and collect the soot until it is burned off. The process of burning off the collected soot is called regeneration.

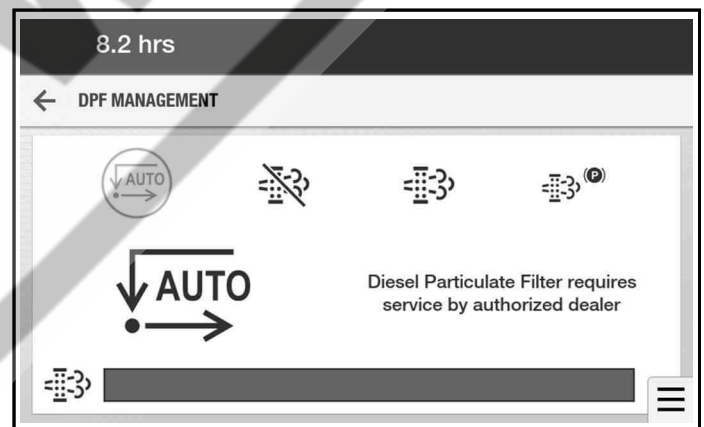
A service regeneration cycle may be required if too much soot is allowed to accumulate in the DPF. This can occur in the following situations:

- The machine is often operated for brief periods (less than 30 minutes) that do not allow sufficient time for the DPF to complete an automatic or operator activated forced regeneration cycle.
- The inhibit mode is used for an extended period of time. This will inhibit the DPF from actively regenerating and burning off the collected soot.

Ash residue will remain after the regeneration process is complete. The ash must be removed from the DPF every 5000 hours or earlier if the display shows service code "P242F".

DPF Service Regeneration

Figure 249



The machine will alert the operator when DPF service is required [Figure 249].

Service code "P24A3" "Very High DPF Soot Mass - Service Regen Required" will be accompanied by a severe torque reduction.

Service regeneration requires the use of specialised equipment. See your Bobcat dealer for service regeneration.

DPF Cleaning

Contact your Bobcat dealer to arrange the cleaning of the DPF when indicated.

Service code "P242F" "High DPF Ash Content - Ash Cleaning Needed" will show in the display screen when DPF cleaning is necessary.

The DPF is a critical component of the engine exhaust system and must be properly maintained. Specialised equipment is required to clean the ash from the DPF. See your Bobcat dealer for DPF cleaning.

FUEL SYSTEM

Fuel Specifications

NOTE: Contact your local fuel supplier to receive recommendations for your region.

U.S. Standard (ASTM D975)

Use only clean, high quality diesel fuel, grade number 2-D or grade number 1-D.

Ultra-low sulfur diesel fuel must be used in this machine. Ultra-low sulfur is defined as 15 mg/kg (15 ppm) sulfur maximum.

The following is one suggested blending guideline that should prevent fuel gelling during cold temperatures:

TEMPERATURE	GRADE 1-D	GRADE 2-D
Above -9°C (+15°F)	0%	100%
Down to -21°C (-5°F)	50%	50%
Below -21°C (-5°F)	100%	0%

NOTE: Biodiesel blend fuel may also be used in this machine. Biodiesel blend fuel must contain no more than five percent biodiesel mixed with ultra-low sulfur petroleum based diesel. This biodiesel blend fuel is commonly marketed as B5 blended diesel fuel. B5 blended diesel fuel must meet ASTM specifications.

E.U. Standard (EN590)

Use only clean, high quality diesel fuel that meets the EN590 specifications listed below:

- Sulfur-free diesel fuel defined as 10 mg/kg (10 ppm) sulfur maximum.
- Diesel fuel with cetane number of 51.0 and above.

NOTE: Biodiesel blend fuel may also be used in this machine. Biodiesel blend fuel must contain no more than seven percent biodiesel mixed with sulfur-free petroleum based diesel. This biodiesel blend fuel is commonly marketed as B7 blended diesel fuel. B7 blended diesel fuel must meet EN590 specifications.

Biodiesel Blend Fuel

Biodiesel blend fuel has unique qualities that should be considered before using in this machine:

- Cold weather conditions can lead to plugged fuel system components and hard starting.
- Biodiesel blend fuel is an excellent medium for microbial growth and contamination, which can cause corrosion and plugging of fuel system components.
- Use of biodiesel blend fuel may result in premature failure of fuel system components, such as plugged fuel filters and deteriorated fuel lines.

- Shorter maintenance intervals may be required, such as cleaning the fuel system and replacing fuel filters and fuel lines.
- Using biodiesel blended fuels containing more than the recommended amount of biodiesel can affect engine life and cause deterioration of hoses, tubelines, injectors, injector pump, and seals. (See Fuel Specifications on Page 152)

Apply the following guidelines if biodiesel blend fuel is used:

- Ensure the fuel tank is as full as possible at all times to prevent moisture from collecting in the fuel tank.
- Ensure that the fuel tank cap is securely tightened.
- Biodiesel blend fuel can damage painted surfaces. Remove all spilled fuel from painted surfaces immediately.
- Drain all water from the fuel filter daily before operating the machine.
- Do not exceed engine oil change interval. Extending oil change intervals can cause engine damage.
- Before vehicle storage, drain the fuel tank, refill with 100% petroleum diesel fuel, add fuel stabiliser, and run the engine for at least 30 minutes.

NOTE: Biodiesel blend fuel does not have long-term stability and should not be stored for more than three months.

Filling The Fuel Tank

⚠ WARNING

FIRE AND EXPLOSION HAZARD

Failure to follow instructions can cause serious injury or death.

Stop the engine and allow it to cool before adding fuel. NO SMOKING! ◀

W-2063

⚠ WARNING

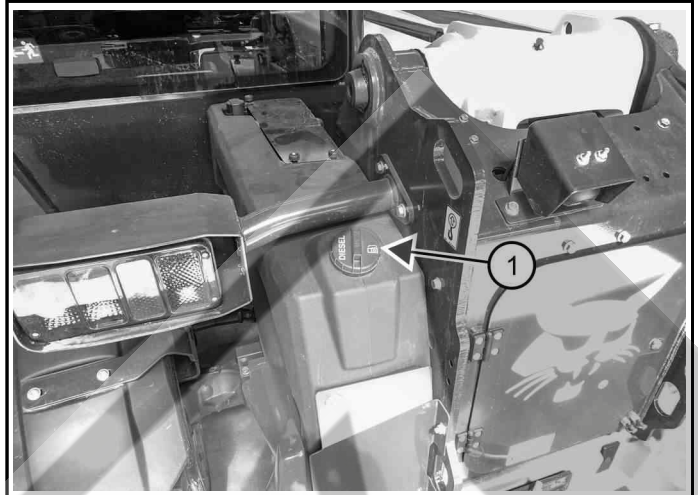
FIRE AND EXPLOSION HAZARD

Failure to use care around combustibles can cause serious injury or death.

Always clean up spilled flammable fluids or oil. Keep heat, flames, sparks or lighted tobacco away from flammable fluids and oil. ◀

W-2103

Figure 250



C215932a

1. Remove the fuel fill cap (Item 1) [Figure 250].
2. Use a clean, approved safety container to add fuel of the correct specifications.

Add fuel only in an area that has free movement of air and no open flames or sparks. NO SMOKING!

3. Install and tighten the fuel fill cap (Item 1) [Figure 250].

Replacing The Fuel Tank Breather

⚠ WARNING

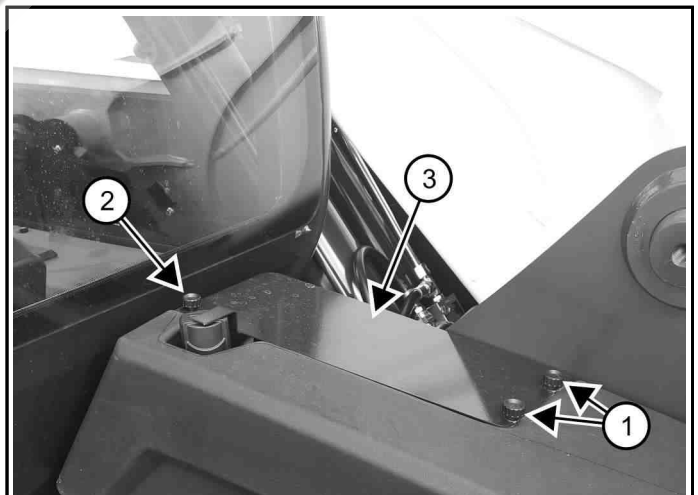
FIRE AND EXPLOSION HAZARD

Failure to use care around combustibles can cause serious injury or death.

Always clean up spilled flammable fluids or oil. Keep heat, flames, sparks or lighted tobacco away from flammable fluids and oil. ◀

W-2103

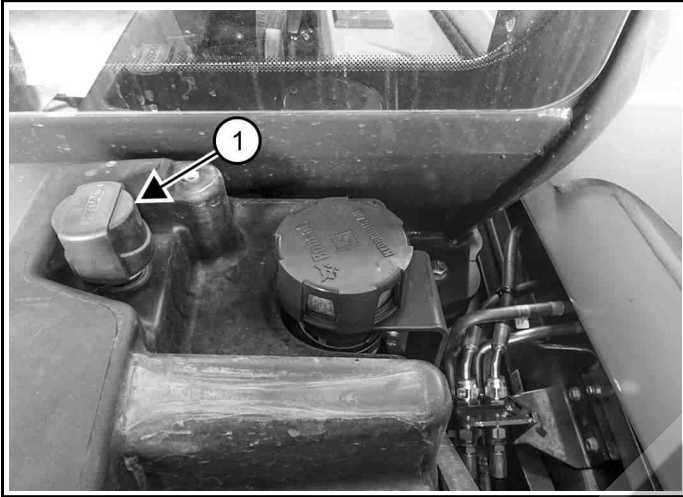
Figure 251



EM11330b

1. On the fuel tank, loosen the two screws (Item 1) [Figure 251].
2. Remove the screw (Item 2) and the cover (Item 3) [Figure 251].

Figure 252



3. Remove and discard the fuel tank breather (Item 1) [Figure 252].
4. Install a new fuel tank breather and tighten to 10 N·m (88 in-lb) torque.

Fuel Pre-Filter

WARNING

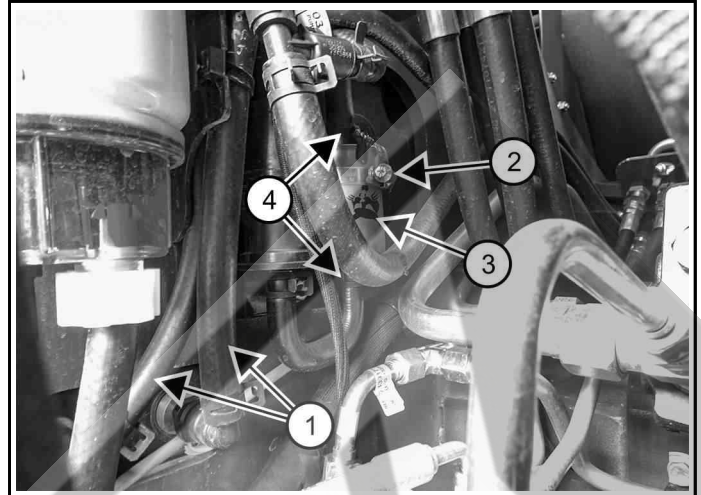
INJECTION HAZARD

Pressurised diesel fuel or hydraulic fluid can penetrate skin and eyes, causing serious injury or death. Fluid leaks under pressure may not be visible. Use a piece of cardboard or wood to find leaks. DO NOT use your bare hand. Wear safety goggles. If fluid enters skin or eyes, get immediate medical attention from a doctor familiar with this injury.

See the service schedule for the service interval when to replace the fuel pre-filter.
(See Service Schedule on Page 138)

1. Stop the engine.
2. Open the rear door. (See Rear Door on Page 148)
3. Place a suitable container under the filter in order to catch any fuel that might spill.
4. Clean up any spilled fuel.

Figure 253



5. Either close the shut-off valve (if equipped) or clamp off the hoses (Item 1) [Figure 253].
6. Loosen and remove the clamp (Item 2) from the fuel pre-filter (Item 3) [Figure 253].
7. Loosen the clamps (Item 4) [Figure 253] on both sides of the fuel pre-filter.
8. Replace the fuel pre-filter and install the clamps (Item 4) [Figure 253].
9. Install and tighten the clamp (Item 2) [Figure 253].
10. Remove the clamps from the hoses (Item 1) [Figure 253].
11. Dispose of drained fluid in an environmentally safe manner.
12. Remove air from the fuel system.
(See Removing Air From The Fuel System on Page 156)
13. Start the engine and allow to operate for one minute.
14. Stop the engine and check for leaks at the pre-filter.
15. Close the rear door.

Fuel Filter

See the service schedule for the service interval when to replace the fuel filter.
(See Service Schedule on Page 138)

Removing Water

IMPORTANT

MACHINE DAMAGE HAZARD

Water in the fuel system can cause serious engine damage.

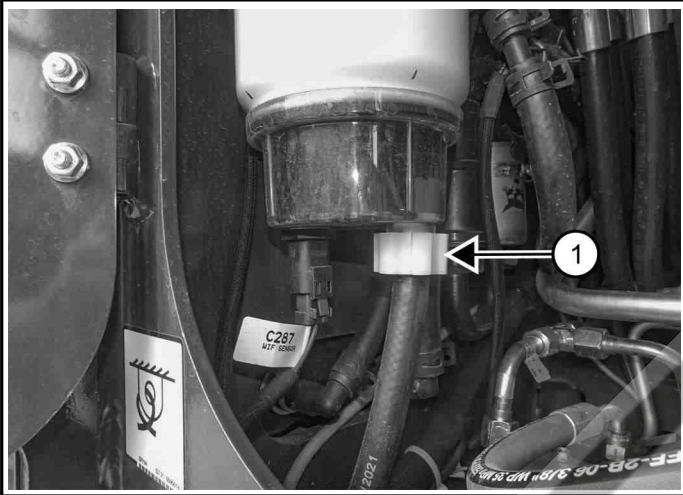
Remove water from the main fuel filter daily.

1-2354

Presence of water in the fuel system is displayed on the display screen with an error code.
(See Monitoring The Standard Display During Operation on Page 91)

1. Stop the engine and open the rear door.
(See Rear Door on Page 148)

Figure 254



2. Take the hose connected to the drain valve (Item 1) [Figure 254] out of the machine. Place a suitable container under the hose in order to catch any fuel that might spill. Clean up any spilled fuel.
3. Loosen the drain valve (Item 1) [Figure 254] at the bottom of the filter to remove trapped water from the filter.
4. When clean fuel drains from the filter, hand tighten the drain valve (Item 1) [Figure 254].
5. Dispose of drained fluid in an environmentally safe manner.
6. Close the rear door.

Replacing Element

⚠ WARNING

INJECTION HAZARD

Pressurised diesel fuel or hydraulic fluid can penetrate skin and eyes, causing serious injury or death.

Fluid leaks under pressure may not be visible. Use a piece of cardboard or wood to find leaks. **DO NOT** use your bare hand. Wear safety goggles. If fluid enters skin or eyes, get immediate medical attention from a doctor familiar with this injury.

W-2072

⚠ WARNING

FIRE AND EXPLOSION HAZARD

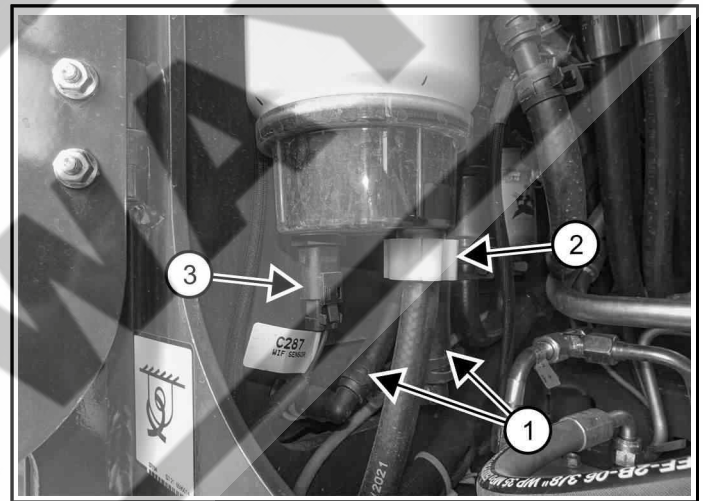
Failure to use care around combustibles can cause serious injury or death.

Always clean up spilled flammable fluids or oil. Keep heat, flames, sparks or lighted tobacco away from flammable fluids and oil.

W-2103

1. Stop the engine and open the rear door.
(See Rear Door on Page 148)
2. Place a suitable container under the filter in order to catch any fuel that might spill.
3. Clean up any spilled fuel.
4. Clean the outside of the filter.

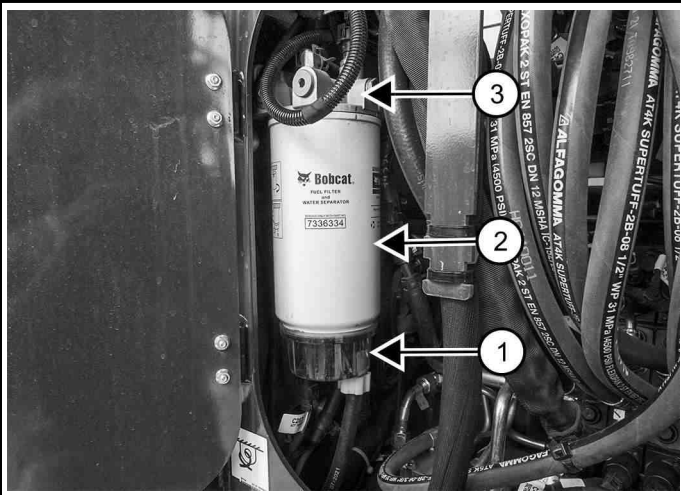
Figure 255



C219937e

5. Clamp off the hoses (Item 1) [Figure 255].
6. Loosen the drain valve (Item 2) [Figure 255] and allow the fluid to drain into the container. Dispose of drained fluid in an environmentally safe manner.
7. When fuel stops draining from the filter, disconnect the electrical connector (Item 3) [Figure 255].

Figure 256



8. Remove the fuel filter cap (Item 1) from the fuel filter element (Item 2) [Figure 256].
9. Remove the fuel filter element (Item 2) from the fuel filter head (Item 3) [Figure 256]. Do NOT remove the hoses from the fuel filter head.

Do NOT fill the new fuel filter element with fuel at this time.

10. Put clean oil on the two new fuel filter element O-rings, install the element, and tighten 3/4 turn by hand.
11. Install the fuel filter cap on the fuel filter element.
12. Connect the electrical connector (Item 3) [Figure 255].
13. Remove the clamps from the hoses (Item 1) [Figure 255].
14. Remove air from the fuel system.
(See Removing Air From The Fuel System on Page 156)
15. Close the engine cover.
16. Start the engine and allow to operate for one minute.
17. Stop the engine and check for leaks at the filter.
18. Close the rear door.

Removing Air From The Fuel System

⚠ WARNING

INJECTION HAZARD

Pressurised diesel fuel or hydraulic fluid can penetrate skin and eyes, causing serious injury or death.

Fluid leaks under pressure may not be visible. Use a piece of cardboard or wood to find leaks. DO NOT use your bare hand. Wear safety goggles. If fluid enters skin or eyes, get immediate medical attention from a doctor familiar with this injury. ◀

W-2072

Perform the following procedure before starting the engine when air is found in the system and always after any fuel component replacement and repair, including the fuel filter and when the fuel tank has run out of fuel.

1. Ensure all low-pressure and high-pressure fuel connections are installed correctly.

Figure 257



C211777c

2. Turn the key switch (Item 1) to RUN (Item 2) [Figure 257] (this will activate the electrical fuel pump relay).
3. Leave the ignition key in the Run position (Item 2) [Figure 257] for three minutes.
4. Crank the engine with the accelerator pedal released (low idle position) until the engine starts.
5. Run the engine at low idle for approximately five seconds then cycle the accelerator pedal from the low idle position to the high idle position three times. The time to cycle the accelerator pedal should take five to ten seconds. This will assist in displacing any residual trapped air in the fuel injection pump.
6. Check for fuel leaks in the fuel system.

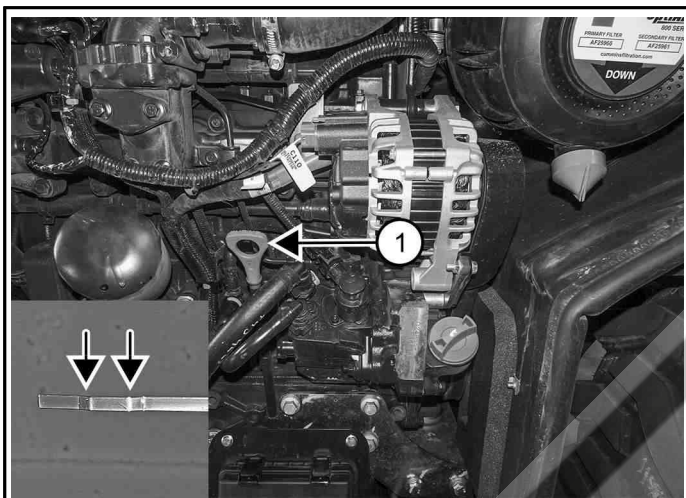
ENGINE LUBRICATION SYSTEM

Checking And Adding Engine Oil

Check the engine oil level every day before starting the engine for the work shift.

1. Stop the engine.

Figure 258



2. Open the engine cover and remove the dipstick (Item 1) [Figure 258].
3. Keep the oil level between the marks on the dipstick (Inset) [Figure 258]. Do not overfill.

Engine Oil Chart

ENGINE CRANKCASE OIL	
Recommended SAE Viscosity Number	
Refer to the temperature range anticipated before next oil change.	
Must use API Category CK-4 or better or ACEA E9 or better.	
Do not use API category FA-4 engine oil.	
[1] SAE 10W-30	
[2] SAE 15W-40	

Bobcat engine oils are recommended for use in this machine. If Bobcat engine oil is not available, use a good quality engine oil that meets API Service Category of CK-4 or better, or ACEA E9 or better.

⚠ IMPORTANT

MACHINE DAMAGE HAZARD

Failure to follow directions may result in severe engine damage.

Use of API Service Category FA-4 engine oil is not approved and may cause irreversible damage to the engine. ◀

I-2384

Removing And Replacing Oil And Filter

⚠ WARNING

IMPACT AND INJECTION HAZARDS

Flying debris or pressurised fluids can cause serious injury or death.

Wear safety glasses to prevent eye injury when any of the following conditions exist:

- When fluids are under pressure.
- Flying debris or loose material.
- Engine is running.
- Tools are being used. ◀

W-2019

⚠ WARNING

FIRE AND EXPLOSION HAZARD

Failure to use care around combustibles can cause serious injury or death.

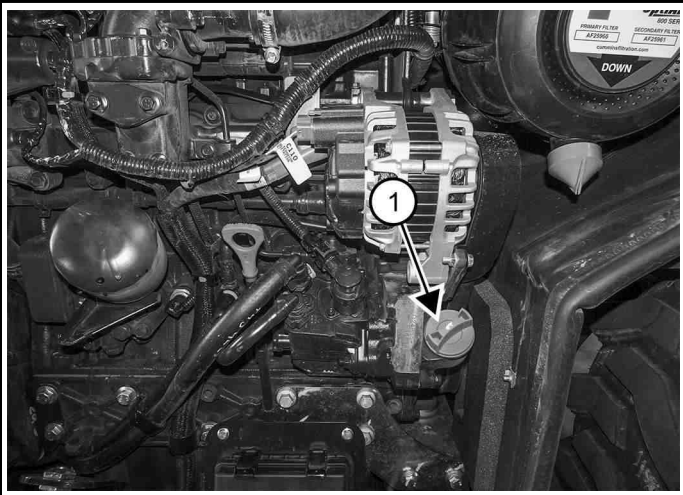
Always clean up spilled flammable fluids or oil. Keep heat, flames, sparks or lighted tobacco away from flammable fluids and oil. ◀

W-2103

See the service schedule for correct service interval for replacing the engine oil and filter.
(See Service Schedule on Page 138)

1. Run the engine until it is at operating temperature. Stop the engine.
2. Open the engine cover.
(See Opening And Closing The Engine Cover on Page 147)

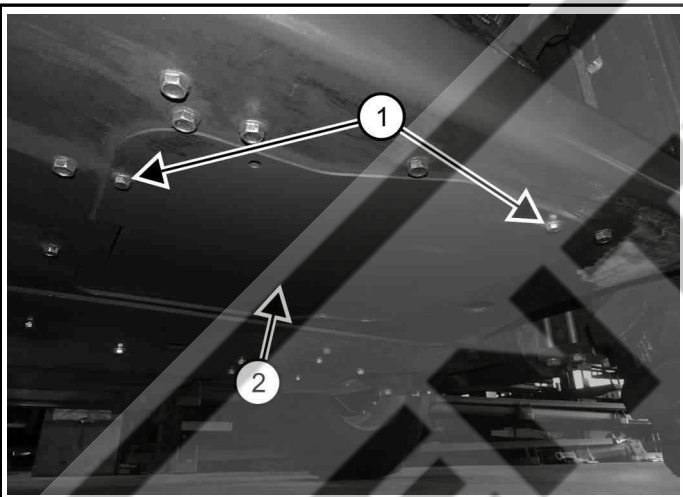
Figure 259



C215938c

3. Clean the area around the oil fill cap (Item 1) [Figure 259].
4. Remove the oil fill cap (Item 1) [Figure 259].

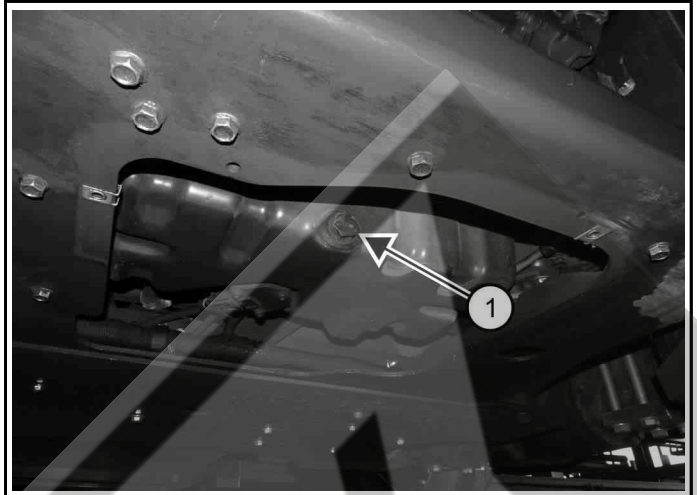
Figure 260



EM11320a

5. Remove the two bolts (Item 1) and the cover (Item 2) [Figure 260] at the bottom of the frame.

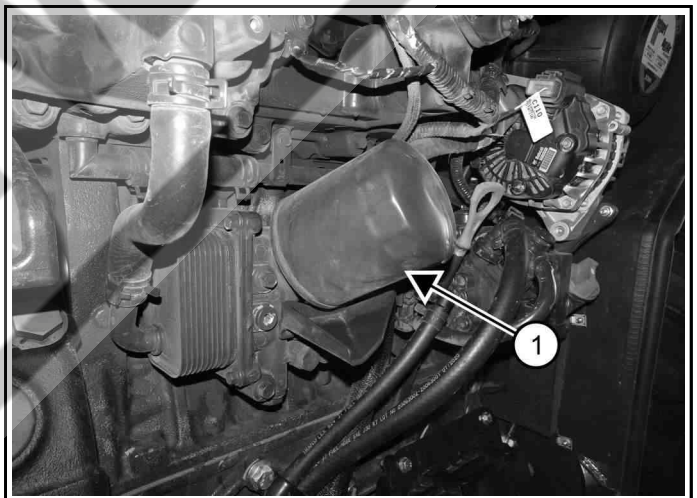
Figure 261



EM11321a

6. Remove the oil drain plug (Item 1) [Figure 261] from the oil drain fitting and drain the oil into a container. Recycle or dispose of used oil in an environmentally safe manner.
7. Fit a new sealing ring to the oil drain plug.
8. Install the oil drain plug.

Figure 262



EM11319a

9. Place a suitable container under the oil filter (Item 1) [Figure 262] in order to catch any oil that might spill. Clean up any spilled oil.
10. Remove the oil filter (Item 1) [Figure 262] and clean the filter base.
11. Put clean oil on the new filter gasket, install the new filter and hand tighten. Use genuine Bobcat filter only.
12. Put oil in the engine. For capacity, (See Fluid Capacities on Page 309) For type, (See Engine Oil Chart on Page 157)

13. Install oil fill cap (Item 1) [Figure 259], start the engine and let it run for several minutes.
14. Stop the engine and check for leaks at the oil filter.
15. Add oil as needed, if it is not between the marks on the dipstick.
(See Checking And Adding Engine Oil on Page 157)
16. Install the cover (Item 2) at the bottom of the frame using the three bolts (Item 1) [Figure 260].

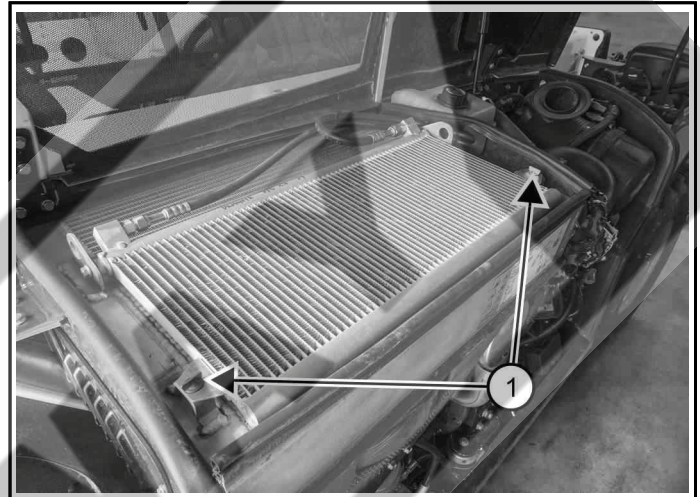
COOLING SYSTEM

- Check the cooling system every day to prevent overheating, loss of performance or engine damage.

Cleaning The Cooling System

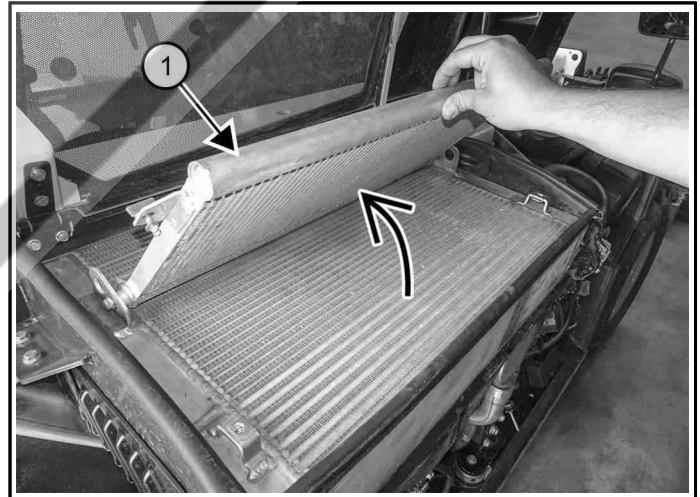
1. Stop the engine and open the engine cover.
(See Opening And Closing The Engine Cover on Page 147)

Figure 263



2. Loosen the two screws (Item 1) [Figure 263].

Figure 264



3. Raise the condenser (Item 1) [Figure 264].
4. Use low pressure air to clean the top and bottom of the cooler. Be careful not to damage fins.
5. Lower the condenser and tighten the two screws (Item 1) [Figure 263].

Checking Coolant Level

⚠ IMPORTANT

MACHINE DAMAGE HAZARD

The incorrect ratio of water to coolant will reduce cooling system efficiency and may lead to premature engine failure.

- Always use the correct ratio of water to coolant.
- Always add a premixed solution. ◀

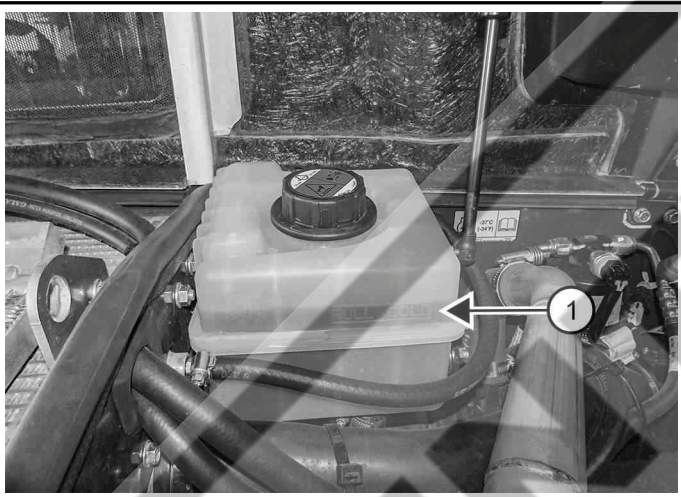
I-2124

Always check coolant level before operating the machine. Lack of engine coolant will result in engine damage.

The cooling system is factory filled with ethylene glycol (EG) coolant. DO NOT mix ethylene glycol with propylene glycol.

1. Stop the engine and allow the engine to cool. Open the engine cover.
(See Opening And Closing The Engine Cover on Page 147)

Figure 265



C215939a

2. Check coolant level using the level markers (Item 1) [Figure 265] on the tank. Coolant must be between MIN and MAX level markers when the engine is cold.
3. Use a refractometer to check the condition of ethylene glycol in your cooling system.
4. Add premixed coolant to the tank if the coolant level is low.
5. Close the engine cover.

Removing And Replacing The Coolant

⚠ IMPORTANT

MACHINE DAMAGE HAZARD

The incorrect ratio of water to coolant will reduce cooling system efficiency and may lead to premature engine failure.

- Always use the correct ratio of water to coolant.
- Always add a premixed solution. ◀

I-2124

⚠ WARNING

IMPACT AND INJECTION HAZARDS

Flying debris or pressurised fluids can cause serious injury or death.

Wear safety glasses to prevent eye injury when any of the following conditions exist:

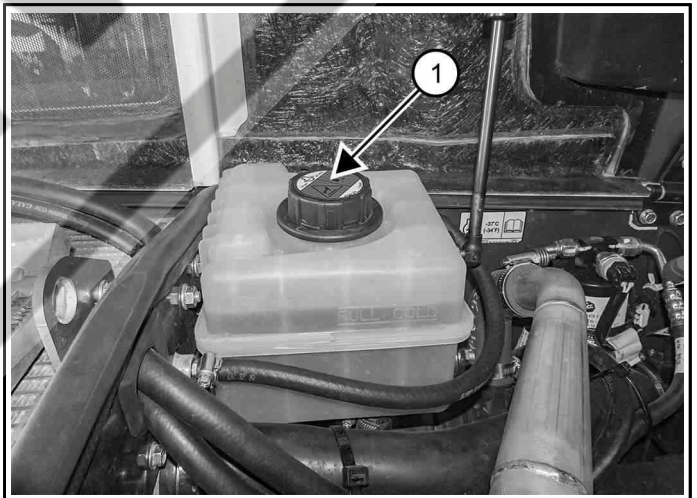
- When fluids are under pressure.
- Flying debris or loose material.
- Engine is running.
- Tools are being used. ◀

W-2019

See the service schedule for correct service intervals.
(See Service Schedule on Page 138)

1. Lift the boom and install the approved boom stop.
(See Approved Boom Stop on Page 146)
2. Stop the engine and open the engine cover.

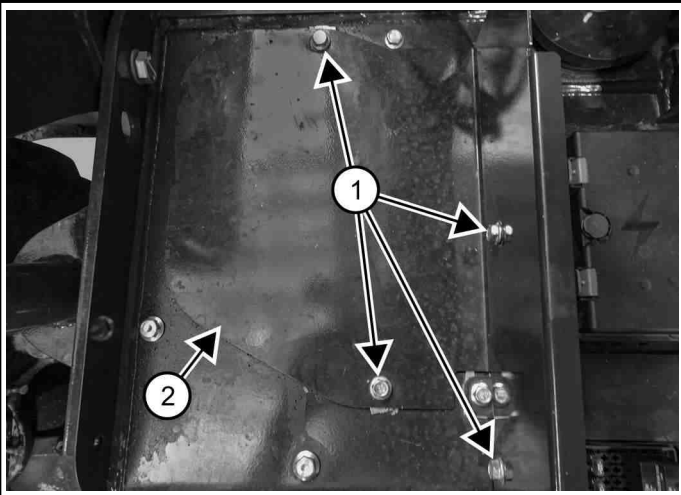
Figure 266



C215939b

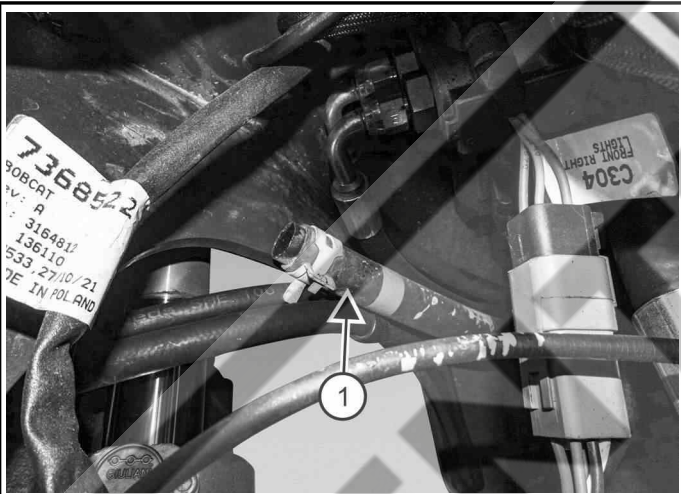
3. When the engine is cool, remove the coolant fill cap (Item 1) [Figure 266].
4. Remove the battery cover.
(See Removing And Installing The Battery on Page 170)

Figure 267



5. Remove the four bolts (Item 1) and the cover (Item 2) [Figure 267].

Figure 268



6. Move the hose (Item 1) [Figure 268] and place a suitable container underneath it. Remove the clamp and plug from the hose and drain the coolant. Recycle or dispose of used coolant in an environmentally safe manner.
7. Reinstall the plug and clamp, and reposition the hose inside the frame.
8. Reinstall the cover (Item 2) [Figure 267] and the battery cover.
9. Add premixed coolant to the coolant tank until the coolant level reaches the MIN marker on the tank. Install the coolant fill cap (Item 1) [Figure 266]. For the correct coolant:
(See Maintenance Intervals on Page 138)
10. Follow these steps when using concentrated coolant instead of a ready-to-use premix:

- a. Use a separate container to mix the coolant.
 - b. The correct mixture proportions of coolant to provide a -37°C (-34°F) freeze protection are 50% demineralised water and 50% ethylene glycol. For instance, to get 8 L OR 2 U.S. gal of mixture, mix 4 L ethylene glycol with 4 L of water OR 1 U.S. gal ethylene glycol with 1 U.S. gal of water.
 - c. Add premixed coolant to the coolant tank until the coolant level reaches the lower marker on the tank (Item 1).
(See Checking Coolant Level on Page 160)
11. Install the coolant fill cap (Item 1) [Figure 266]. Tighten the coolant fill cap until the cap clicks.
 12. Close the engine cover.
 13. Run the engine until coolant reaches normal operating temperature. Stop the engine.
 14. Check the coolant level when cool. Add coolant as needed. (See Checking Coolant Level on Page 160)

ELECTRICAL SYSTEM

Electrical System Description

The telescopic handler has a 12V, negative ground alternator charging system. The electrical system is protected against an electrical overload by fuses.

The cause of an overload must be found before starting the engine again.

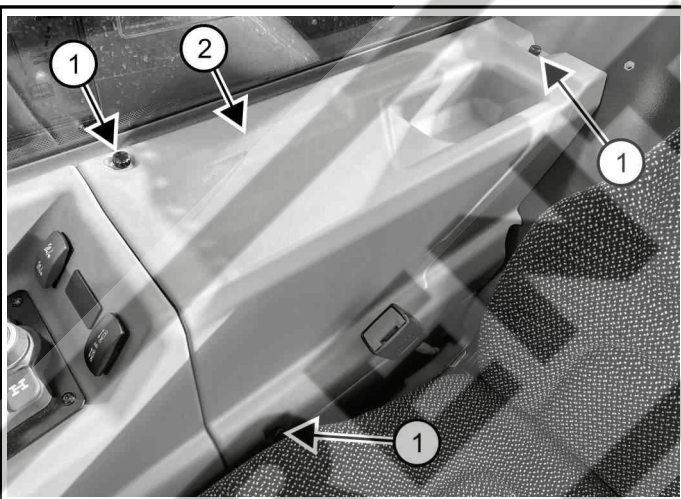
Fuses And Relays Location / Identification

The electrical system is protected by fuses and relays in four locations:

- In the cab.
(See Operator Cab Fuse Panel on Page 162)
- On the front frame.
(See Mainframe Fuse Panel on Page 164) and
(See Mainframe Fuse Panel for Options on Page 165)
(If equipped)
- In the front right corner of the engine compartment.
(See Engine Fuse Panel on Page 166) and
(See Master Fuse Panel on Page 167)
- In the rear of the engine compartment.

Operator Cab Fuse Panel

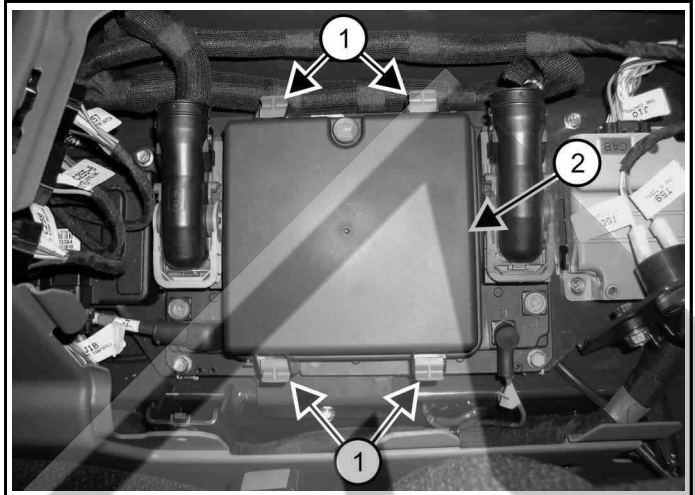
Figure 269



C211785a

1. Loosen the retainer screws (Item 1) and remove the console cover (Item 2) [Figure 269].

Figure 270

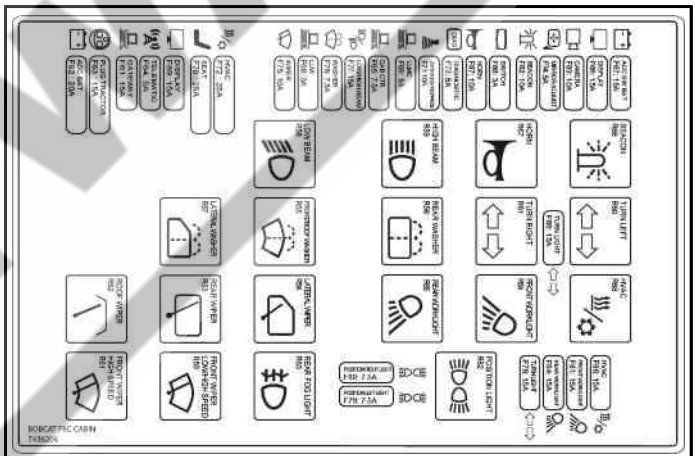


C211784a

2. Loosen the latches (Item 1) and remove the cover (Item 2) [Figure 270] to check or replace fuses or relays.

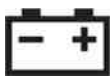
Operator Cab Fuses And Relays

Figure 271



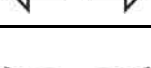
7436206a

Fuse location and amperage ratings are shown in the table below and on the decal [Figure 271]. Relays are identified by the letter "R" in the AMP column.

REF	ICON	DESCRIPTION	AMP
F61		Gateway Controller	15
F62		Accessories	20
F63		Plug Tractor	15

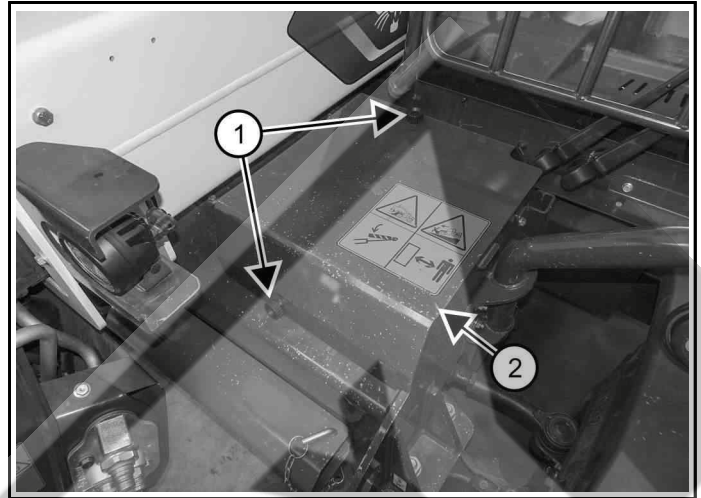
REF	ICON	DESCRIPTION	AMP
F64		Telematics (Bobcat® Machine IQ wireless communications)	5
F65		Cab Controller	7,5
F66		Display	15
F67		Accessories / Switches	15
F68		LLMI	3
F69		LLMC	3
F70		Seat	25
F71		Joysticks / Keypads	10
F72		Heater / HVAC	25
F73		Diagnostic	5
F74		Mirror Adjustment	5
F75		Wiper	10
F76		Washer	7,5
F77		Low / High Beam	15
F78		Turn Light	15

REF	ICON	DESCRIPTION	AMP
F79		Position Left Light	7,5
F80		Position Right Light	7,5
F81		Front Work Light	15
F82		Beacon	10
F83		Camera	10
F84		Rear Work Light	15
F85		Turn Light	15
F86		Heater / HVAC	15
F87		Horn	10
F88		Switches	3
F89		Display	15
R50		Front Wiper Low / High Speed	R
R51		Front Wiper High Speed	R
R52		Roof Wiper	R
R53		Rear Wiper	R

REF	ICON	DESCRIPTION	AMP
R54		Lateral Wiper	R
R55		Front / Roof Washer	R
R56		Rear Washer	R
R57		Lateral Washer	R
R58		Low Beam	R
R59		High Beam	R
R60		Turn Left	R
R61		Turn Right	R
R62		Position Light	R
R63	 NA20330	Rear Fog Light	R
R64		Front Work Light	R
R65		Rear Work Light	R
R66		Beacon	R
R67		Front Horn	R
R68		Heater / HVAC	R

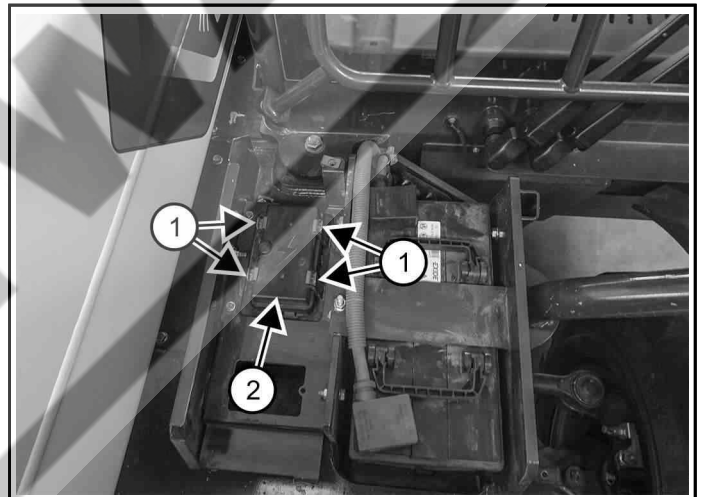
Mainframe Fuse Panel

Figure 272



1. Remove the two screws (Item 1) and remove the battery cover (Item 2) [Figure 272].

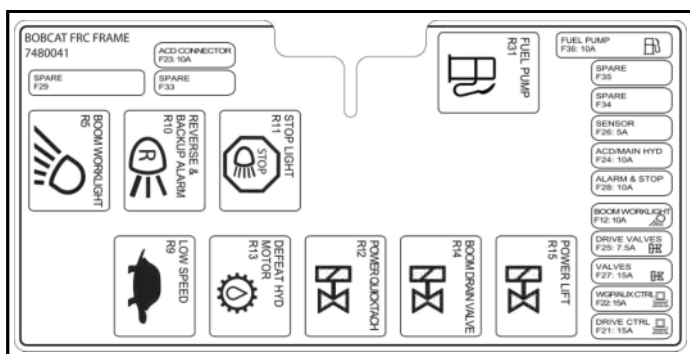
Figure 273



2. Open the four latches (Item 1) and remove the cover (Item 2) [Figure 273] to check or replace fuses or relays.

Mainframe Fuses And Relays

Figure 274



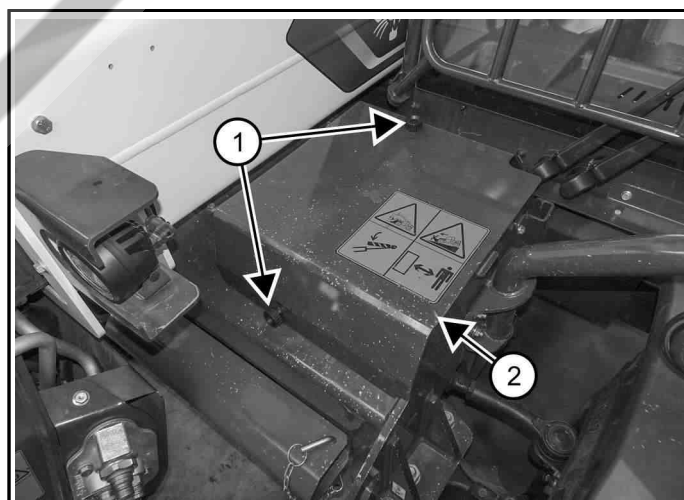
Fuse location and amperage ratings are shown in the table below and on the decal [Figure 274]. Relays are identified by the letter “R” in the AMP column.

REF.	ICON	DESCRIPTION	AMP
F12		Boom Worklight	10
F21		Drive Controller	15
F22		Workgroup / Auxiliary Controller	15
F23		ACD Connector	10
F24		ACD / Main Hyd	10
F25		Drive Valves	7,5
F26		Sensor	5
F27		Valves	15
F28		Alarm and Stop	10
F29		Not used	—
F33		Not used	—
F34		Not used	—
F35		Not used	—
F36		Fuel Pump	10
R5		Boom Work Light	R

REF.	ICON	DESCRIPTION	AMP
R9		Low Speed	R
R10		Reverse And Backup Alarm	R
R11		Stop Light	R
R12		Power Quick-tach	R
R13		Defeat Hyd Motor	R
R14		Boom Drain Valve	R
R15		Power Lift	R
R31		Fuel Pump	R

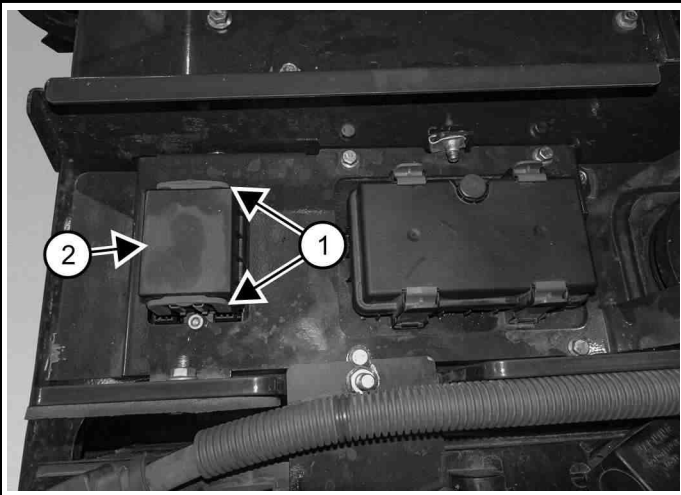
Mainframe Fuse Panel for Options

Figure 275



1. Remove the two screws (Item 1) and remove the battery cover (Item 2) [Figure 275].

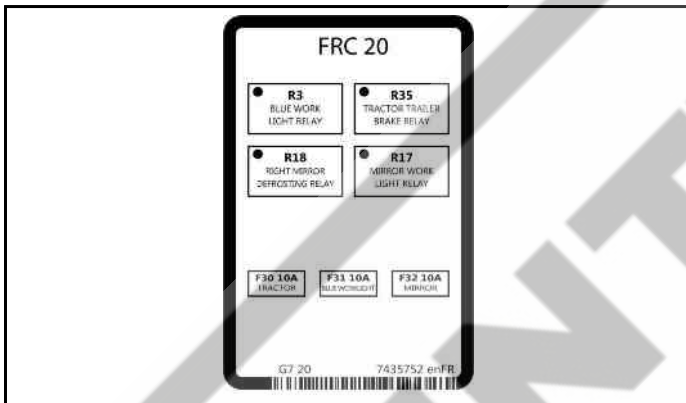
Figure 276



2. Pull up the two latches (Item 1) and remove the cover (Item 2) [Figure 276] to check or replace fuses or relays.

Options Fuses And Relays

Figure 277



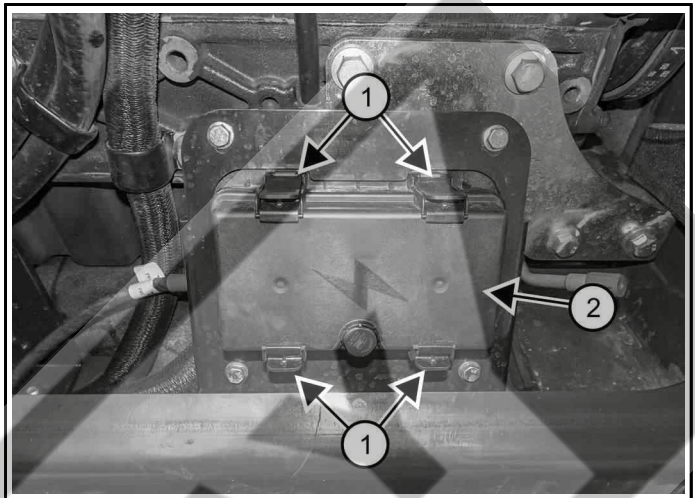
Fuse location and amperage ratings are shown in the table below and on the decal [Figure 277]. Relays are identified by the letter "R" in the AMP column.

REF.	DESCRIPTION	AMP
F30	Tractor	10
F31	Blue Work Light	10
F32	Mirror	10
R3	Blue Work Light Relay	R
R17	Mirror Work Light Relay	R
R18	Right Mirror Defrosting Relay	R
R35	Not Used	—

Engine Fuse Panel

1. Open the engine cover.

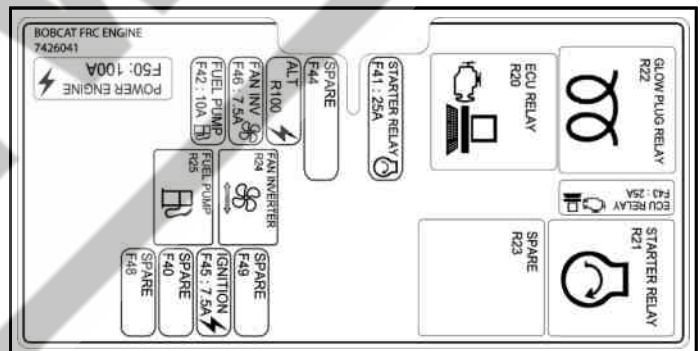
Figure 278



2. Open the four latches (Item 1) and remove the cover (Item 2) [Figure 278] to check or replace fuses or relays.

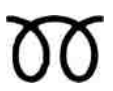
Engine Fuses And Relays

Figure 279



Fuse location and amperage ratings are shown in the table below and on the decal [Figure 279]. Relays are identified by the letter "R" in the AMP column.

REF.	ICON	DESCRIPTION	AMP
F40		Not used	—
F41		Starter	25
F42		Not used	—
F43		ECU	25
F44		Not used	—

REF.	ICON	DESCRIPTION	AMP
F45		Ignition	7,5
F46		Fan Inverter	7,5
F48		Not used	—
F49		Not used	—
F50		Engine Power	100
R20		ECU Relay	R
R21		Starter Relay	R
R22		Glow Plug Relay	R
R23		Not used	—
R24		Fan Inverter	R
R25		Not used	—
R100		Alternator	100 ohm

Master Fuse Panel

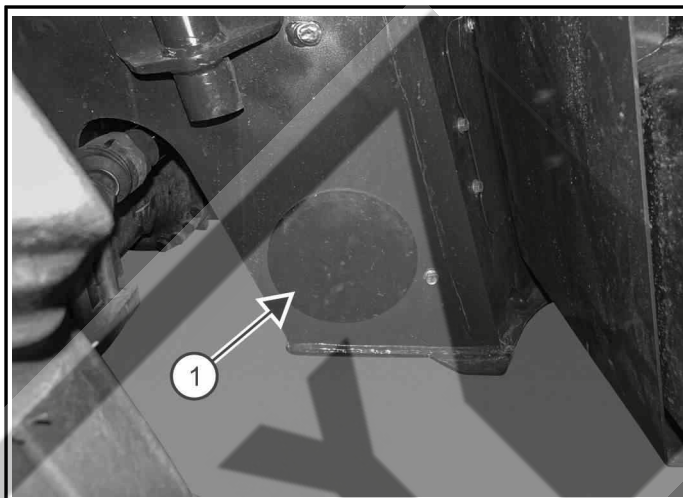
There are four master fuses located in two locations.

Fuse location and amperage ratings are shown in the table below.

REF.	FUSE	DESCRIPTION	AMP
1	F51	Cab Power	80
2	F52	Frame Power	80
3	F53	Engine Battery Power	30
4	F54	Cab Battery Power	30

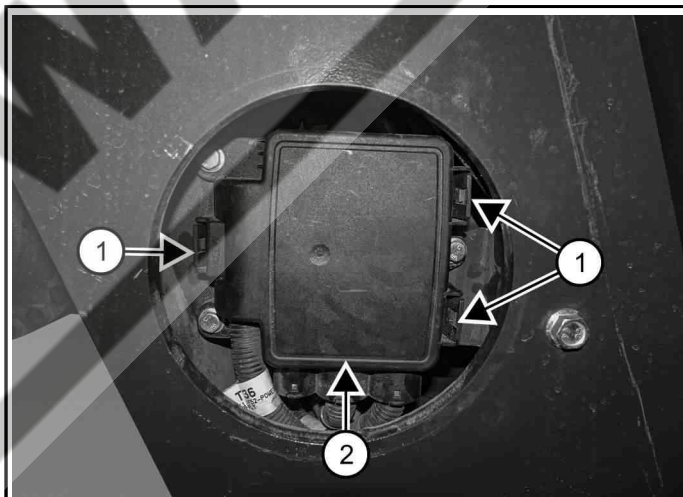
Follow the procedure below to replace the master fuses F51 and F52:

Figure 280



1. Next to the left front wheel, remove the plug (Item 1) [Figure 280].

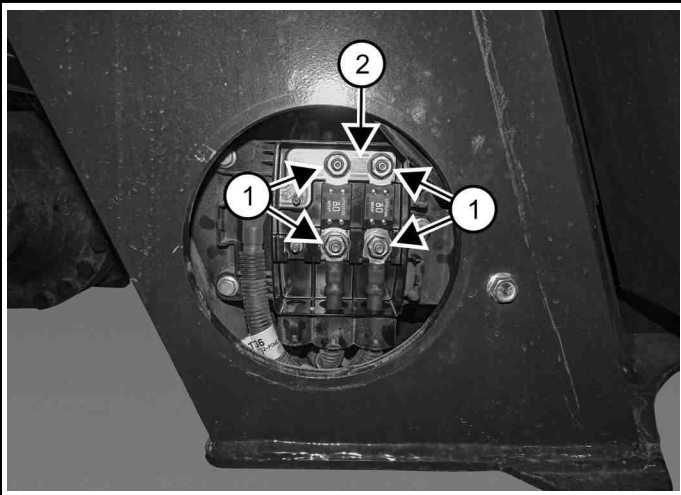
Figure 281



2. Open the clips (Item 1) and remove the fuse cover (Item 2) [Figure 281].

When installing, apply Loctite® #242 to the threads of the bolts.

Figure 282

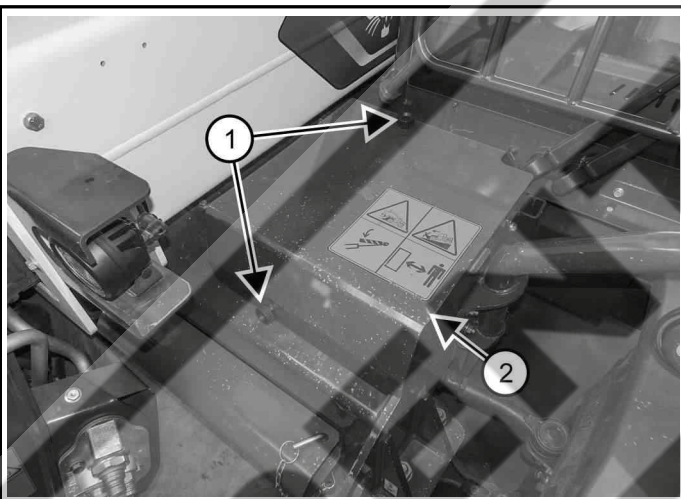


C216208a

3. Remove the four nuts and washers (Item 1) [Figure 282] to remove the master fuse modules.
4. If needed, replace the buss bar (Item 2) [Figure 282].

Follow the procedure below to replace the master fuses F53 and F54:

Figure 283

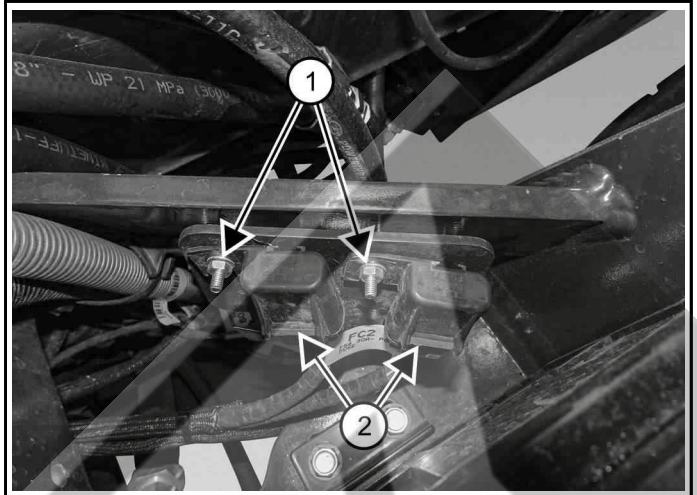


C215942a

5. Remove the two screws (Item 1) and remove the battery cover (Item 2) [Figure 283].

When installing, apply Loctite #242 to the threads of the bolts.

Figure 284



C217354a

6. Remove the two nuts and washers (Item 1) [Figure 284].
7. Disconnect the master fuse modules (Item 2) [Figure 284].

Battery Maintenance

⚠ WARNING

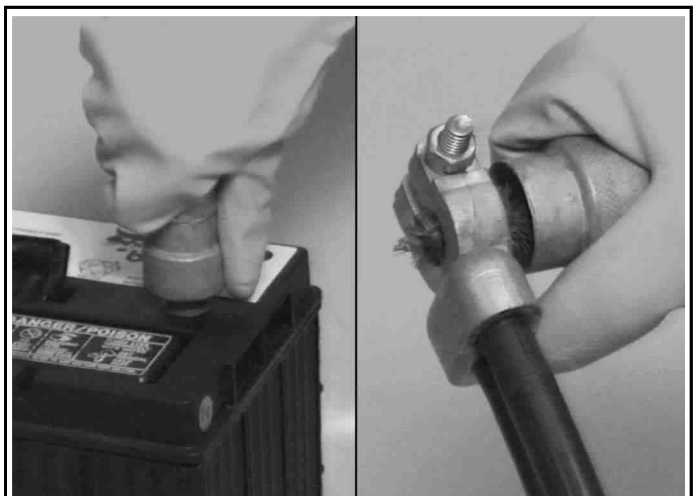
CHEMICAL HAZARD

Contact with or ingestion of battery acid can cause serious injury or death.

- Batteries contain acid that burns eyes and skin on contact. Wear safety goggles, protective clothing, and rubber gloves to keep acid off body.
- In case of acid contact, wash immediately with water. In case of eye contact, get prompt medical attention and wash eye with clean, cool water for at least 5 minutes.
- If electrolyte is ingested, drink large quantities of water or milk! DO NOT induce vomiting. Get prompt medical attention.

W-2095

Figure 285



C208003

- The battery cables must be clean and tight .
- Check electrolyte level in the battery. Add distilled water as needed.
- Remove acid or corrosion from battery and cables with sodium bicarbonate (baking soda) and water solution.
- Put Bobcat Battery Saver or grease on the battery terminals and cable ends to prevent corrosion.

Using A Booster Battery (Jump Starting)

⚠ WARNING

EXPLOSION HAZARD

Battery gas can explode and cause serious injury or death.

- Keep arcs, sparks, flames and lighted tobacco away from batteries. When jumping from booster battery make final connection (negative) at machine frame.
- Do not jump start or charge a frozen or damaged battery. Warm battery to 16°C (60°F) before connecting to a charger. Unplug charger before connecting or disconnecting cables to a battery. Never lean over battery while boosting, testing or charging. ◀

W-2085

⚠ IMPORTANT

MACHINE DAMAGE HAZARD

Damage to the alternator can occur

Do not operate machine if:

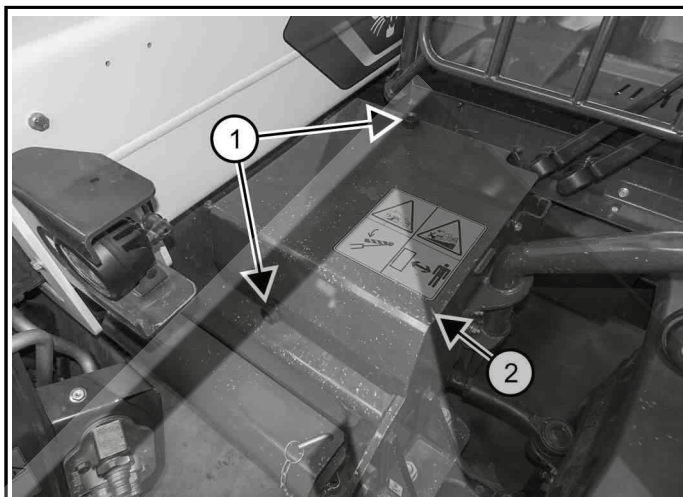
- Engine is operated with battery cables disconnected.
- Battery cables are connected when using a fast charger or when welding on the machine. Remove both cables from the battery.
- Extra battery cables (booster cables) are connected wrong. ◀

I-2023

If it is necessary to use a booster battery to start the engine, BE CAREFUL! There must be one person in the operator's seat and one person to connect and disconnect the battery cables.

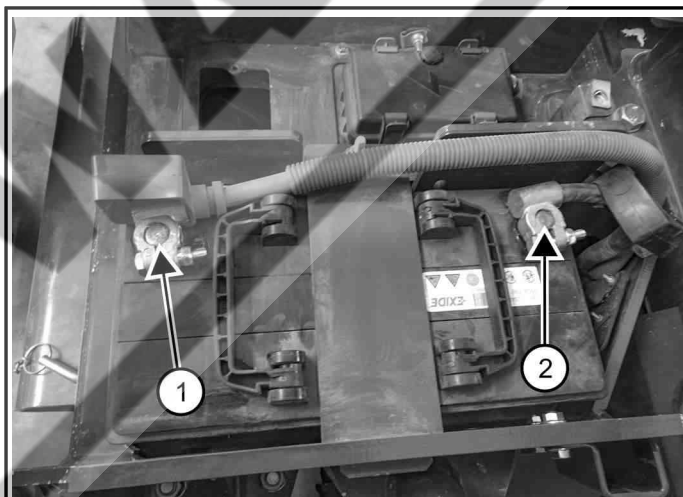
The key switch (if equipped) or start switch (if equipped) must be OFF. The booster battery must be 12 V.

Figure 286



1. Remove the two screws (Item 1) and remove the battery cover (Item 2) [Figure 286].

Figure 287



2. Connect the end of the first cable to the positive (+) terminal of the booster battery. Connect the other end of the same cable to the positive (+) terminal (Item 1) [Figure 287] of the Telescopic Handler battery.
3. Connect the end of the second cable to the earth (-) terminal of the booster battery. Connect the other end of the same cable to the earth (-) terminal (Item 2) [Figure 287] on the Telescopic Handler starter.
4. Keep cables away from moving parts. Start the engine.
5. After the engine has started, remove the earth (-) cable (Item 2) [Figure 287] first.
6. Remove the cable from the positive (+) terminal (Item 1)

7. Install the battery cover (Item 2) and the two screws (Item 1) [Figure 286].

Removing And Installing The Battery

WARNING

CHEMICAL HAZARD

Contact with or ingestion of battery acid can cause serious injury or death.

- Batteries contain acid that burns eyes and skin on contact. Wear safety goggles, protective clothing, and rubber gloves to keep acid off body.
- In case of acid contact, wash immediately with water. In case of eye contact, get prompt medical attention and wash eye with clean, cool water for at least 5 minutes.
- If electrolyte is ingested, drink large quantities of water or milk! DO NOT induce vomiting. Get prompt medical attention.

W-2085

WARNING

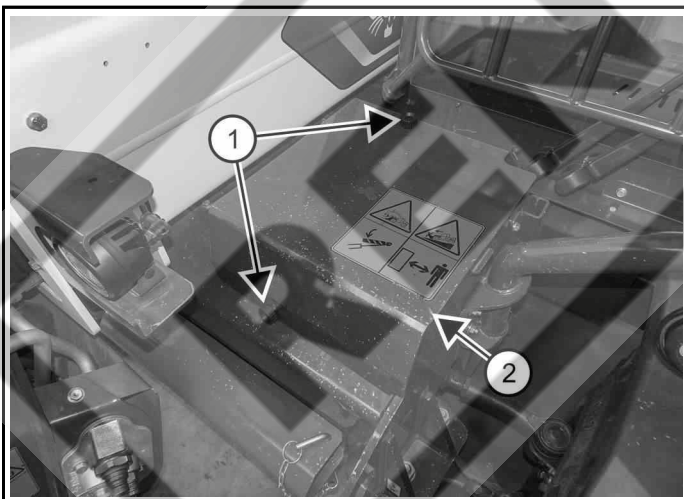
EXPLOSION HAZARD

Battery gas can explode and cause serious injury or death.

- Keep arcs, sparks, flames and lighted tobacco away from batteries. When jumping from booster battery make final connection (negative) at machine frame.
- Do not jump start or charge a frozen or damaged battery. Warm battery to 16°C (60°F) before connecting to a charger. Unplug charger before connecting or disconnecting cables to a battery. Never lean over battery while boosting, testing or charging.

W-2086

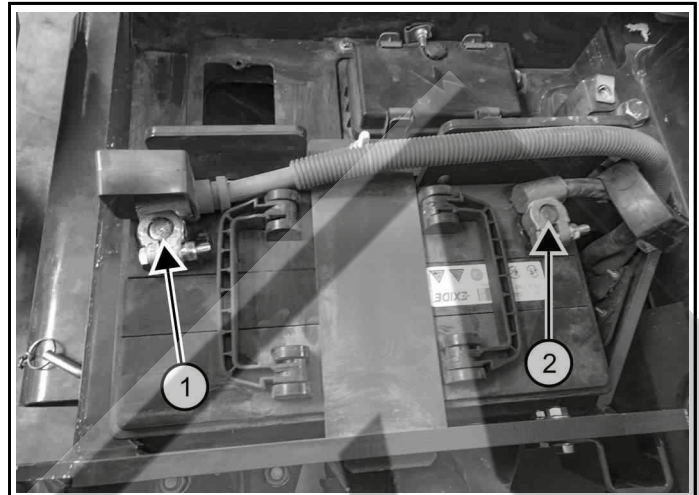
Figure 288



C215942a

1. Remove the two screws (Item 1) and remove the battery cover (Item 2) [Figure 288].

Figure 289

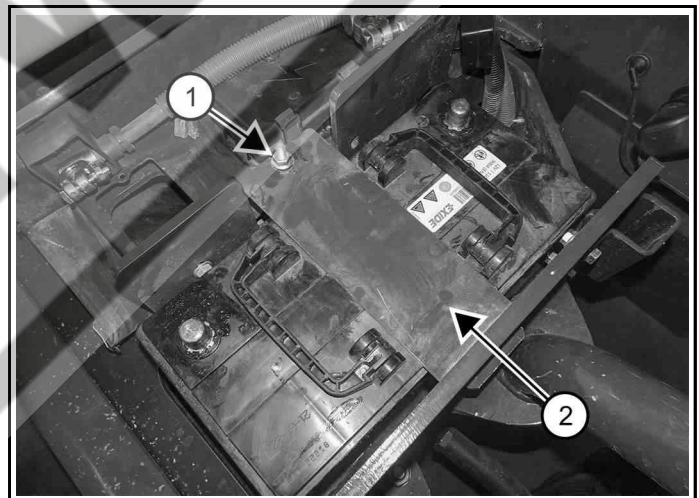


C215944a

2. Always disconnect the earth (-) cable (Item 2) [Figure 289] first to prevent sparks.
3. Remove the positive (+) battery cable (Item 1) [Figure 289].

When installing, tighten the bolts to 5 - 10 N•m (44 - 88 in-lb) torque.

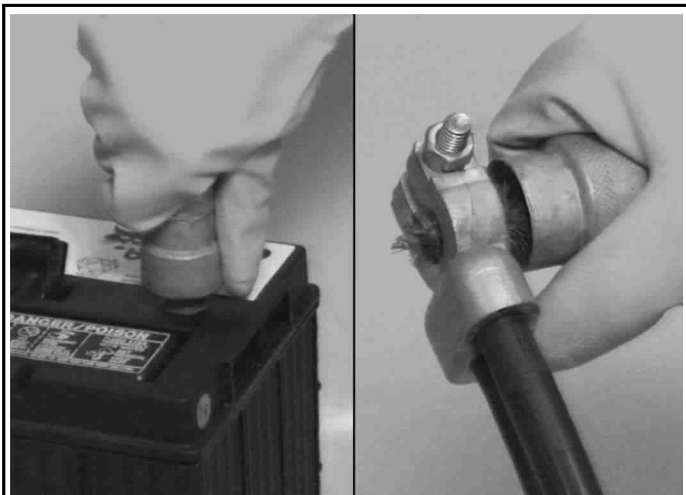
Figure 290



C215945a

4. Remove the nut (Item 1) and bracket (Item 2) [Figure 290].
5. Remove the battery.

Figure 291



C208003

6. Always clean the battery terminals and cable ends when installing a new or used battery [Figure 291].
7. When installing the battery, do not touch any metal parts with the battery terminals.
8. Connect and tighten the battery cables. Connect the earth (-) cable last to prevent sparks.

HYDRAULIC / HYDROSTATIC SYSTEM

Checking And Adding Fluid

⚠ WARNING

FIRE AND EXPLOSION HAZARD

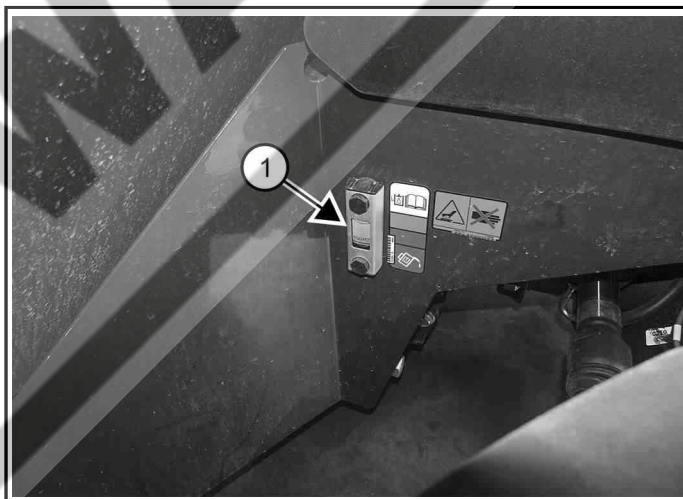
Failure to use care around combustibles can cause serious injury or death. Always clean up spilled flammable fluids or oil. Keep heat, flames, sparks or lighted tobacco away from flammable fluids and oil. ◀

W-2103

Use only recommended fluid in the hydraulic system. (See Maintenance Intervals on Page 138)

1. Completely retract and lower the boom. Tilt the attachment carrier forward.
2. Stop the machine on a level surface.
3. Stop the engine.
4. Hydraulic fluid must be at ambient temperature for this procedure.

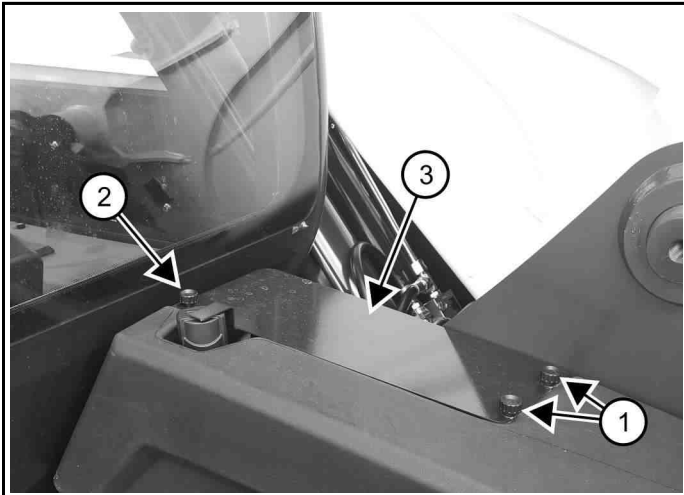
Figure 292



C215946a

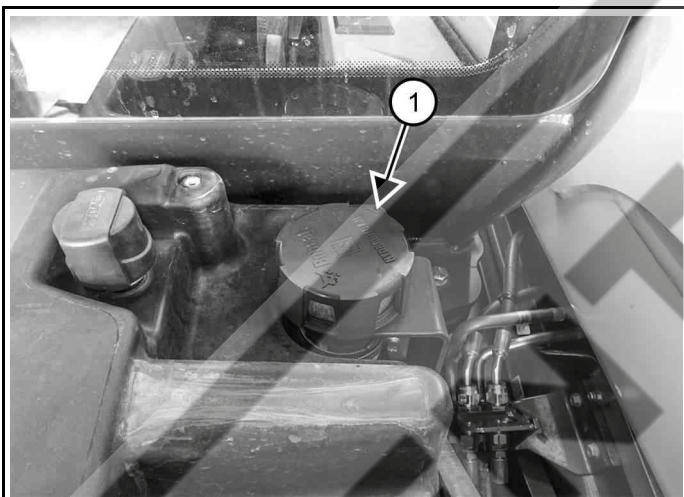
5. Check the fluid level at the sight gauge (Item 1) [Figure 292].

Figure 293



6. On the fuel tank, loosen the two screws (Item 1). Remove the screw (Item 2) and the cover (Item 3) [Figure 293].

Figure 294



7. Remove the fill / breather cap (Item 1) [Figure 294].
8. Add fluid until it is at the centre of the sight gauge (Item 1) [Figure 292].
9. Install the fill / breather cap (Item 1) [Figure 294].
10. Install the cover (Item 3) with the three screws (Item 1 and 2) [Figure 293]. Hand-tighten the screws.

Hydraulic Fluid Chart

HYDRAULIC FLUID	
Recommended Hydraulic Fluids	
Refer to the temperature range anticipated before next fluid change.	
[1] Bobcat VG 68 or ISO VG 68 HVLP fluid with minimum VI 160	
[2] (Europe, Middle East, Africa Only) Bobcat Superior SH Hydraulic / Hydrostatic	
[3] Bobcat VG 46 or ISO VG 46 HVLP fluid with minimum VI 155	

⚠ IMPORTANT

MACHINE DAMAGE HAZARD

Failure to follow directions can result in machine damage.
Starting the engine when the temperature of the hydraulic fluid is less than -29°C (-20°F) will result in significant damage to the hydraulic system and components.
Park the machine in a heated location or provide some means of warming the hydraulic fluid prior to starting the engine if the ambient temperature at startup is expected to be -29°C (-20°F) or below.

Removing And Replacing Hydraulic Fluid

⚠ WARNING

INJECTION HAZARD

Pressurised diesel fuel or hydraulic fluid can penetrate skin and eyes, causing serious injury or death.
Fluid leaks under pressure may not be visible. Use a piece of cardboard or wood to find leaks. DO NOT use your bare hand. Wear safety goggles. If fluid enters skin or eyes, get immediate medical attention from a doctor familiar with this injury.

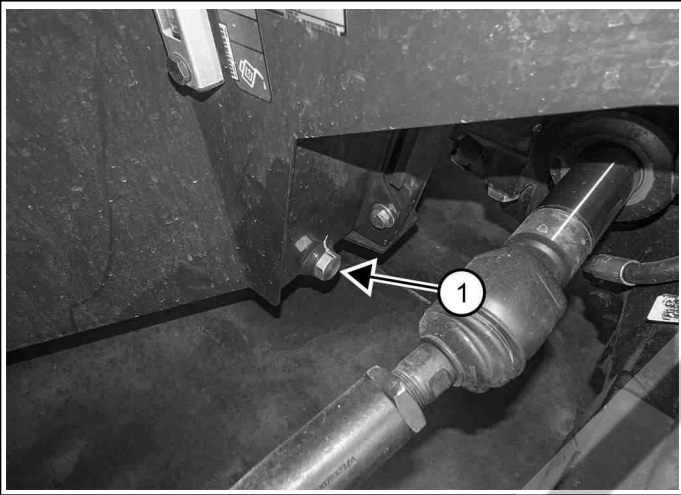
See the service schedule for the correct service intervals.
(See Service Schedule on Page 138)

Replace the fluid if it becomes contaminated or after major repair.

Use only recommended fluid in the hydraulic system.
(See Maintenance Intervals on Page 138)

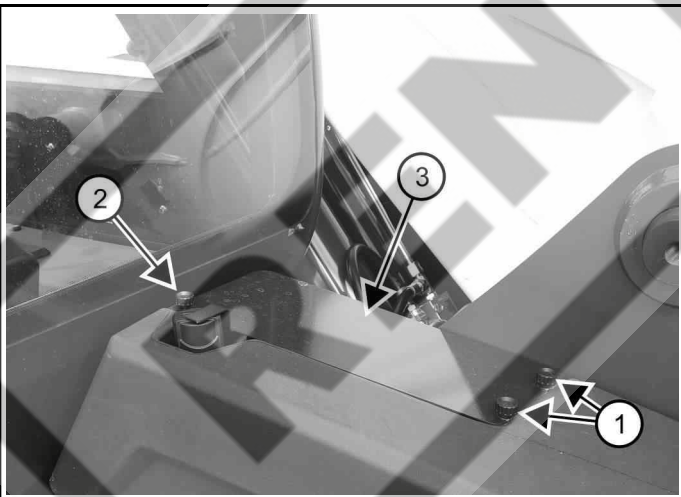
Always replace the hydraulic / hydrostatic filter whenever the hydraulic fluid is replaced.
(See Removing And Replacing Hydraulic / Hydrostatic Filters on Page 174)

Figure 295



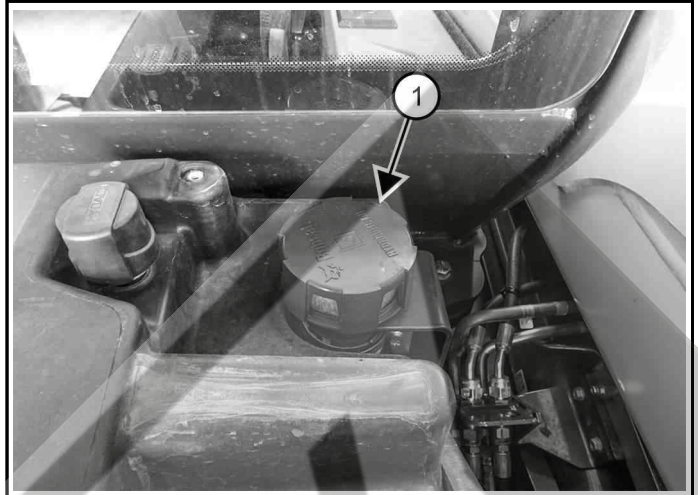
1. Remove the hydraulic fluid tank drain plug (Item 1) [Figure 295] behind the left front wheel and drain the fluid into a container. Recycle or dispose of the fluid in an environmentally safe manner.
2. Put a new seal on the drain plug. Install the drain plug (Item 1) [Figure 295] and tighten.

Figure 296



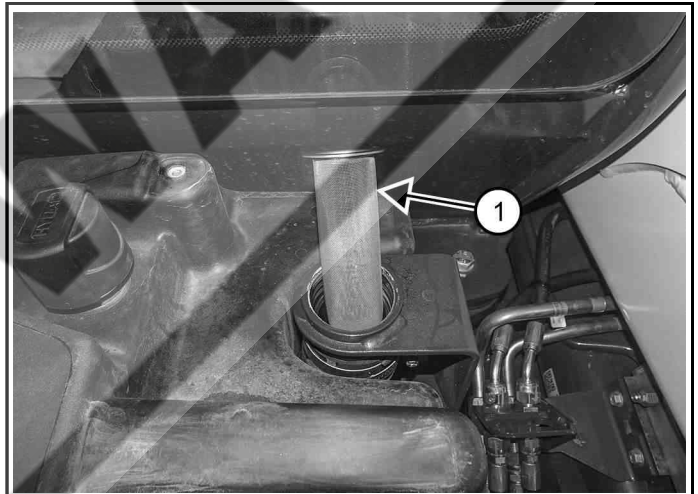
3. On the fuel tank, loosen the two screws (Item 1). Remove the screw (Item 2) and the cover (Item 3) [Figure 296].

Figure 297



4. Remove the fill / breather cap (Item 1) [Figure 297].

Figure 298



5. Remove and clean the hydraulic fill screen (Item 1) [Figure 298]. Use low pressure air to dry the screen.
6. Install hydraulic fill screen and add fluid until it is at the centre of the sight gauge (Item 1) .
7. Install the fill / breather cap (Item 1) [Figure 297].
8. Install the cover (Item 3) with the three screws (Item 1 and 2) [Figure 296]. Hand-tighten the screws.

Removing And Replacing Hydraulic / Hydrostatic Filters

WARNING

FIRE AND EXPLOSION HAZARD

Failure to use care around combustibles can cause serious injury or death. Always clean up spilled flammable fluids or oil. Keep heat, flames, sparks or lighted tobacco away from flammable fluids and oil. ⁴

W2103

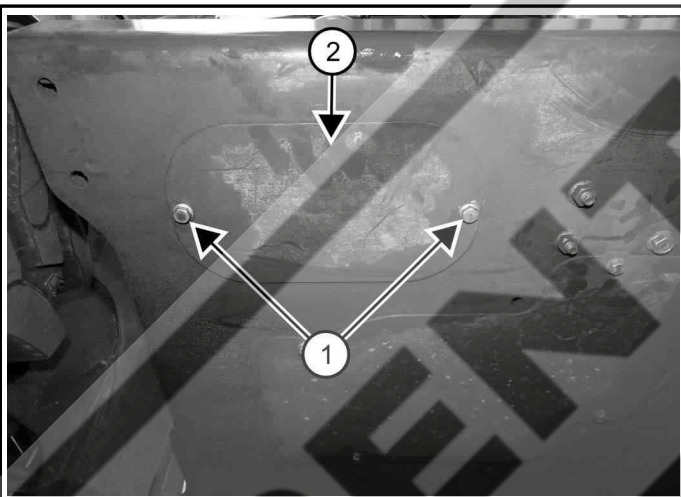
See the service schedule for the correct service intervals. (See Service Schedule on Page 138)

Before disassembling any components, wait for at least ten minutes after the engine has stopped to avoid a large amount of hydraulic fluid loss. Any attempt of removing a filter housing before the hydraulic pressure is gone may damage the filter housing threads.

Allow the machine to rest for at least 5 minutes to reduce pressure on the hydraulic system.

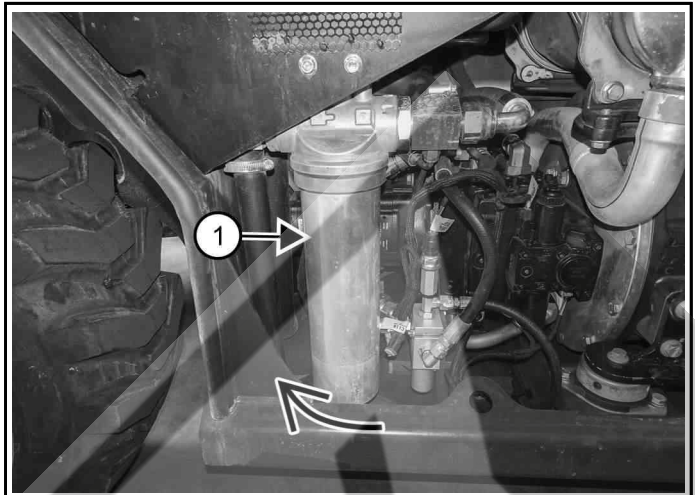
1. Open the engine cover.
(See Opening And Closing The Engine Cover on Page 147)

Figure 299



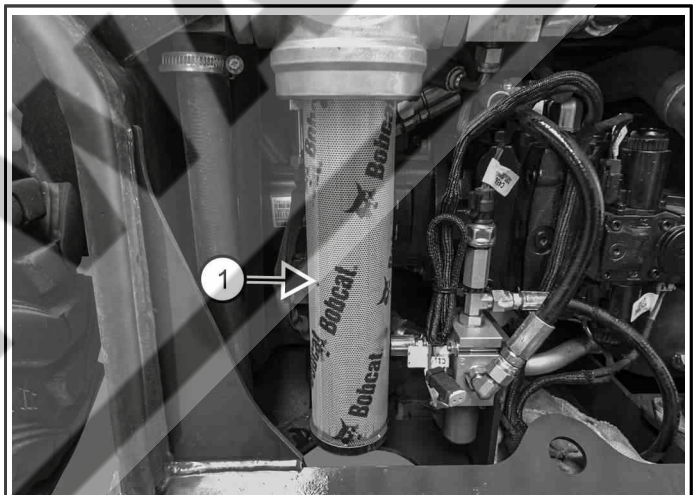
2. Remove the two bolts (Item 1) and the cover (Item 2) [Figure 299] from the bottom of the frame.

Figure 300



3. Rotate the filter housing (Item 1) anticlockwise and remove.

Figure 301



4. Remove the hydraulic / hydrostatic filter (Item 1) and discard.
5. Install a new hydraulic / hydrostatic filter and reinstall the filter housing.

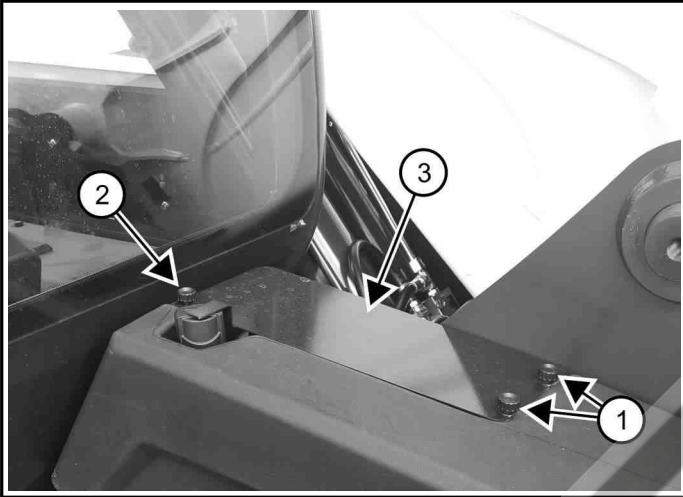
NOTE: Use aluminium grease on the threads of the filter housing.

6. Start the engine and let the engine run for one minute (low idle) before operating the boom hydraulics.
7. Stop the engine and check for leaks at the filters. Check the fluid level in the hydraulic fluid tank and add as needed.
8. Install the cover and close the engine cover.

Removing And Installing The Fill / Breather Cap

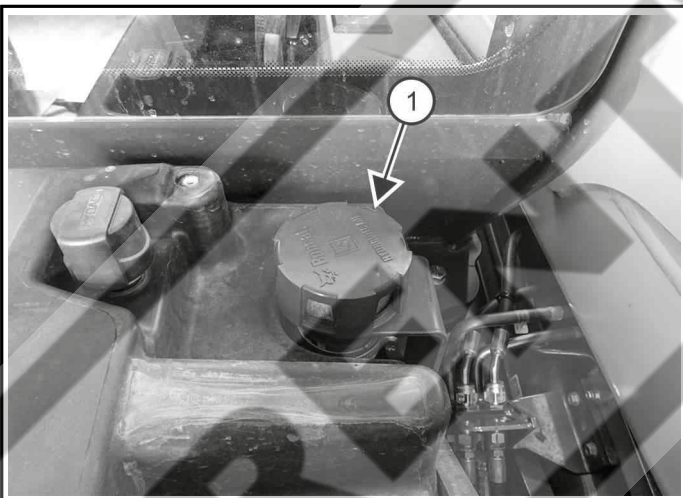
See the service schedule for the correct replacement interval. (See Service Schedule on Page 138)

Figure 302



1. On the fuel tank, loosen the two screws (Item 1). Remove the screw (Item 2) and the cover (Item 3) [Figure 302].

Figure 303



2. Remove the fill / breather cap (Item 1) [Figure 303].
3. Install the new fill / breather cap (Item 1) [Figure 303].
4. Install the cover (Item 3) with the three screws (Item 1 and 2) [Figure 302]. Hand-tighten the screws.

AXLES (FRONT AND REAR)

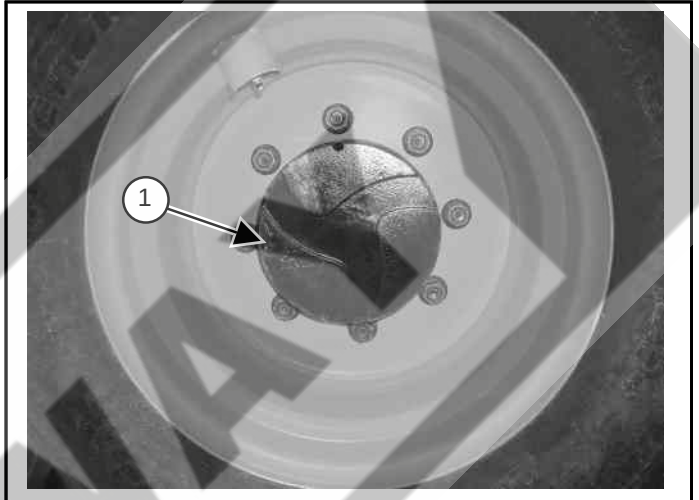
Checking And Adding Oil (Planetary Carrier)

See the service schedule for the correct service interval. (See Service Schedule on Page 138)

For oil capacity. (See Fluid Capacities on Page 309)

For oil type. (See Maintenance Intervals on Page 138)

Figure 304



1. Park the machine on a level surface with the plug (Item 1) [Figure 304] positioned as shown.
2. Clean the plug (Item 1) [Figure 304] and the surrounding surface.
3. Remove the plug (Item 1) [Figure 304]. The oil level should be at the bottom edge of the plug hole.
4. Add oil through the hole if the oil level is below the hole.
5. Install and tighten the plug to 35 - 50 N•m (26 - 37 ft-lb) torque.
6. Repeat the procedure for the other three planetary carriers.

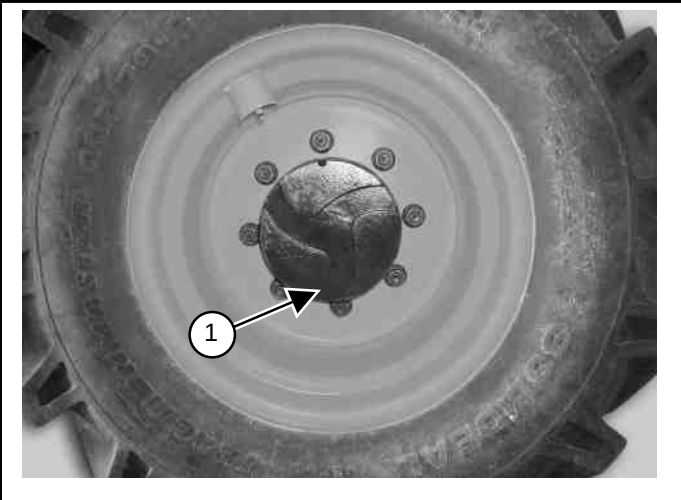
Removing And Replacing Oil (Planetary Carrier)

See the service schedule for the correct service interval. (See Service Schedule on Page 138)

For oil capacity. (See Fluid Capacities on Page 309)

For oil type. (See Maintenance Intervals on Page 138)

Figure 305



P191979a

1. Park the machine on a level surface with the plug (Item 1) [Figure 305] positioned as indicated by the arrow.
2. Clean the plug (Item 1) [Figure 305] and the surrounding surface.
3. Remove the plug (Item 1) [Figure 305] and drain oil into a container. Recycle or dispose of the used lubricant in an environmentally safe manner.
4. Reposition the plug hole as shown in (See Checking And Adding Oil (Planetary Carrier) on Page 175) and add gear lube until the lube level is at the bottom edge of the plug hole (Item 1) [Figure 304].
5. Install and tighten the plug to 35 - 50 N•m (26 - 37 ft-lb) torque.
6. Repeat the procedure for the other planetary carriers.

Checking And Adding Oil (Rear Differential)

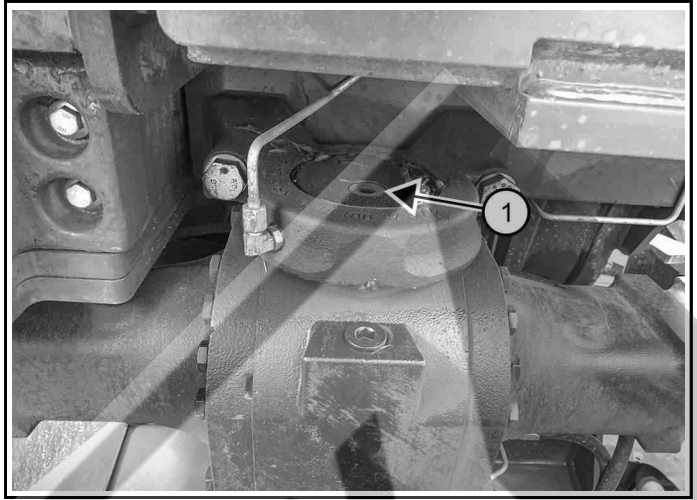
See the service schedule for the correct service interval. (See Service Schedule on Page 138)

For oil capacity. (See Fluid Capacities on Page 309)

For oil type. (See Maintenance Intervals on Page 138)

1. Park the machine on a level surface.

Figure 306



C215949a

2. Clean the plug (Item 1) [Figure 306] and the surrounding surface.
3. Remove the plug (Item 1) [Figure 306]. The oil level should be at the bottom edge of the plug hole.
4. Add oil through the hole if the oil level is below the hole.
5. Install and tighten the plug to 35 - 50 N•m (26 - 37 ft-lb) torque.

Removing And Replacing Oil (Rear Differential)

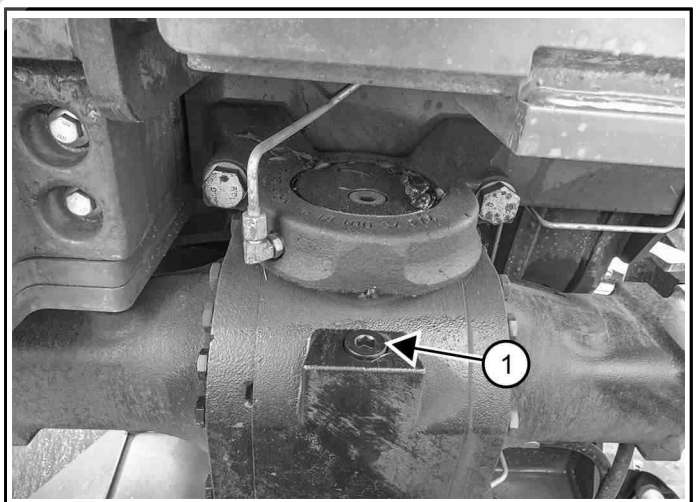
See the service schedule for the correct service interval. (See Service Schedule on Page 138)

For oil capacity. (See Fluid Capacities on Page 309)

For oil type. (See Maintenance Intervals on Page 138)

1. Park the machine on a level surface.

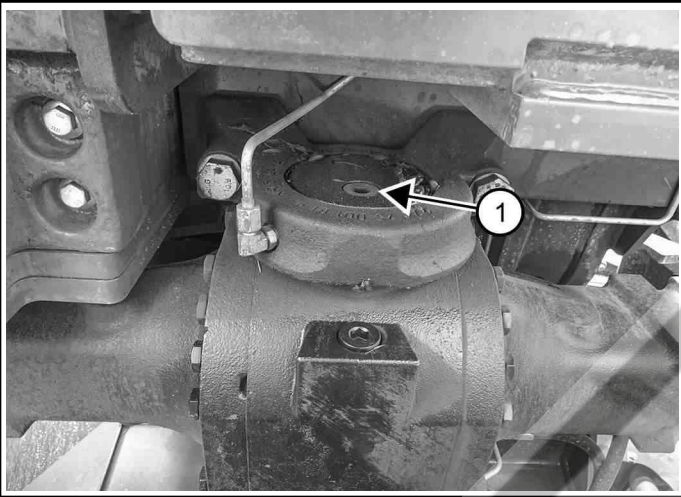
Figure 307



C215949b

2. Clean the plug (Item 1) [Figure 307] and the surrounding surface.
3. Remove the plug (Item 1) [Figure 307] and drain oil into a container. Recycle or dispose of the used lubricant in an environmentally safe manner.
4. Install and tighten the plug (Item 1) [Figure 307] to 35 - 50 N•m (26 - 37 ft-lb) torque.

Figure 308



5. Add oil through the hole (Item 1) [Figure 308] until it is to the bottom of the plug hole.
6. Install and tighten the plug to 35 - 50 N•m (26 - 37 ft-lb) torque.

Checking And Adding Oil (Front Differential)

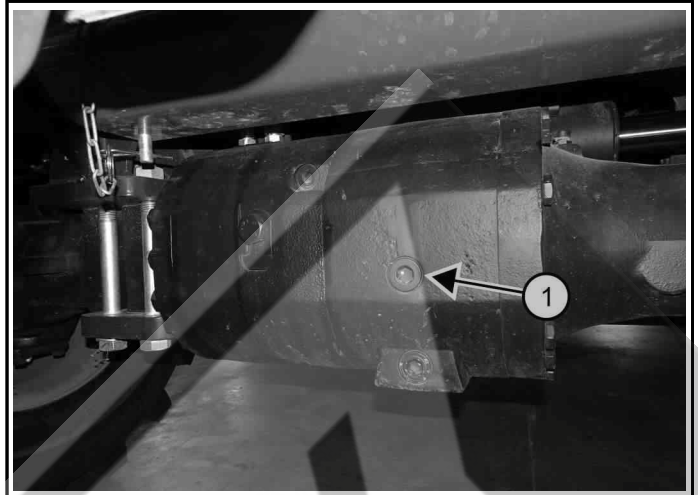
See the service schedule for the correct service interval. (See Service Schedule on Page 138)

For oil capacity. (See Fluid Capacities on Page 309)

For oil type. (See Maintenance Intervals on Page 138)

1. Park the machine on a level surface.

Figure 309



2. Clean the plug (Item 1) [Figure 309] and the surrounding surface.
3. Remove the plug (Item 1) [Figure 309]. The oil level should be at the bottom edge of the plug hole.
4. Add oil through the hole if the oil level is below the hole.
5. Install and tighten the plugs to 35 - 50 N•m (26 - 37 ft-lb) torque.

Removing And Replacing Oil (Front Differential)

See the service schedule for the correct service interval. (See Service Schedule on Page 138)

For oil capacity. (See Fluid Capacities on Page 309)

For oil type. (See Maintenance Intervals on Page 138)

- Park the machine on a level surface.

Figure 310

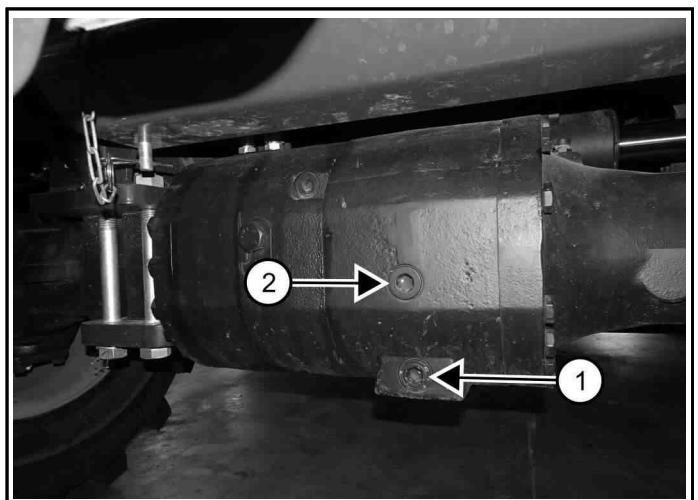


Figure 311

- Clean the plugs (Item 1 and 2) [Figure 310] and [Figure 311] and the surrounding surface.
- Remove the plugs (Item 1) [Figure 310] and [Figure 311] and drain oil into a container. Recycle or dispose of the used lubricant in an environmentally safe manner.
- Install and tighten the plugs (Item 1) [Figure 310] and [Figure 311] to 35 - 50 N•m (26 - 37 ft-lb) torque.
- Clean the plug (Item 2) [Figure 310] and the surrounding surface.
- Add oil through the hole (Item 2) [Figure 310].
- Install and tighten the plug (Item 2) [Figure 310] to 35 - 50 N•m (26 - 37 ft-lb) torque.

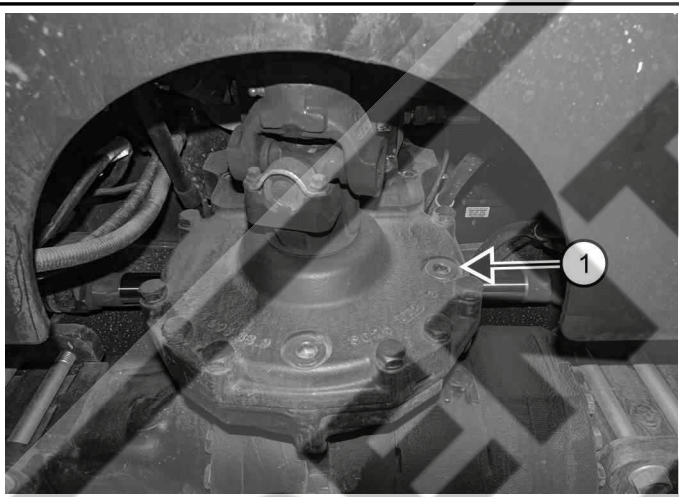
Checking And Adding Oil (Reduction Box)

For oil capacity. (See Fluid Capacities on Page 309)

For oil type. (See Maintenance Intervals on Page 138)

1. Park the machine on a level surface.

Figure 312



2. Clean the plug (Item 1) [Figure 312] and the surrounding surface.
3. Remove the plug (Item 1) [Figure 312]. The oil level should be at the bottom edge of the plug hole.
4. Add oil through the hole if the oil level is below the hole.
5. Install and tighten the plug.

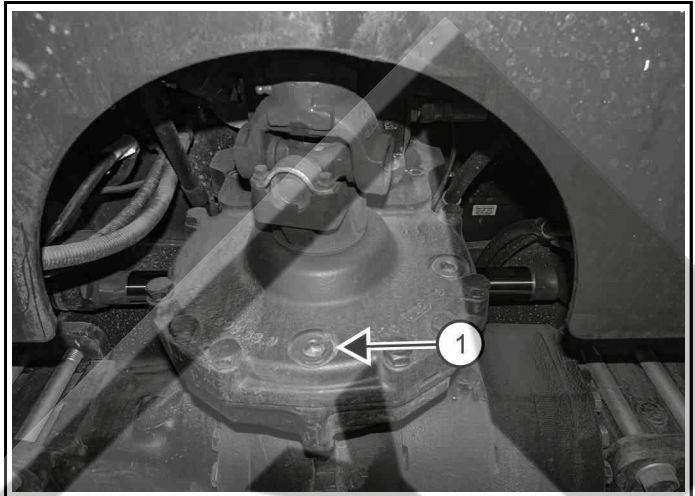
Removing And Replacing Oil (Reduction Box)

For oil capacity. (See Fluid Capacities on Page 309)

For oil type. (See Maintenance Intervals on Page 138)

1. Park the machine on a level surface.

Figure 313



2. Clean the plug (Item 1) [Figure 313] and the surrounding surface.
3. Remove the plug (Item 1) [Figure 313] and drain oil into a container. Recycle or dispose of the used lubricant in an environmentally safe manner.
4. Install and tighten the plug (Item 1) [Figure 313].
5. Remove the plug (Item 1) [Figure 312] and add oil through the hole until it is to the bottom of the plug hole.
6. Install and tighten the plug (Item 1) [Figure 312].

ALTERNATOR BELT

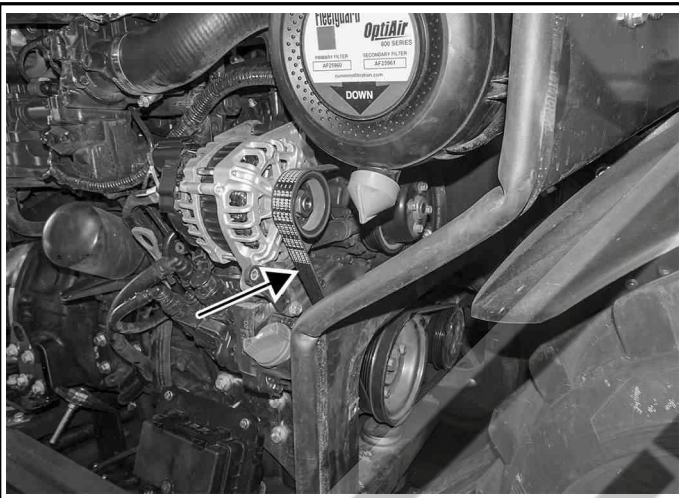
Adjusting The Alternator Belt

The alternator belt is a special maintenance free type that is pretensioned over the pulleys. This belt eliminates the need for a tensioning device and does not require periodic adjustment. Contact your Bobcat dealer for replacement parts.

Checking The Alternator Belt

1. Open the engine cover.
(See Engine Cover on Page 147)

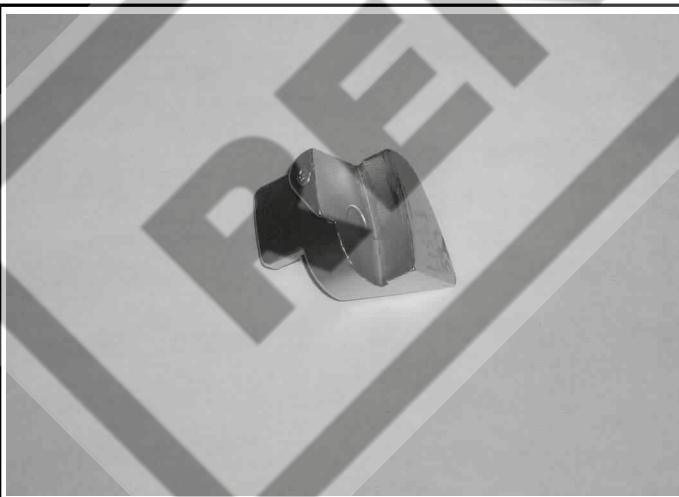
Figure 314



2. Check the whole belt drive visually for damage or wear. Replace if necessary.

Replacing The Alternator Belt

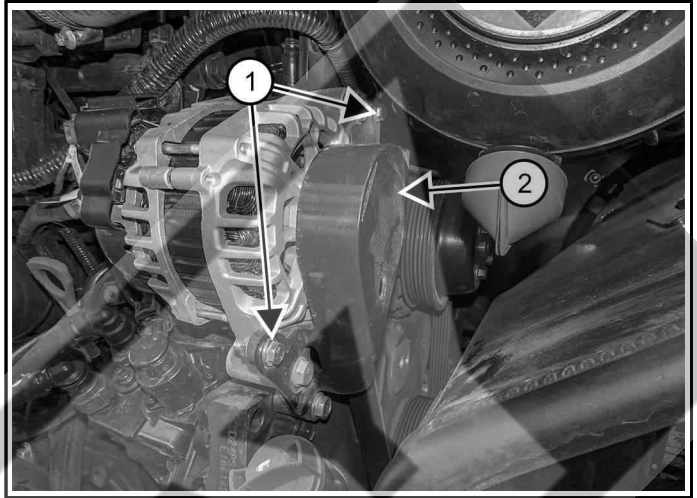
Figure 315



A belt tool [Figure 315] is required to install the new alternator belt. The belt tool is available in local aftermarket stores.

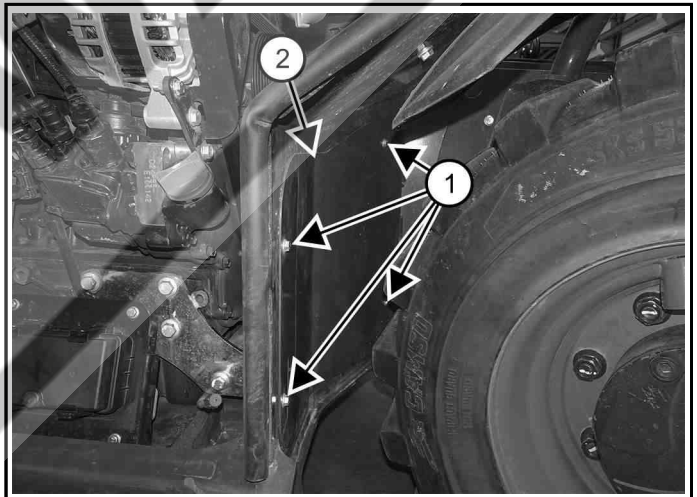
1. Stop the engine and open the engine cover.
(See Opening And Closing The Engine Cover on Page 147)

Figure 316



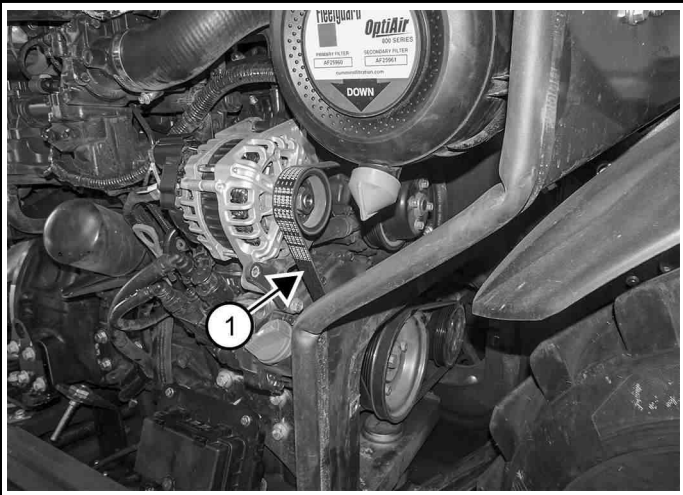
2. Remove the two bolts (Item 1) and belt cover (Item 2) [Figure 316].

Figure 317



3. Remove the four bolts (Item 1) and cover (Item 2) [Figure 317].
4. Remove the air conditioning belt (if equipped).
(See Air Conditioning Belt on Page 180)

Figure 318



C215961c

5. Cut the alternator belt (Item 1) [Figure 318] and remove the belt from the pulleys.
6. Inspect the pulleys for wear.
7. Install the new belt using the belt tool.
8. After belt replacement let the engine run for five minutes and check the alternator belt.

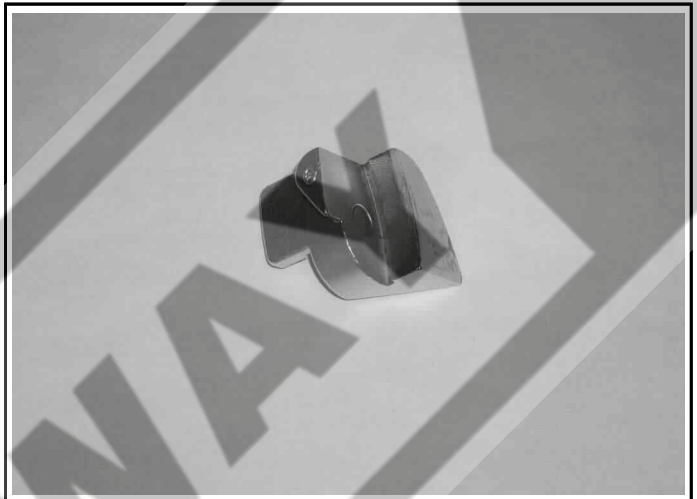
AIR CONDITIONING BELT

Adjusting The Air Conditioning Belt

The air conditioning belt is a special maintenance free type that is pretensioned over the pulleys. This belt eliminates the need for a tensioning device and does not require periodic adjustment. Contact your Bobcat dealer for replacement parts.

Replacing The Air Conditioning Belt

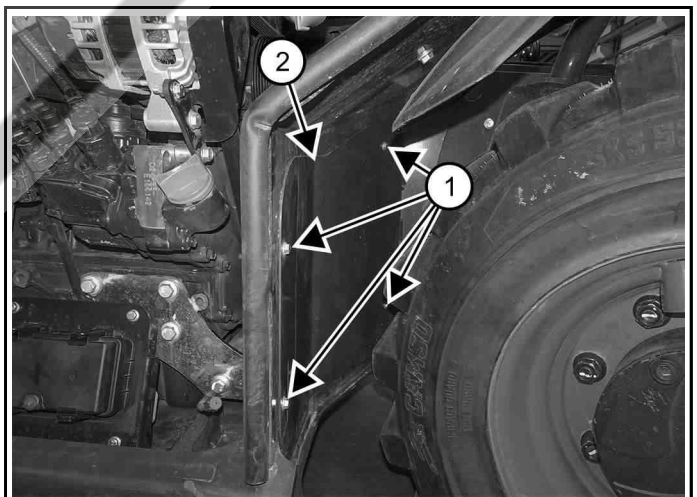
Figure 319



A belt tool [Figure 319] is required to install the new air conditioning belt. The belt tool is available in local aftermarket stores.

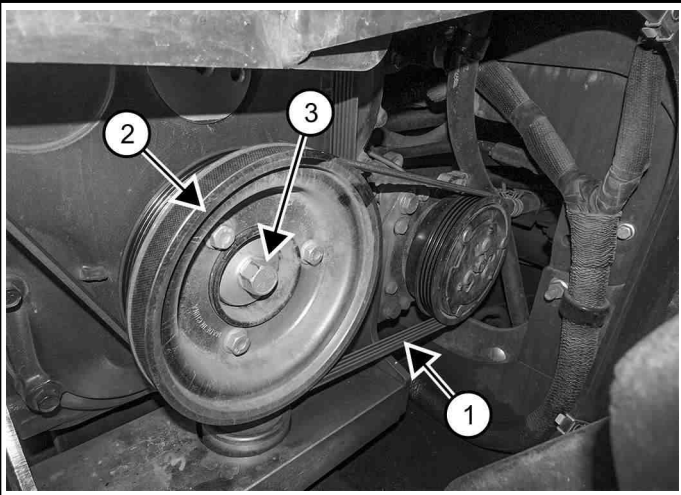
1. Stop the engine.

Figure 320



2. Remove the four bolts (Item 1) and cover (Item 2) [Figure 320].

Figure 321



3. Cut the old belt (Item 1) [Figure 321] and remove the belt from the pulleys. Inspect the pulleys for wear.
4. Install the new belt on the air conditioning compressor pulley and position the belt (Item 1) on the bottom side of the crank shaft pulley (Item 2) [Figure 321].
5. Rotate the engine clockwise using the large crankshaft pulley bolt (Item 3) and guide the belt on the pulley with the belt tool.

Do NOT use the alternator pulley nut, the water pump pulley bolts, or the smaller crankshaft pulley bolts. Ensure that the belt is fully installed on both pulleys.

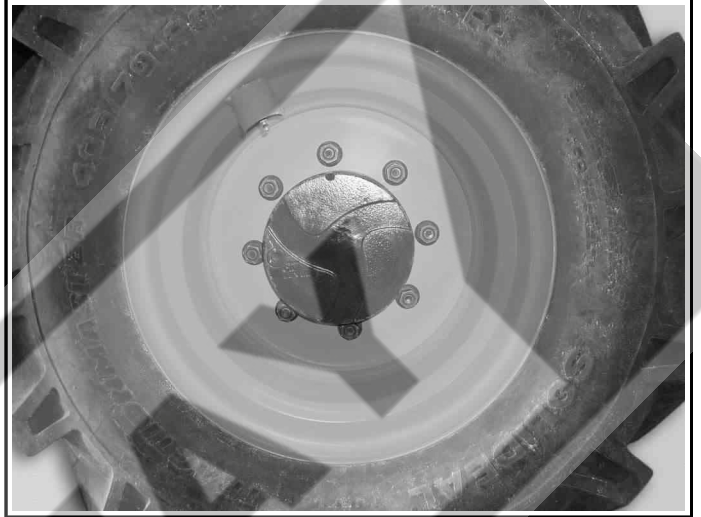
6. Install the cover (Item 2) and tighten the bolts (Item 1) [Figure 320].

TYRE MAINTENANCE

Wheel Nuts

See the service schedule for the service interval to check the wheel nuts. (See Service Schedule on Page 138)

Figure 322



- Check the tightening torque on the wheel nuts. The correct wheel nut tightening torque is 360 N•m (266 ft-lb) [Figure 322].

Rotating

Check the tyres regularly for wear, damage and pressure. For the correct tyre pressure, (See Traction on Page 309)

Rear tyres usually wear faster than front tyres. To keep the wear even, move the front wheels to the rear and rear wheels to the front.

It is important to keep the same size tyres on each side of the machine. If different sizes are used, each tyre will be turning at a different rate and cause excessive wear. The tread bars of all the tyres must face the same direction.

Recommended tyre pressure must be maintained to avoid excessive tyre wear and loss of stability and handling capacity. Check for the correct pressure before operating the machine.

Replacing The Wheels

WARNING

INSTABILITY AND UNINTENDED MOVEMENT HAZARD

Failure to use jackstands can allow the machine to tip or move causing serious injury or death. Place jackstands under the front and rear of the machine before running engine for service.†

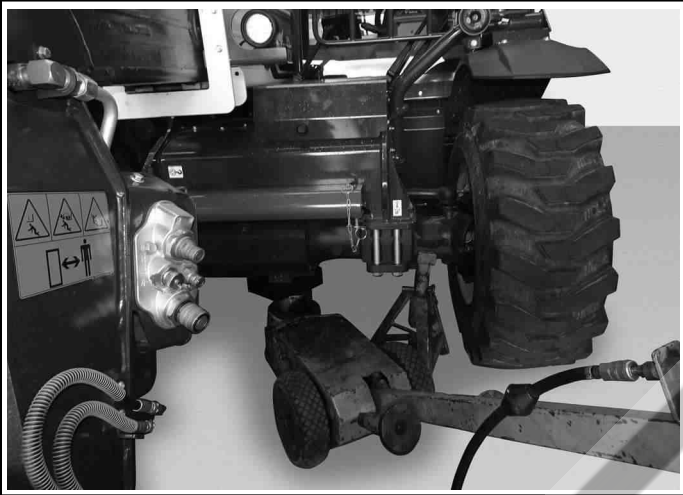
W-2718

NOTE: When replacing the wheels, the four wheels need to be identical. To change the wheel size, contact your Bobcat dealer.

- Always park the machine on a level surface.
- Retract and lower the boom fully.
- STOP the engine.

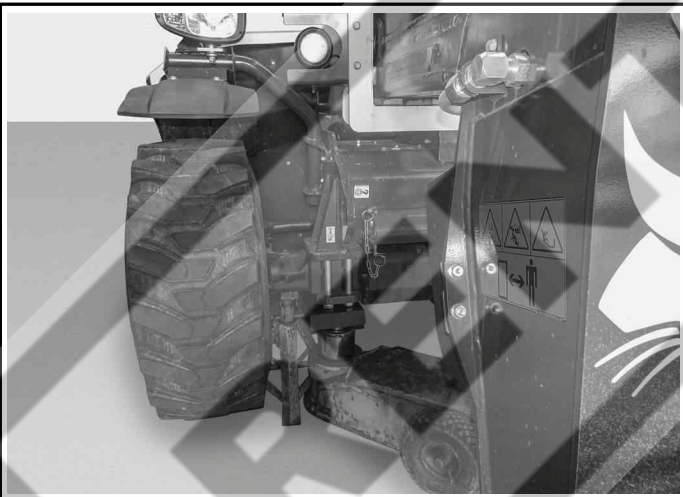
Replacing The Front Wheels

Figure 323



1. Put the floor jack under the left side of the front axle. Lift the machine and install the first jackstand [Figure 323].

Figure 324



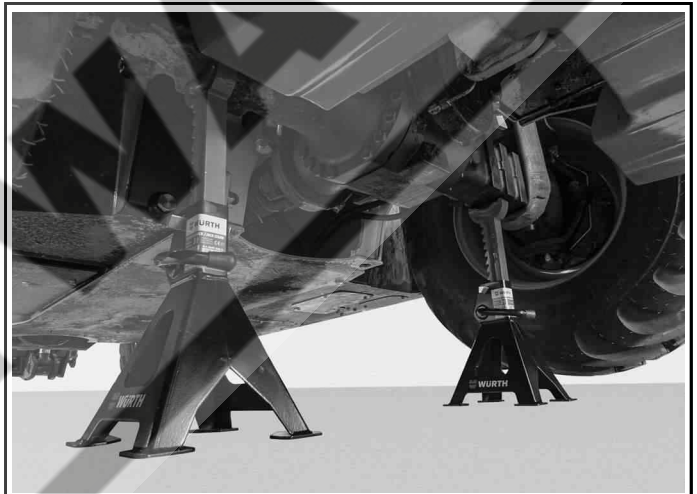
2. Put the floor jack under the right side of the front axle. Lift the machine and install the second jackstand [Figure 324].
3. Remove the eight wheel nuts and replace the wheel. Install the wheel nuts and tighten using a crisscross pattern to 360 N•m (266 ft-lb) torque.

Replacing The Rear Wheels

Figure 325



Figure 326



1. Put the floor jack under the centre of the counterweight [Figure 325]. Lift the machine and install jackstands [Figure 326].
2. Remove the eight wheel nuts and replace the wheel. Install the wheel nuts and tighten using a crisscross pattern to 360 N•m (266 ft-lb) torque.

Mounting

To change the size of the tyres, contact your Bobcat dealer.

Tyres are to be repaired only by an authorised person using the correct procedures and type of equipment.

Tyres and rims must always be checked for correct size before mounting. Check rim and tyre bead for damage. The rim flange must be cleaned and free of rust. The tyre bead and rim flange must be lubricated with a rubber lubricant before mounting the tyre.

Avoid excessive pressure which can rupture the tyre and cause serious injury or death.

During inflation of the tyre, check the tyre pressure frequently to avoid over inflation.

Tyre Pressure

⚠ WARNING

EXPLOSION HAZARD

Failure to use correct tyre mounting procedure can cause serious injury or death.

Do not inflate tyres above specified pressure. ◀

W-2078

⚠ IMPORTANT

MACHINE DAMAGE HAZARD

Mixing tyre brands and sizes and improper tyre inflation pressure can cause transmission or tyre damage.

Never exceed the MAXIMUM pressure shown on the sidewall of the tyre.

Use only tyres of the same size and similar wear condition on the same machine.

DO NOT mix brands of tyres used on the same machine. ◀

1-2007

For correct inflation, (See Traction on Page 309)

LUBRICATING THE MACHINE

Lubrication Locations

Lubricate as specified in the SERVICE SCHEDULE for the best performance of the machine.
(See Service Schedule on Page 138)

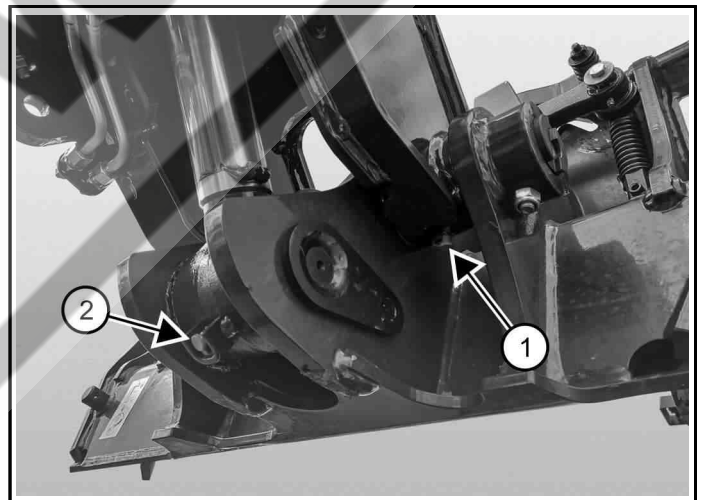
Record the operating hours each time you lubricate so that it is performed at the correct interval.

Always use a good quality lithium based multipurpose grease. (Bobcat Multi Purpose Grease P/N 6987888, Bobcat Supreme HD Grease P/N 6987889 or Bobcat Extreme HD P/N 69878790 depending on the severity of the condition of use). Apply lubricant until extra grease shows.

Remove the attachment from the machine before lubricating.
(See Installing And Removing Attachments (Manual Bob-Tach System) on Page 106)
(See Installing And Removing Attachments (Power Bob-Tach System) on Page 109)
(See Installing And Removing Attachments (Manual Quick-Tach Or Mani-Tach System) on Page 113)
(See Installing And Removing Attachments (Power Quick-Tach Or Mani-Tach System) on Page 115)

Lubricate the following locations on the machine:

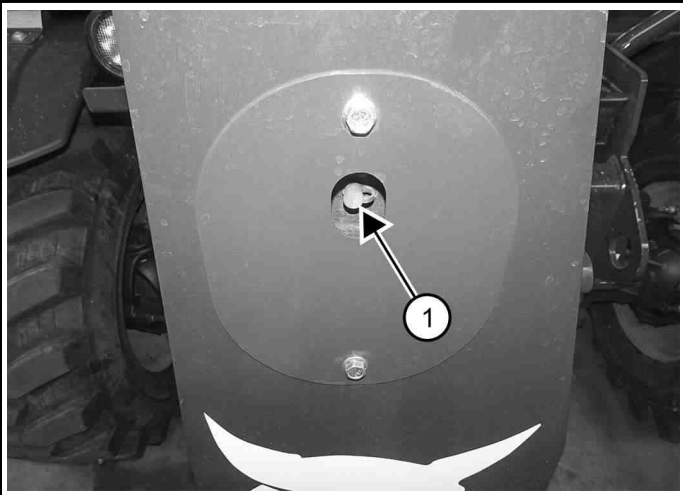
Figure 327



C217546a

- Attachment carrier pivot (Item 1) [Figure 327] (both sides).
- Tilt cylinder rod end (Item 2) [Figure 327].
- Remove the front cover from the boom end.

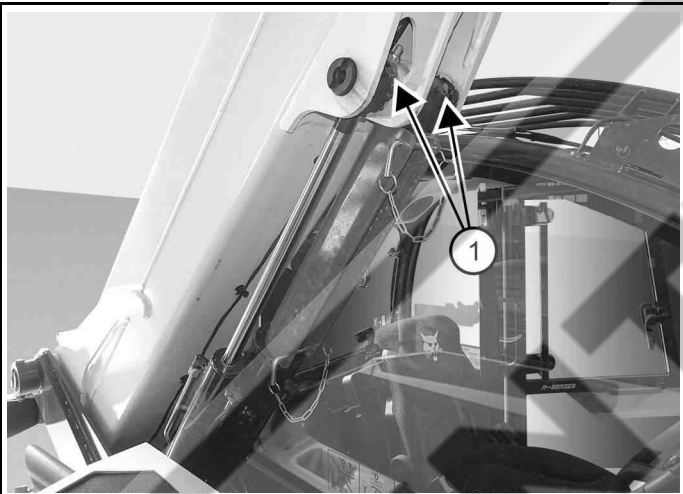
Figure 328



C215954a

- Tilt cylinder base end (Item 1) [Figure 328].

Figure 329

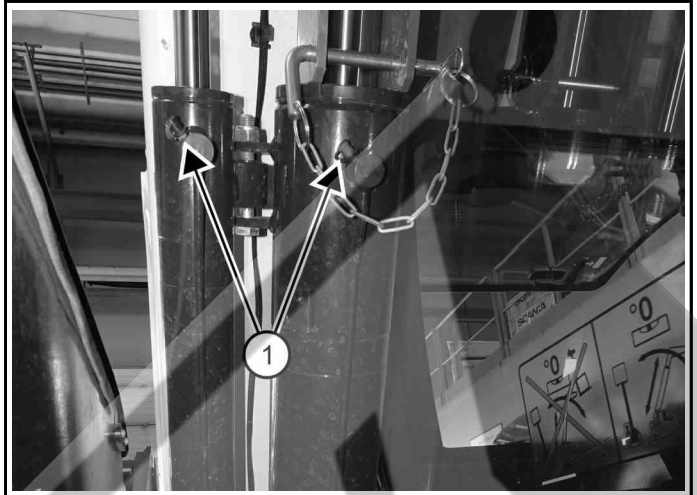


C215922b

- Boom cylinder rod end (Item 1) and self-levelling cylinder rod end (Item 2) [Figure 329].

NOTE: Raise the boom and install the approved boom stop before lubricating the boom and self-levelling (compensation) cylinders. (See Installing The Approved Boom Stop on Page 146)

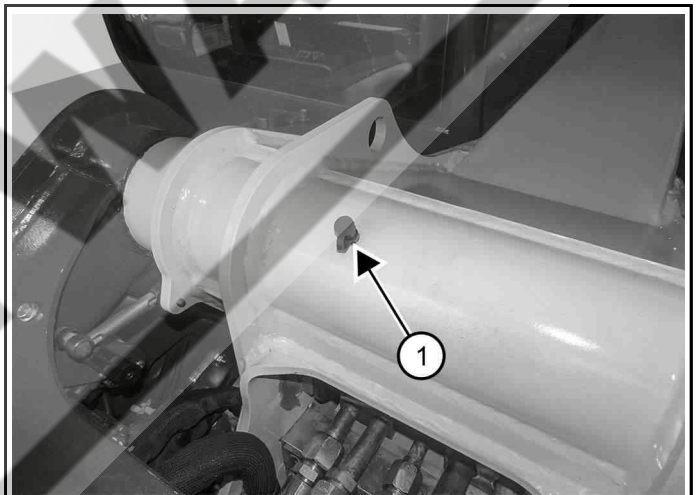
Figure 330



EM11317a

- Boom cylinder base end (Item 1) and self-levelling (compensation) cylinder base end (Item 2) [Figure 330].

Figure 331

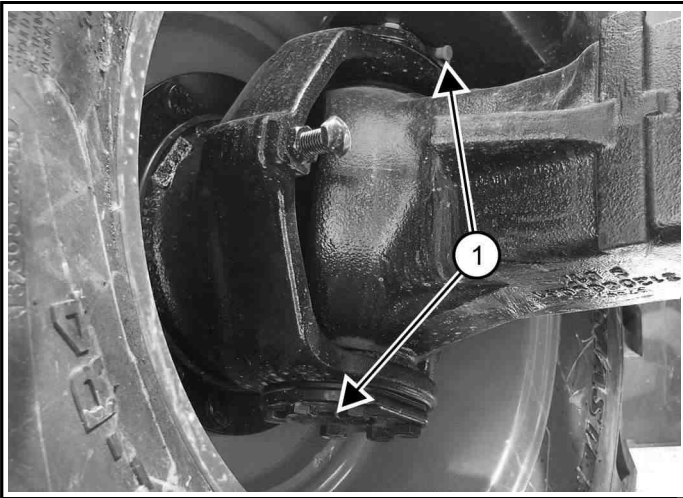


C215952a

- Boom pivot (Item 1) [Figure 331] (one place).

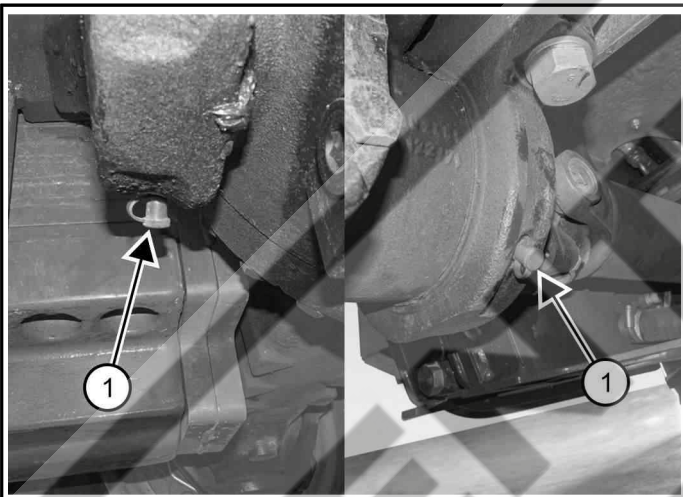
Machine without easy greasing installed:

Figure 332



- Axle pivots - top and bottom (Item 1) [Figure 332] all four wheels.

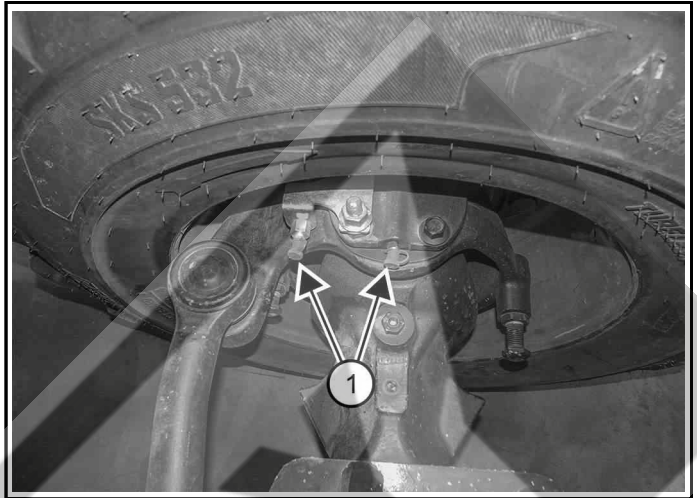
Figure 333



- Axle oscillation - rear axle (Item 1) [Figure 333].

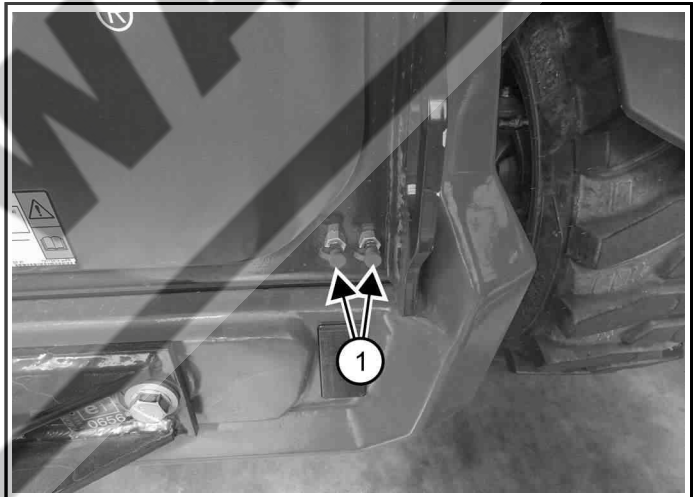
Machine with easy greasing installed:

Figure 334



- Axle pivots (Item 1) [Figure 334] all four wheels.

Figure 335



- Axle oscillation (Item 1) [Figure 335].

Lubricating The Front Wear Pads

1. Fully extend and lower the boom.
2. Put the Travel Direction Control in neutral. (See Travel Direction on Page 42)
3. Ensure that the parking brake is engaged. (See Parking Brake on Page 67)
4. Stop the engine and exit the machine. (See Stopping The Engine And Leaving The Machine on Page 92)

Figure 336



P119186

5. Use a brush to lubricate the outside of the inner boom.

Lubricating The Rear Wear Pads

1. Partially extend and fully lower boom.
2. Put the Travel Direction Control in neutral. (See Travel Direction on Page 42)
3. Ensure the parking brake is engaged. (See Parking Brake on Page 67)
4. Stop the engine and exit the machine. (See Stopping The Engine And Leaving The Machine on Page 92)

Figure 337



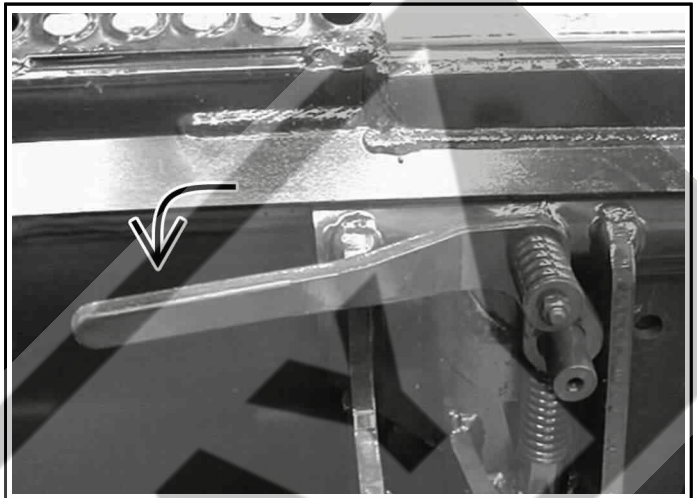
EM11492

5. Use a brush to lubricate the inside of the boom [Figure 337].

ATTACHMENT CARRIER

Inspecting And Maintaining The Manual Bob-Tach

Figure 338



P85513e

1. Move the Bob-Tach levers down to engage the wedges [Figure 338].

The levers and wedges must move freely.

⚠ WARNING

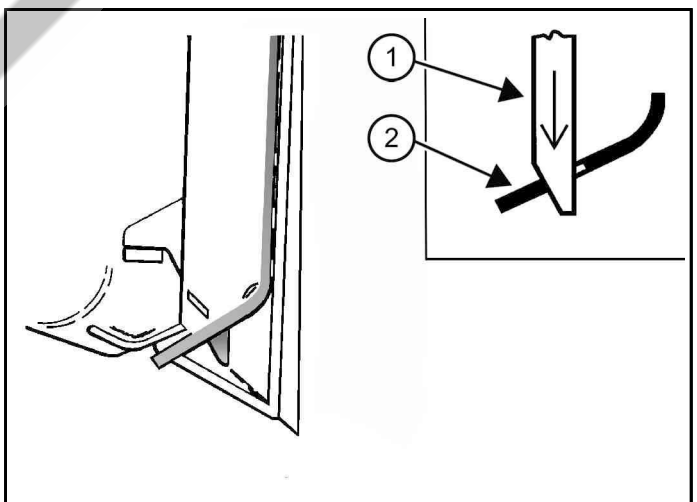
CRUSHING HAZARD

Failure to secure Bob-Tach attachment mounting system wedges can allow attachment to come off and cause serious injury or death.

Both wedges must extend through the holes in the attachment mounting frame. Lever(s) must be fully down and locked. ◀

W-2102

Figure 339

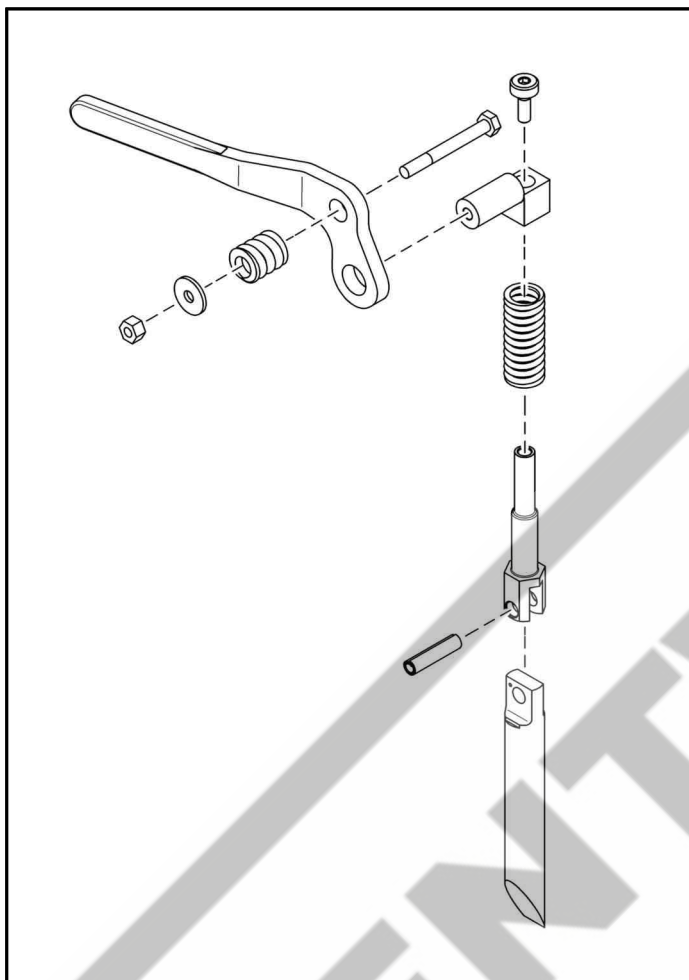


NA3450B

- The wedges (Item 1) [Figure 339] must extend through the holes in the attachment mounting frame.

- The wedges (Item 1) must contact the lower edge of the holes in the attachment mounting frame (Item 2) [Figure 339].
- If the wedges do not contact the lower edge of the holes [Figure 339], the attachment will be loose and can come off the Bob-Tach.

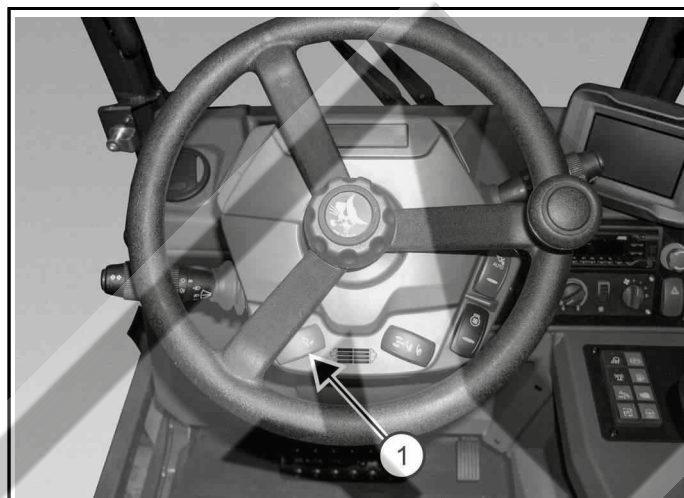
Figure 340



2. Inspect the mounting frame on the attachment and Bob-Tach, linkages, and wedges for excessive wear or damage [Figure 340].
3. Replace any parts that are damaged, bent, or missing.
4. Keep all fasteners tight.
5. Look for cracked welds. Contact your Bobcat dealer for repair or replacement parts.
6. Lubricate the wedges.
(See Service Schedule on Page 138) and
(See Lubricating the Machine on Page 183)

Inspecting And Maintaining The Power Bob-Tach

Figure 341



1. Press the bottom of the hydraulic attachment lock switch (Item 1) [Figure 341] and fully tilt the Bob-Tach attachment mounting system back until the wedges are fully raised.
2. Press the top of the hydraulic attachment lock switch (Item 1) [Figure 341] and wait until the wedges are fully down.

The levers and wedges must move freely.

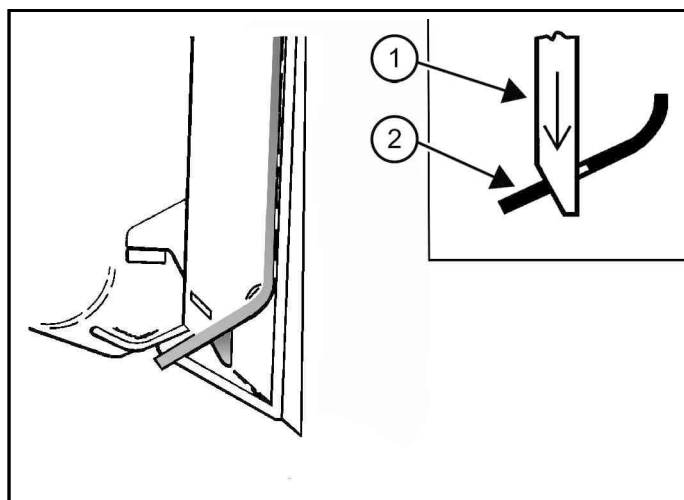
WARNING

CRUSHING HAZARD

Failure to secure Bob-Tach attachment mounting system wedges can allow attachment to come off and cause serious injury or death. Both wedges must extend through the holes in the attachment mounting frame. Lever(s) must be fully down and locked.

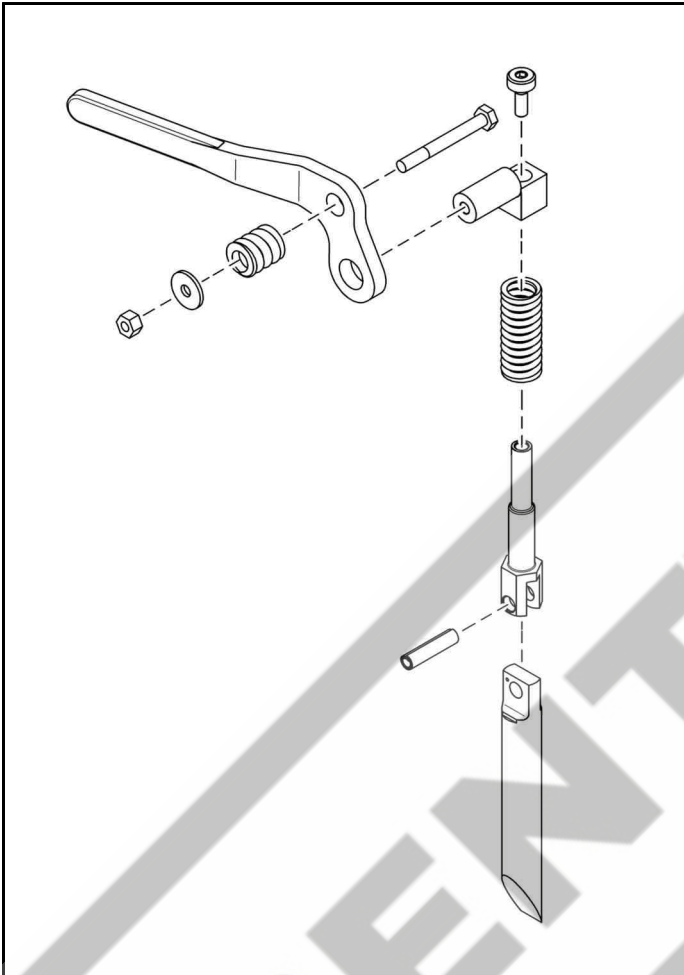
W-2102

Figure 342



- The wedges (Item 1) [Figure 342] must extend through the holes in the attachment mounting frame.
- The spring loaded wedges (Item 1) must contact the lower edge of the holes in the attachment mounting frame (Item 2) [Figure 342].
- If the wedges do not contact the lower edge of the holes [Figure 342], the attachment will be loose and can come off the Bob-Tach system.

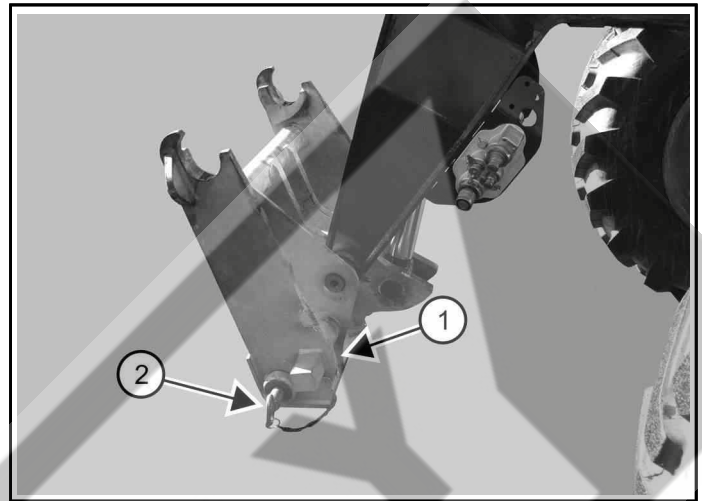
Figure 343



3. Inspect the mounting frame on the attachment and Bob-Tach frame, linkages, and wedges for excessive wear or damage [Figure 343].
4. Replace any parts that are damaged, bent, or missing.
5. Keep all fasteners tight.
6. Look for cracked welds. Contact your Bobcat dealer for repair or replacement parts.
7. Lubricate the wedges.

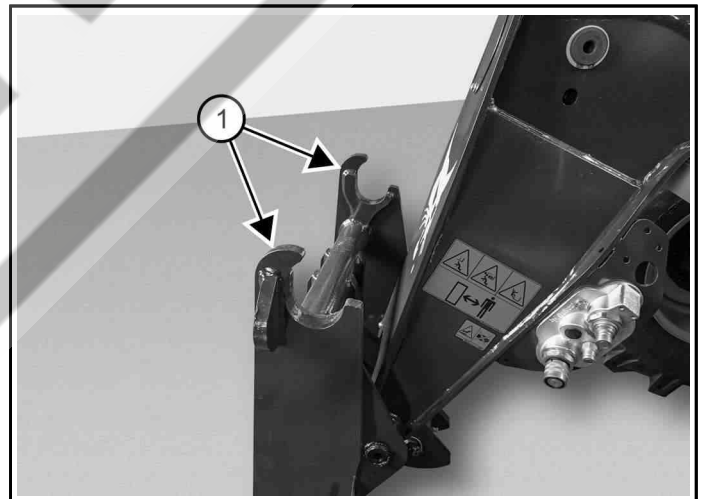
Inspecting And Maintaining The Manual Quick-Tach Or Mani-Tach

Figure 344



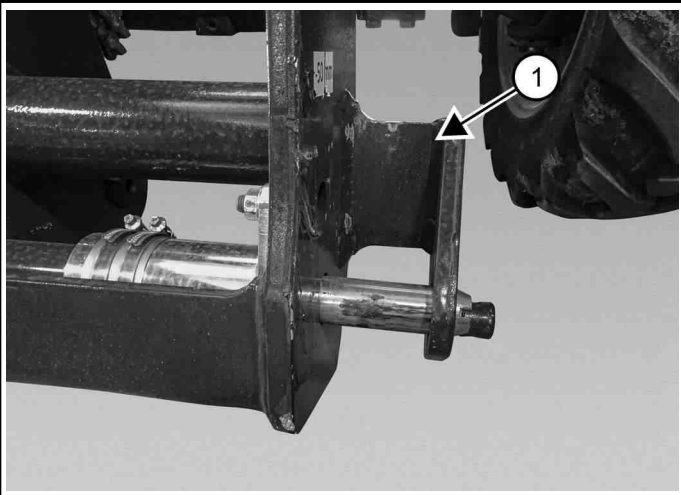
1. Remove the locking bar safety pin (Item 1), and remove the locking bar (Item 2) from the attachment carrier.
 - a. Check the condition of the locking bar and safety pin.
 - b. Replace as needed.

Figure 345



2. The attachment carrier mounting hooks (Item 1) [Figure 345] (both sides) must not be damaged or worn.
 - a. Inspect the attachment carrier condition.
 - b. Replace as needed.

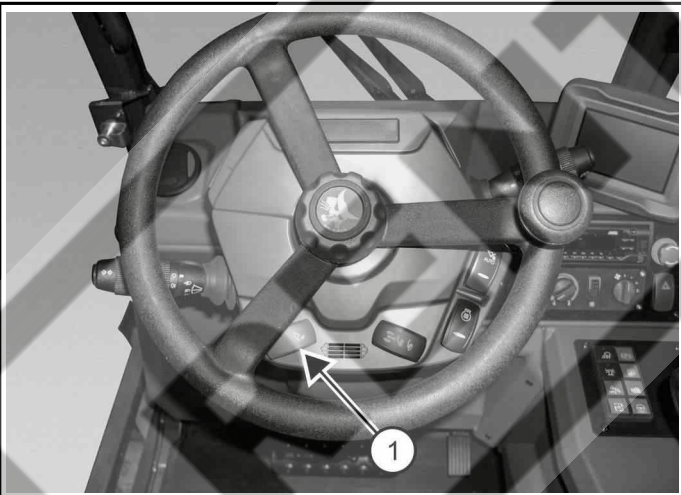
Figure 346



3. The stop block (Item 1) [Figure 346] (both sides) must not be damaged or worn.
 - a. Inspect stop block condition.
 - b. Replace as needed.
4. Lubricate the attachment carrier. (See Lubricating the Machine on Page 183)

Inspecting And Maintaining The Power Quick-Tach Or Mani-Tach

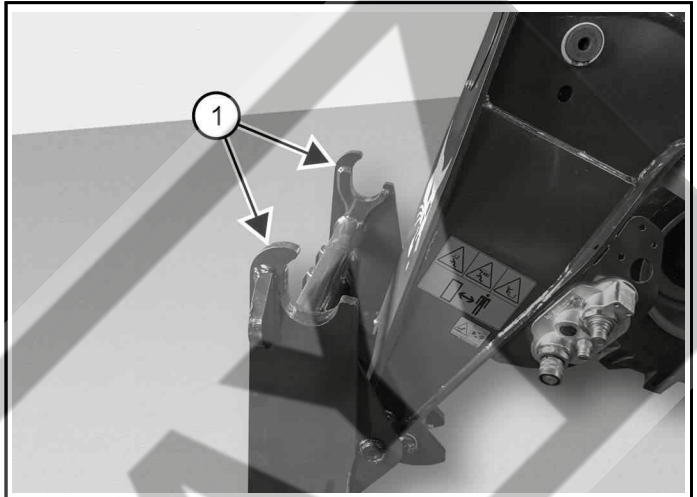
Figure 347



1. Push and hold the bottom of the hydraulic attachment lock switch (Item 1) [Figure 347] until the locking pins are fully retracted.
2. Release the hydraulic attachment lock switch (Item 1) [Figure 347] and wait until the locking pins are fully extended.

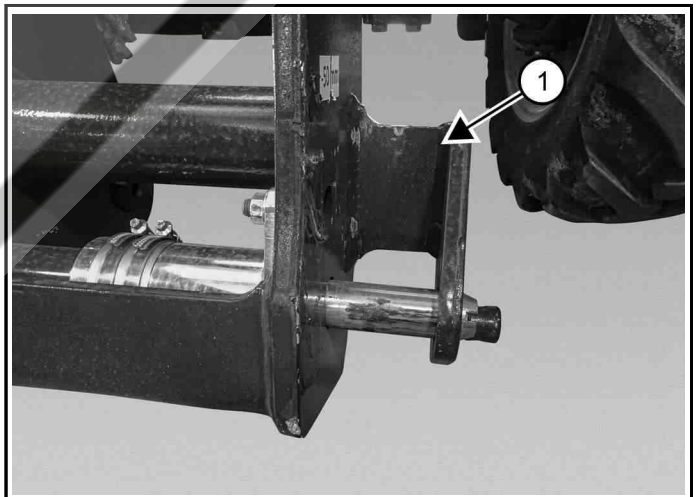
- The locking pins must move freely. The pins must not be bent or the ends deformed.
- The pins must extend through the holes in the attachment mounting frame.

Figure 348



3. The attachment carrier mounting hooks (Item 1) [Figure 348] (both sides) must not be damaged or worn.
 - a. Inspect the attachment carrier condition.
 - b. Replace as needed.

Figure 349



4. The stop block (Item 1) [Figure 349] (both sides) must not be damaged or worn.
 - a. Inspect stop block condition.
 - b. Replace as needed.
5. Lubricate the attachment carrier. (See Lubricating the Machine on Page 183)

MACHINE STORAGE AND RETURN TO SERVICE

Storage

Sometimes it can be necessary to store your Bobcat Telescopic Handler for an extend period of time. Below is a list of items to perform before storage.

- Thoroughly clean the machine including the engine compartment.
- Store the attachments in a dry protected shelter.
- Lubricate the machine.
- Replace worn or damaged parts.
- Park the machine in a dry protected shelter.
- Lower the boom all the way and put the attachment (if equipped) flat on the ground.
- Check tyre inflation and put blocks under the frame to remove weight from the tyres.
- Put grease on any exposed cylinder rods.
- Put fuel stabilizer in the fuel tank and run the engine a few minutes to circulate the stabilizer to the pump and fuel injectors.

If biodiesel blend fuel has been used, perform the following:

Drain the fuel tank, refill with 100% petroleum diesel fuel, add fuel stabilizer and run the engine for at least 30 minutes.

- Drain and flush the cooling system. Refill with premixed coolant.
- Replace all fluids and filters (engine, hydraulic / hydrostatic).
- Replace air cleaner, heater and air conditioning filters.
- Put all controls in NEUTRAL position.
- Remove the battery. Be sure the electrolyte level is correct then charge the battery. Store it in a cool dry place above freezing temperatures and charge it periodically during storage.
- Cover the exhaust pipe opening.
- Tag the machine to indicate that it is in storage condition.

Return To Service

After the Bobcat Telescopic Handler has been in storage, it is necessary to follow a list of items to return the machine to service.

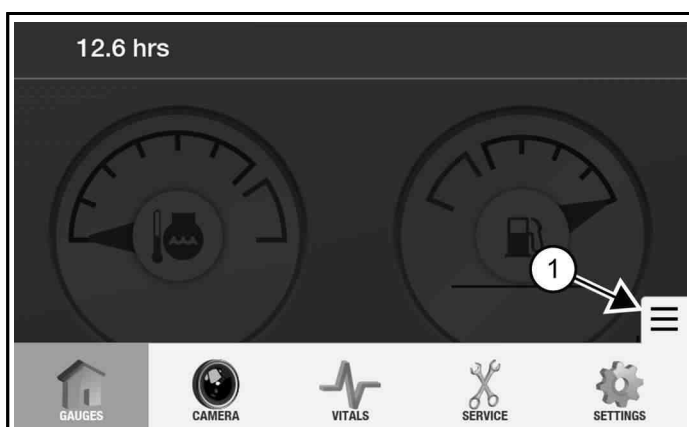
- Check the engine and hydraulic fluid levels; check coolant level.

- Install a fully charged battery.
- Remove grease from exposed cylinder rods.
- Check all belt tensions.
- Be sure all shields and guards are in place.
- Lubricate the machine.
- Check tyre inflation and remove blocks from under frame.
- Remove cover from exhaust pipe opening.
- Start the engine and let run for a few minutes while observing the instrument panels and systems for correct operation.
- Operate machine, check for correct function.
- Stop the engine and check for leaks. Repair as needed.

NAVIGATION (STANDARD DISPLAY)

Navigation Bar

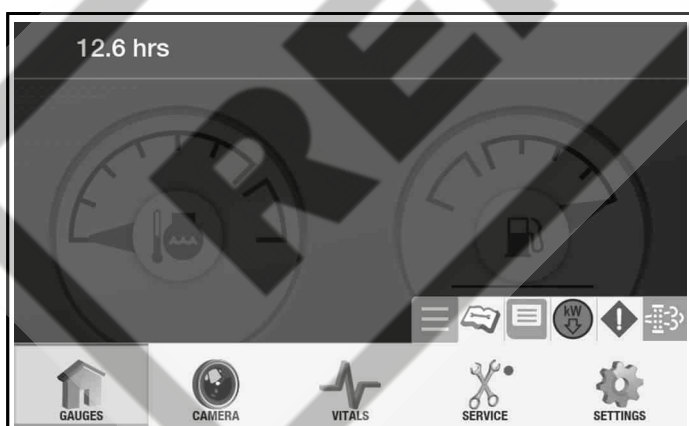
Figure 350



1. Select the **[NAVIGATION HANDLE]** icon (Item 1) [Figure 350] to open the navigation bar.
2. The navigation bar contains icons that are used to take you to the following screens:
 - **GAUGES** - Home screen
 - **CAMERA** - Rear-view camera screen
 - **VITALS** - (See Vitals (Standard Display) on Page 192)
 - **SERVICE** - (See Service (Standard Display) on Page 193)
 - **SETTINGS** - (See Settings (Standard Display) on Page 194)

Viewing Active Shortcuts

Figure 351



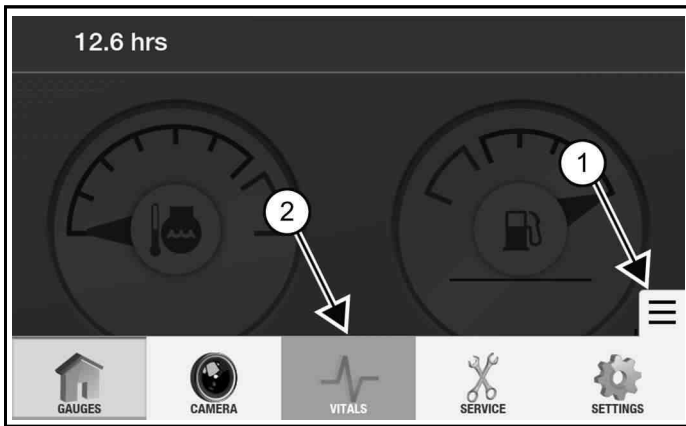
- The following icons can appear in the navigation handle position [Figure 351]. Selecting the icon will take you directly to the indicated screen.

ICON	DESCRIPTION	FUNCTION
	Navigation Handle	Opens and closes the navigation bar (See Navigation Bar on Page 191)
	Service Due	Opens the service screen (See Record A Service on Page 193)
	Software Update	Opens the software screen (See Software on Page 199)
	Machine Derate	Opens the machine performance screen (See Vital Detail And Machine Performance on Page 192)
	Warning	Opens the service codes screen (See View Service Codes on Page 193)
	Diesel Particulate Filter	Opens the DPF management screen (See DPF Description on Page 61)

VITALS (STANDARD DISPLAY)

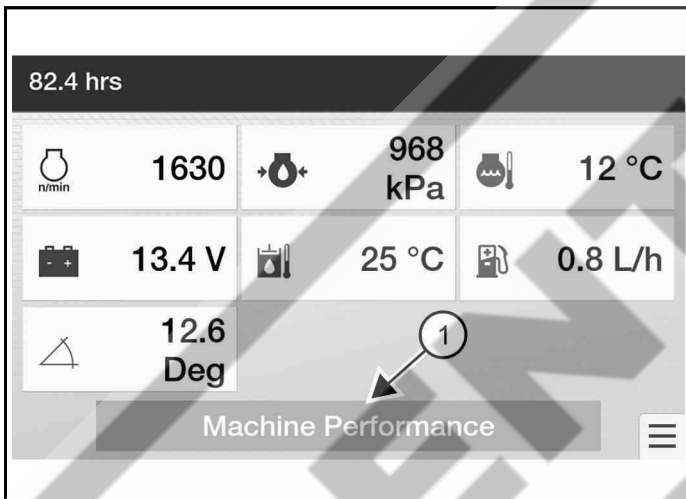
Vital Detail And Machine Performance

Figure 352



1. Select the **[NAVIGATION HANDLE]** icon (Item 1) [Figure 352].
2. Select **[VITALS]** (Item 2) [Figure 352].

Figure 353



3. The following vitals can be viewed in a digital format [Figure 353]:
 - Engine Speed (revolutions per minute (rpm))
 - Engine Oil Pressure
 - Engine Coolant Temperature
 - System Voltage
 - Hydraulic Fluid Temperature
 - Fuel Usage Per Hour
 - Boom Angle Value
4. Select **[MACHINE PERFORMANCE]** (Item 1) [Figure 353] to view limitations or restrictions that prevent machine damage.

Figure 354

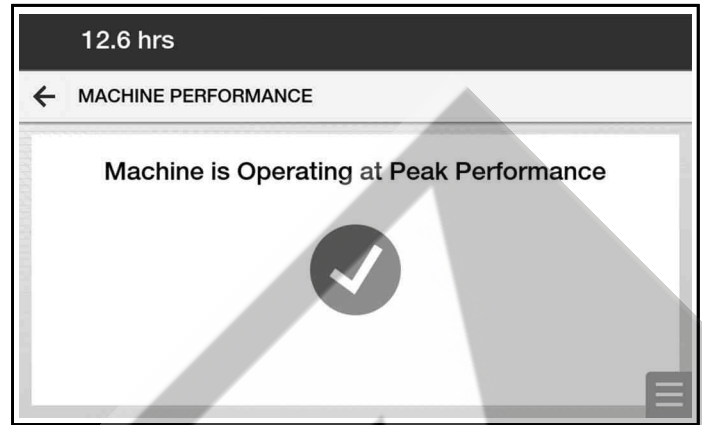
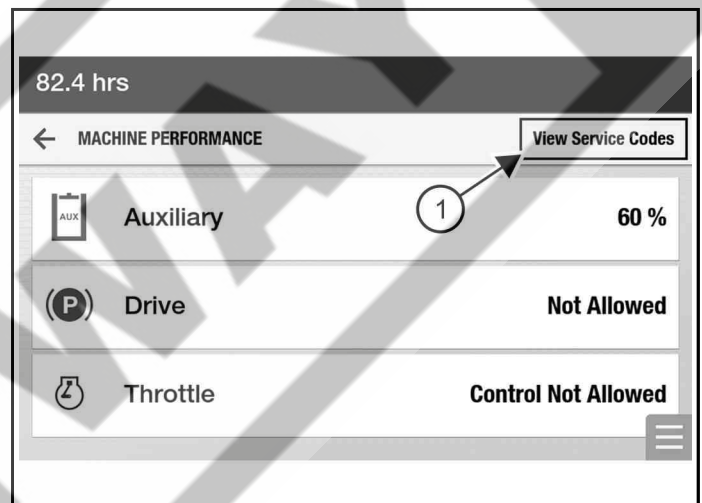


Figure 355



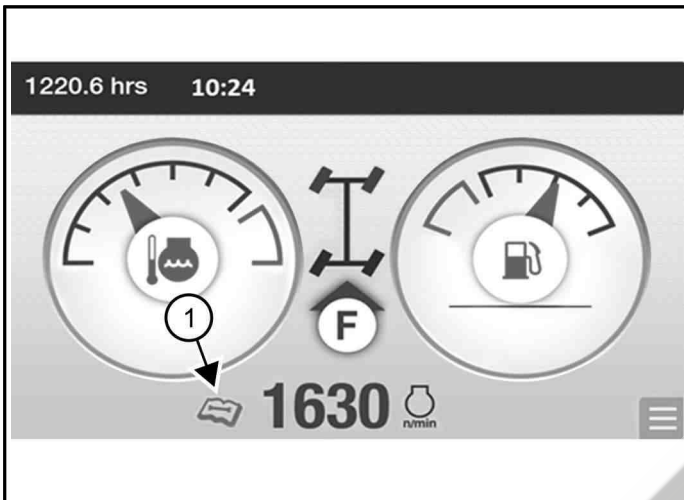
Examples of **MACHINE PERFORMANCE** screens are shown in [Figure 354] and [Figure 355]. Associated service codes may also be listed.

5. Select **[VIEW SERVICE CODES]** (Item 1) [Figure 355] to take you directly to the **SERVICE CODES** screen.

SERVICE (STANDARD DISPLAY)

Record A Service

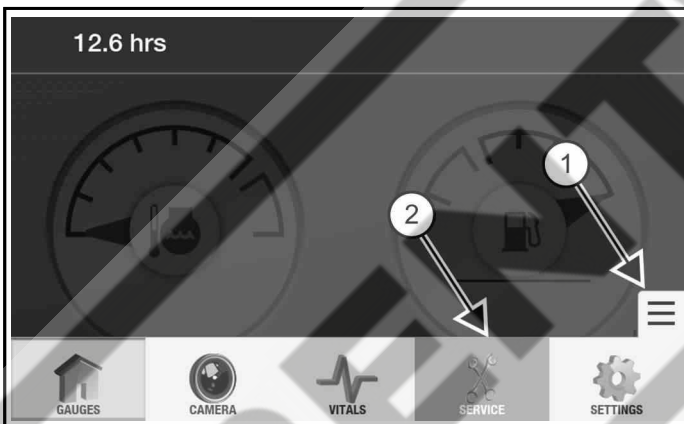
Figure 356



C211162a

The service schedule information is based off the machine service schedule. The display will notify the operator 10 hours prior to the next service due and continue until the service is completed (Item 1) [Figure 356].

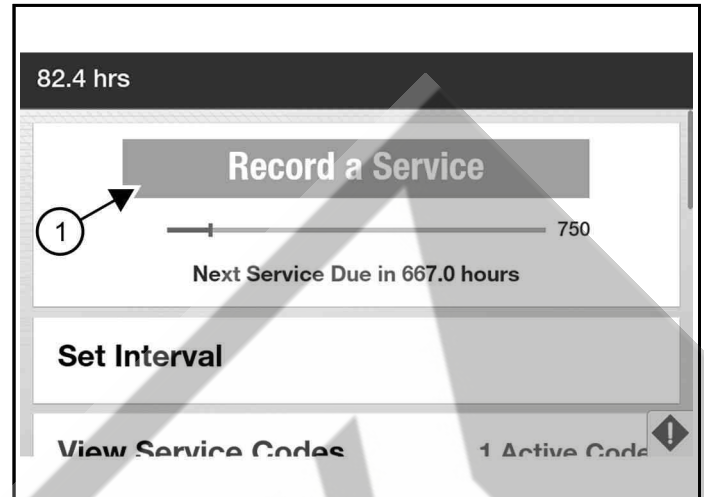
Figure 357



NA3700A

1. Select the **[NAVIGATION HANDLE]** icon (Item 1) [Figure 357].
2. Select **[SERVICE]** (Item 2) [Figure 357].

Figure 358

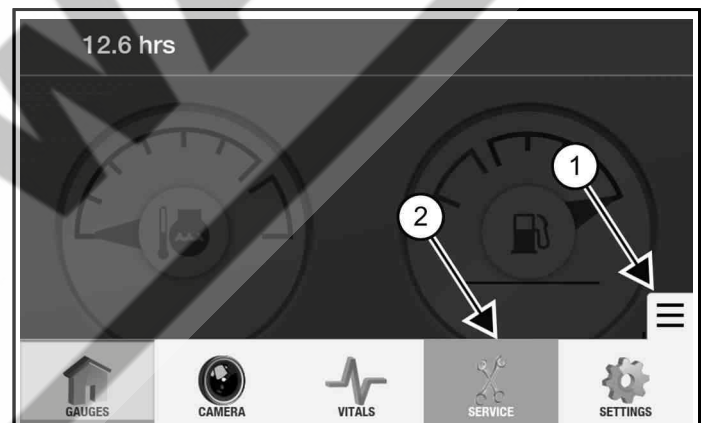


C210759a

3. Select **[RECORD A SERVICE]** (Item 1) [Figure 358] to record the service as completed.

View Service Codes

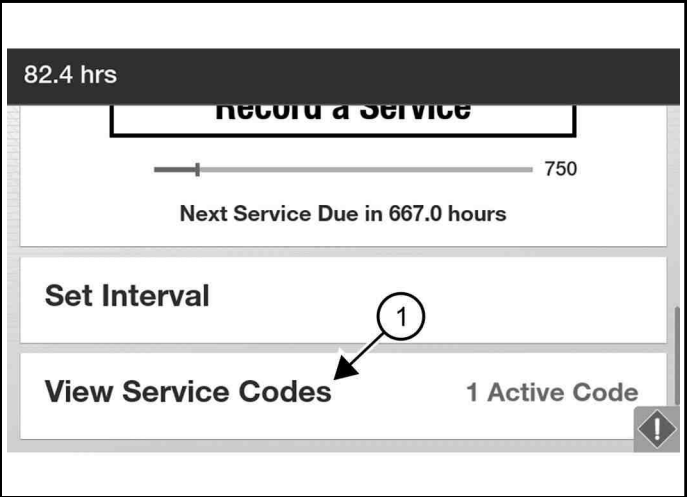
Figure 359



NA3700A

1. Select the **[NAVIGATION HANDLE]** icon (Item 1) [Figure 359].
2. Select **[SERVICE]** (Item 2) [Figure 359].

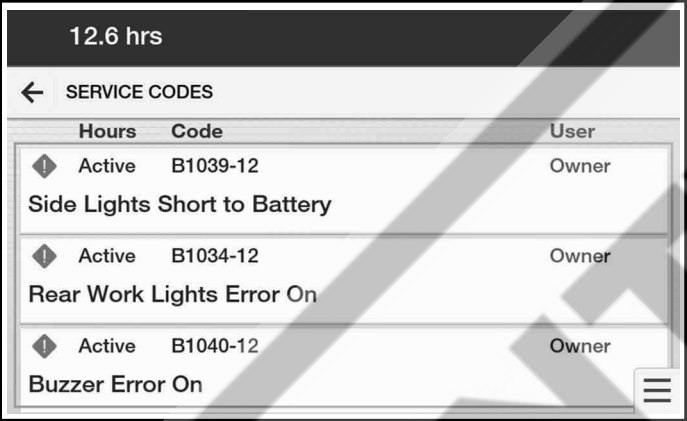
Figure 360



C210760a

3. Select **[VIEW SERVICE CODES]** (Item 1) [Figure 360].

Figure 361



NA3698

4. Scroll down if necessary to see all service codes [Figure 361].

SETTINGS (STANDARD DISPLAY)

Display Settings

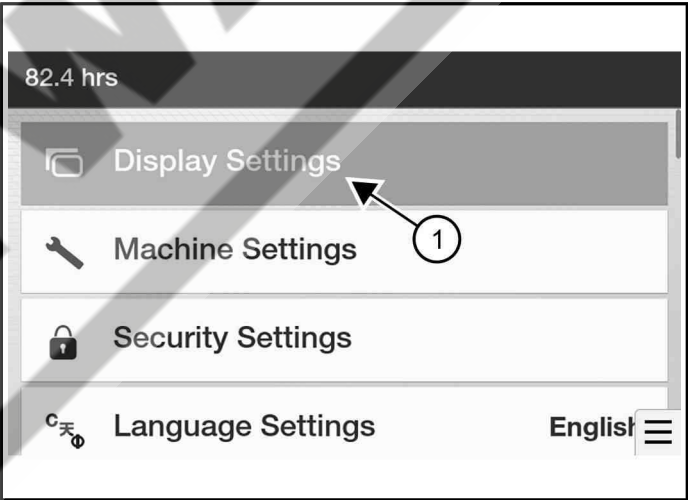
Figure 362



NA3699a

1. Select the **[NAVIGATION HANDLE]** icon (Item 1) [Figure 362].
2. Select **[SETTINGS]** (Item 2) [Figure 362].

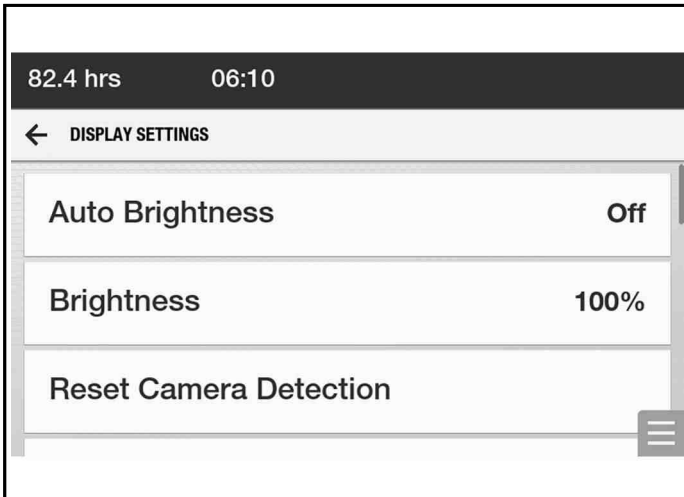
Figure 363



C210761b

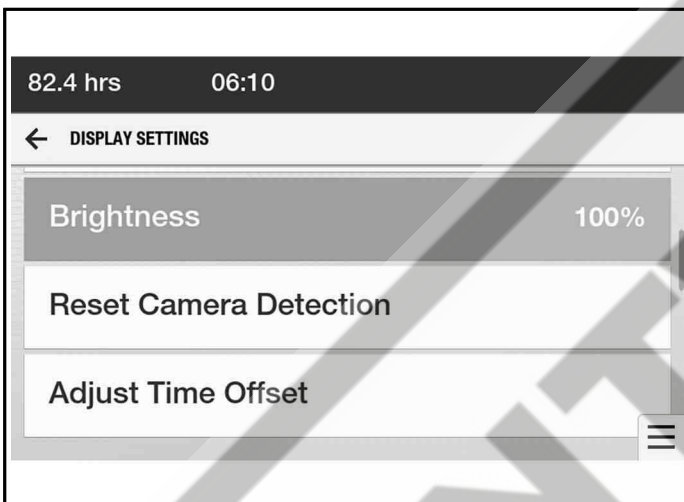
3. Select **[DISPLAY SETTINGS]** (Item 1) [Figure 363].

Figure 364



C210718

Figure 365

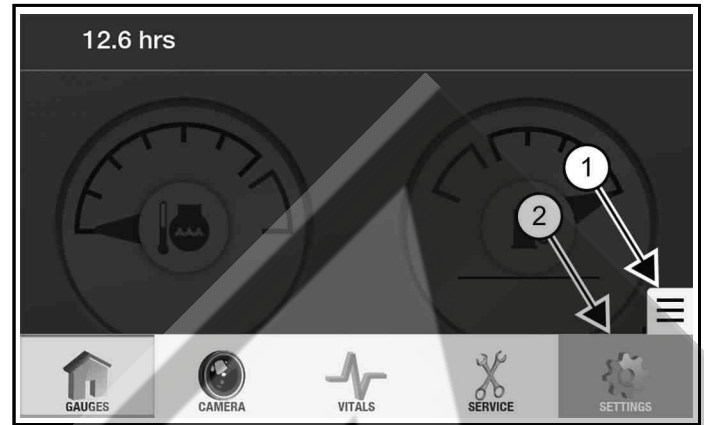


C210720

4. The following display settings are available [Figure 364] and [Figure 365]:
 - Auto brightness on or off
 - Screen brightness adjustment
 - Reset Camera Detection
 - Adjust Time Offset
 - Time Format

Machine Settings

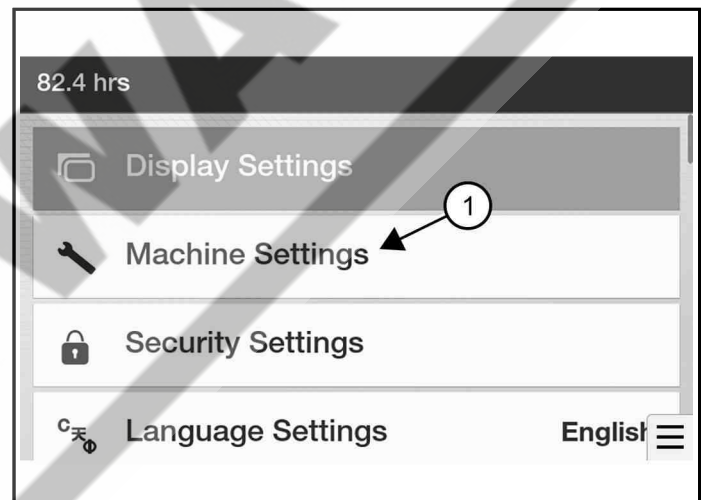
Figure 366



NA3665A

1. Select the **[NAVIGATION HANDLE]** icon (Item 1) [Figure 366].
2. Select **[SETTINGS]** (Item 2) [Figure 366].

Figure 367



C210781a

3. Select **[MACHINE SETTINGS]** (Item 1) [Figure 367].

Figure 368

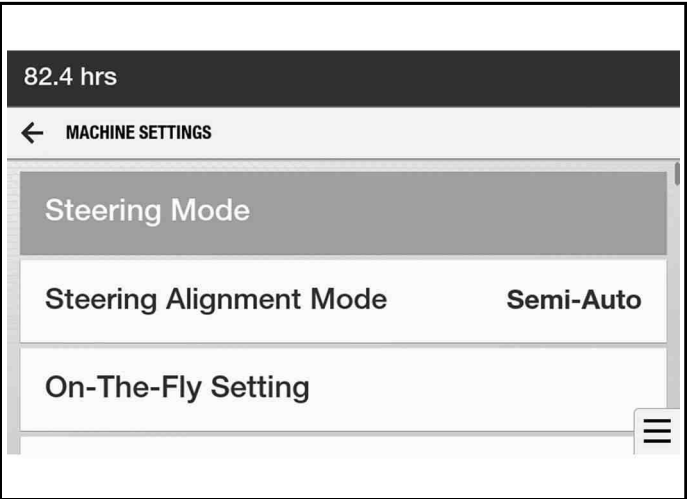


Figure 369



Figure 370

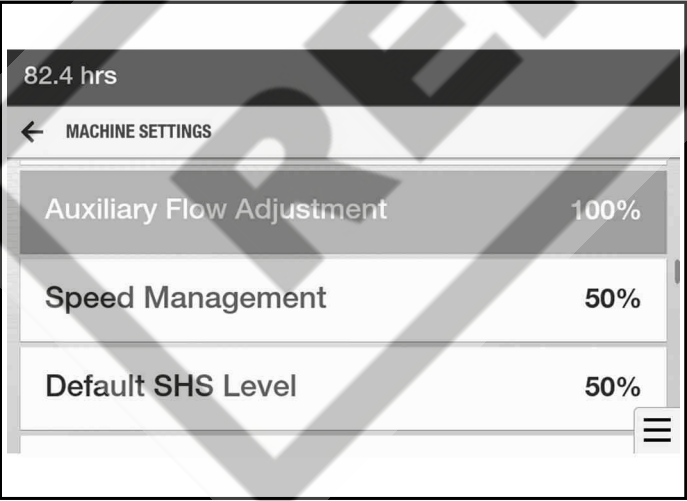
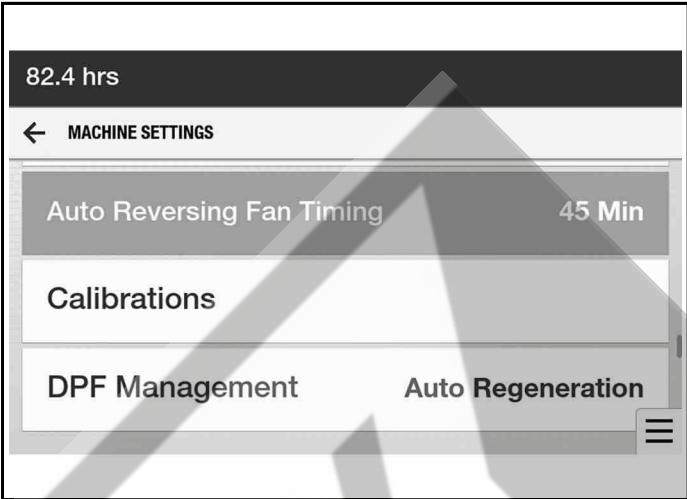


Figure 371



4. The following machine settings may be available depending on machine configuration [Figure 368], [Figure 369], [Figure 370] and [Figure 371]:
- Steering Mode
 - Steering Alignment Mode
 - On-the-Fly Setting
 - Auxiliary on at Start
 - Auxiliary Flow Adjustment
 - Speed Management
 - Default SHS Level
 - Auto Reverse Fan Timing
 - Calibrations
 - DPF Management

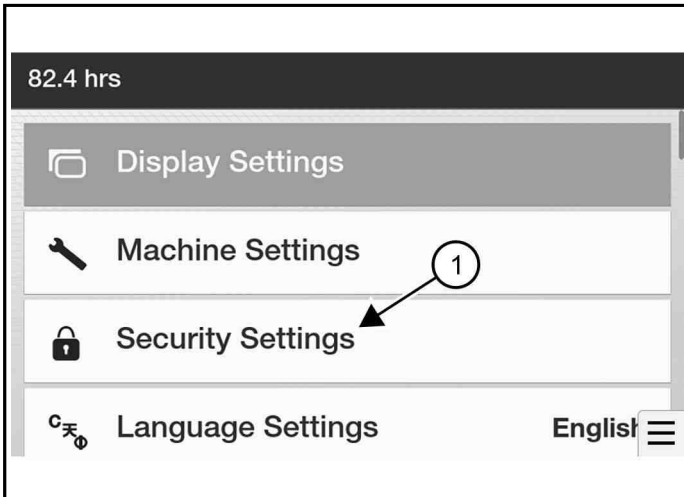
Security Settings

Figure 372



1. Select the **[NAVIGATION HANDLE]** icon (Item 1) [Figure 372].
2. Select **[SETTINGS]** (Item 2) [Figure 372].

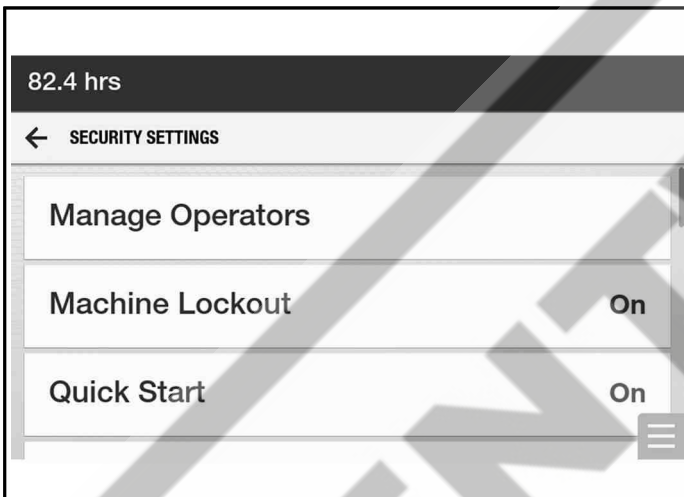
Figure 373



C210761c

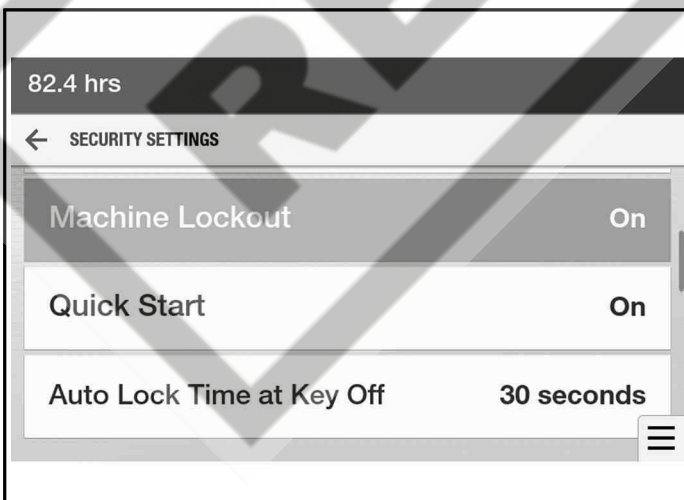
3. Select **[SECURITY SETTINGS]** (Item 1) [Figure 373].

Figure 374



C210758

Figure 375

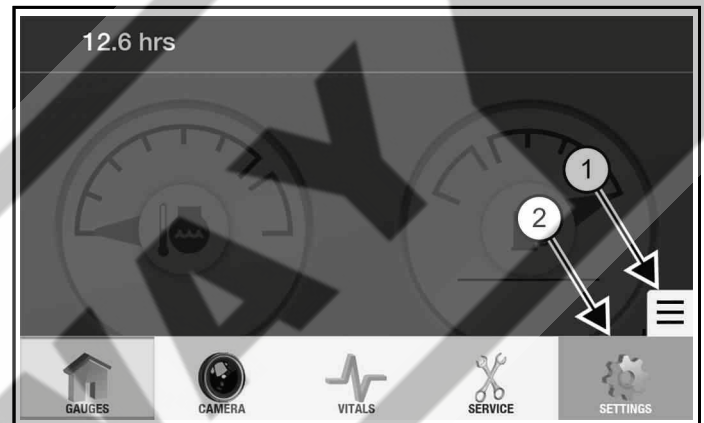


C210757

4. The following security settings are available [Figure 374] and [Figure 375]:
 - Manage Operators (See Security Settings (Manage Operators) on Page 197)
 - Machine Lockout - When on, requires password to use machine
 - Quick Start
 - Auto Lock Time at Key Off

Security Settings (Manage Operators)

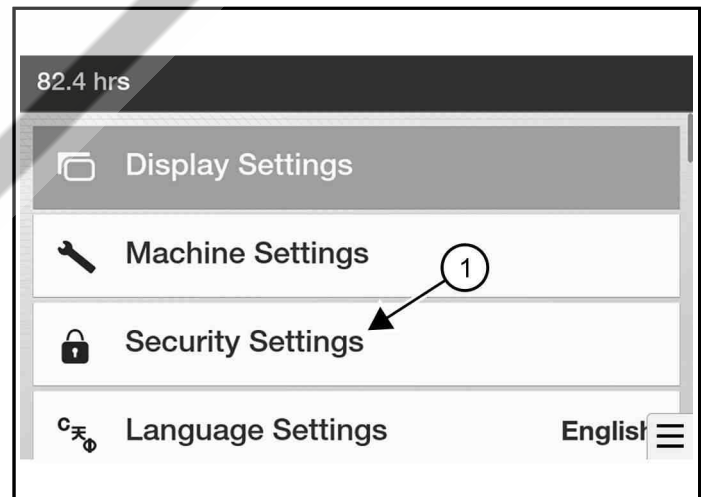
Figure 376



NA3665A

1. Select the **[NAVIGATION HANDLE]** icon (Item 1) [Figure 376].
2. Select **[SETTINGS]** (Item 2) [Figure 376].

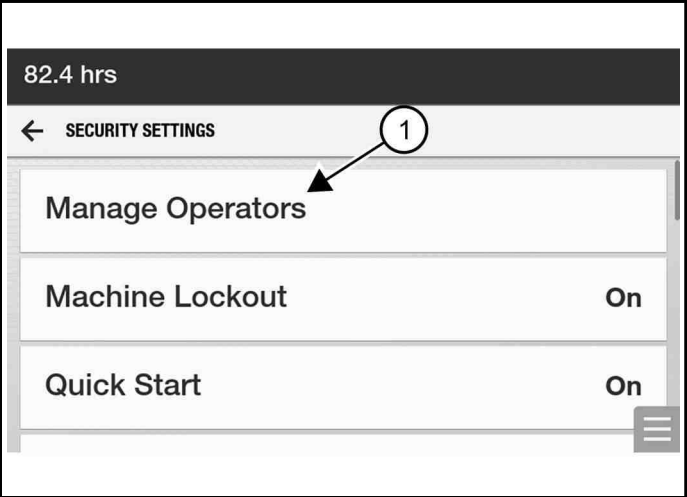
Figure 377



C210761c

3. Select **[SECURITY SETTINGS]** (Item 1) [Figure 377].

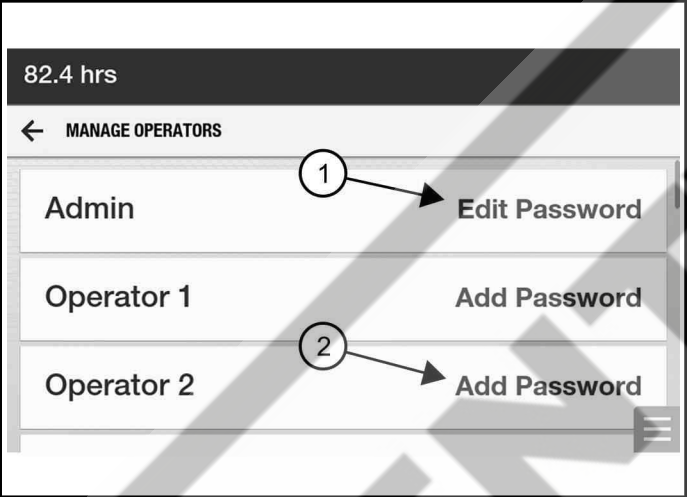
Figure 378



C210756a

4. Select **[MANAGE OPERATORS]** (Item 1) [Figure 378].

Figure 379

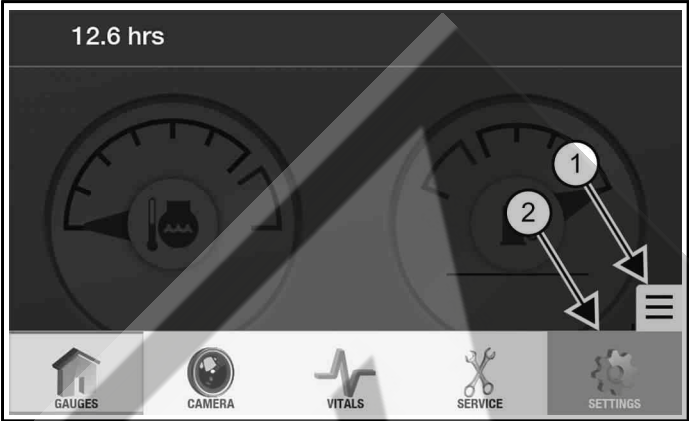


C210750a

5. Select **[ADD PASSWORD]** (Item 2) [Figure 379] to enter a new operator.
A maximum of four operators can be assigned.
6. Select **[EDIT PASSWORD]** (Item 1) [Figure 379] to change a password.

Language Settings

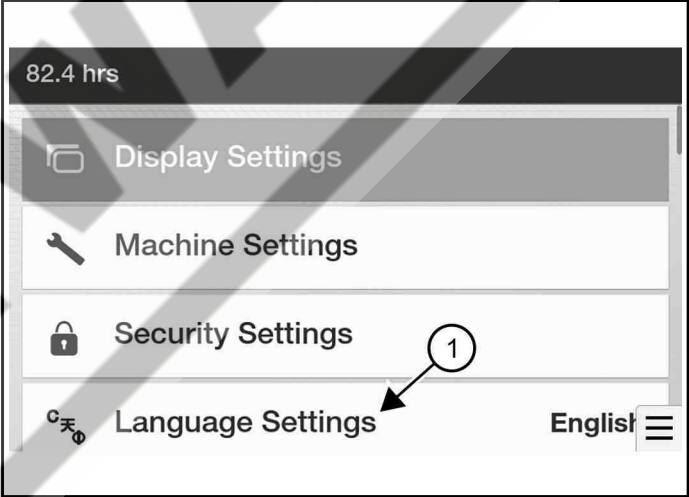
Figure 380



NA3655A

1. Select the **[NAVIGATION HANDLE]** icon (Item 1) [Figure 380].
2. Select **[SETTINGS]** (Item 2) [Figure 380].

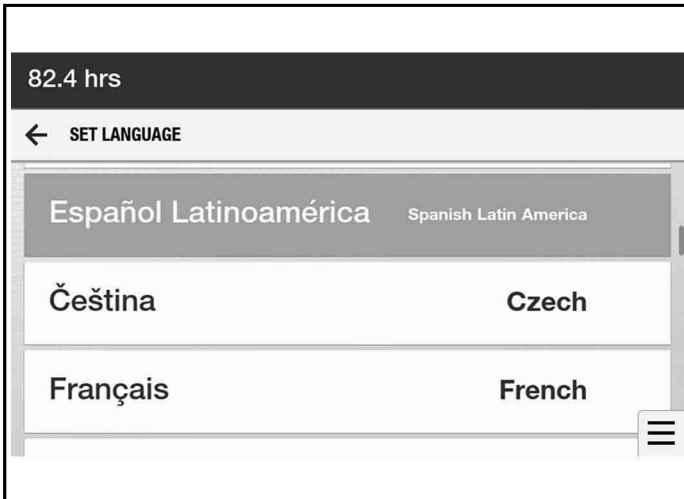
Figure 381



C210761d

3. Select **[LANGUAGE SETTINGS]** (Item 1) [Figure 381].

Figure 382

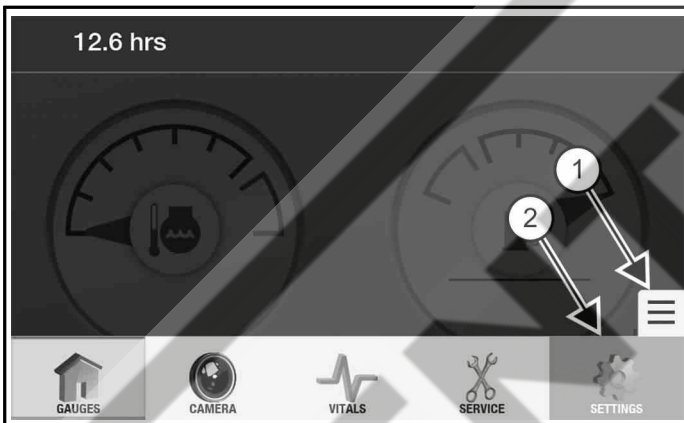


C210738

4. Scroll up or down and select the desired language [Figure 382]. The selected language will take effect immediately.

Units

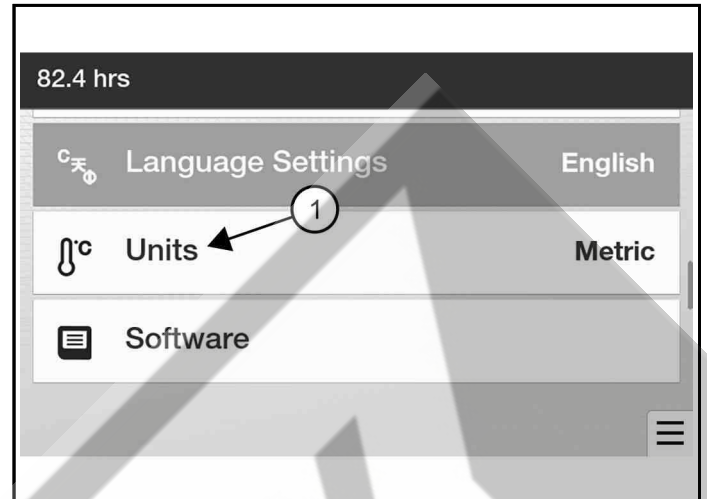
Figure 383



NA3869A

1. Select the **[NAVIGATION HANDLE]** icon (Item 1) [Figure 383].
2. Select **[SETTINGS]** (Item 2) [Figure 383].

Figure 384

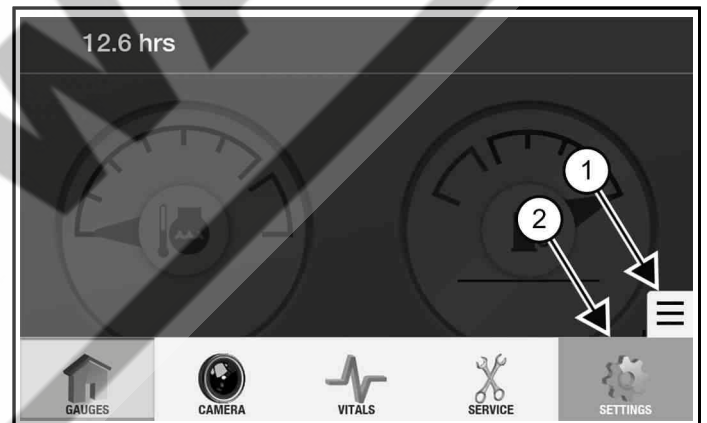


C210762a

3. Scroll down and select **[UNITS]** (Item 1) [Figure 384] to toggle between English and Metric.

Software

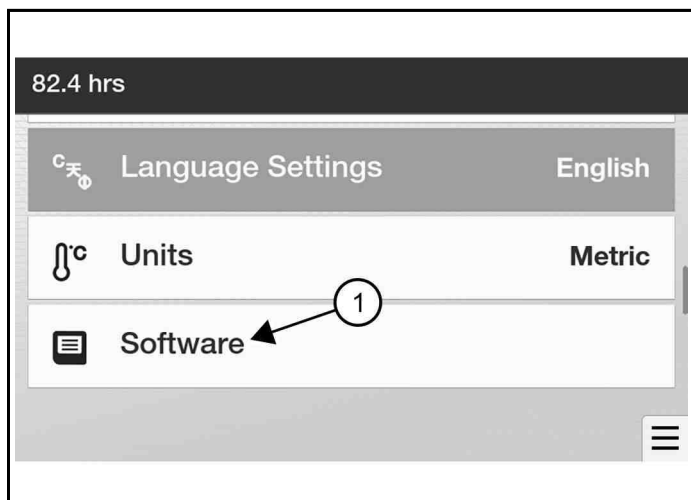
Figure 385



NA3869A

1. Select the **[NAVIGATION HANDLE]** icon (Item 1) [Figure 385].
2. Select **[SETTINGS]** (Item 2) [Figure 385].

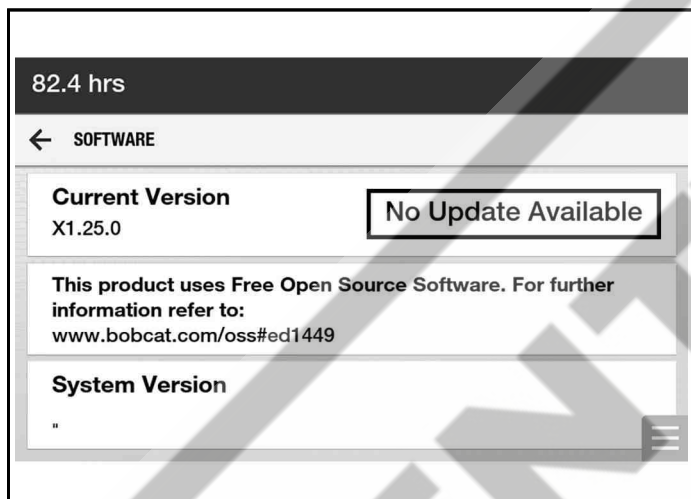
Figure 386



C210762b

3. Scroll down and select **[SOFTWARE]** (Item 1) [Figure 386].

Figure 387



C210768

4. Your machine's current software version is shown [Figure 387]. Software updates can only be performed by your dealer.

DIAGNOSTIC SERVICE CODES

Service Codes List - Engine Controller

The engine controller is located in the back of the engine compartment.

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00000019	"U0607"	CAN frame has a time out for the number of cycles (4).	Engine torque reduction Level 1 (Mid)	1. Electric problem (VCU, abnormal network) 2. Electric problem (CAN wiring harness insulation, resistance)
E00002700	"P042E"	If the position difference between demanded EGR position and feedback EGR position is over the threshold.	Engine Torque Reduction Variable	1. Actuator problem (Faulty EGR valve motor, EGR valve sticking, carbon or foreign material, Faulty EGR position sensor) 2. Electric problem (Wiring harness EGR to ECU)
E00002701	"P042F"	If the position difference between demanded EGR position and feedback EGR position is over the threshold.	Engine Torque Reduction Variable	1. Actuator problem (Faulty EGR valve motor, EGR valve sticking, carbon or foreign material, faulty EGR position sensor) 2. Electric problem (Wiring harness EGR to ECU)
E00002703	"P0406"	EGR Feedback Position value is more than maximum operation range (4.55 V).	Engine Torque Reduction Variable	1. Electric problem (Faulty EGR valve, EGR valve connector, wiring harness EGR to ECU) 2. Electric problem (Faulty ECU, ECU connector)
E00002704	"P0407"	EGR Feedback Position value is less than minimum operation range (0.4 V).	Engine Torque Reduction Variable	1. Electric problem (Faulty EGR valve, EGR valve connector, wiring harness EGR to ECU) 2. Electric problem (Faulty ECU, ECU connector)
E00002720	"P0C17"	If the average voltage value of the feedback position that is calculated in the closed stop is not within the limits (3.4 ~ 4.35 V).	Engine Torque Reduction Variable	1. Actuator problem (Valve sticking, foreign material, deep carbon) 2. Electric problem (Faulty EGR valve) 3. Electric problem (EGR valve connector, wiring harness, Faulty ECU, ECU connector)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00002722	"P0C18"	The absolute value of the difference of the learned voltage values in the mechanical end stops and the first learned voltage values is greater than 0.7 V for long time.	Engine Torque Reduction Variable	1. Actuator problem (Valve sticking, foreign material, deep carbon) 2. Electric problem (Faulty EGR valve) 3. Electric problem (EGR valve connector, wiring harness, faulty ECU, ECU connector)
E00002723	"P0C19"	The absolute value of the difference of the learned voltage values in the mechanical end stops and the last learned voltage values is greater than 0.7 V for short time.	Engine Torque Reduction Variable	1. Actuator problem (Valve sticking, foreign material, deep carbon) 2. Electric problem (Faulty EGR Valve) 3. Electric problem (EGR valve connector, wiring harness, faulty ECU, ECU connector)
E00002915	"P0221"	The hand pedal position track2 sensor signal is higher than maximum threshold (5 V).	Engine torque reduction Level 1 (Mid)	1. Electric problem (Faulty pedal track2 sensor, pedal sensor connector) 2. Electric problem (Wiring harness pedal to ECU) 3. Electric problem (ECU connector, faulty ECU)
E00002904	"P0222"	The accel pedal position track2 sensor signal is lower than minimum threshold (0 V).	Engine torque reduction Level 1 (Mid)	1. Electric problem (Faulty pedal track2 sensor, pedal sensor connector) 2. Electric problem (Wiring harness pedal to ECU) 3. Electric problem (ECU connector, faulty ECU)
E00002903	"P0223"	The accel pedal position track2 sensor signal is higher than maximum threshold (5 V).	Engine torque reduction Level 1 (Mid)	1. Electric problem (Faulty pedal track2 sensor, pedal sensor connector) 2. Electric problem (Wiring harness pedal to ECU) 3. Electric problem (ECU connector, faulty ECU)
E00002917	"P0224"	The hand pedal position track2 sensor signal is lower than minimum threshold (0 V).	Engine torque reduction Level 1 (Mid)	1. Electric problem (Faulty pedal track2 sensor, pedal sensor connector) 2. Electric problem (Wiring harness pedal to ECU) 3. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00005100	"P02E4"	If the position difference between demanded Throttle valve position and feedback Throttle valve position is over the threshold.		1. Actuator problem (Faulty throttle valve motor, throttle valve sticking, carbon or foreign material, faulty throttle valve position sensor) 2. Electric problem (Wiring harness throttle valve to ECU)
E00005101	"P02E5"	If the position difference between demanded Throttle valve position and feedback Throttle valve position is over the threshold.		1. Actuator problem (Faulty throttle valve motor, throttle valve sticking, carbon or foreign material, faulty throttle valve position sensor) 2. Electric problem (Wiring harness throttle valve to ECU)
E00005130	"P02E7"	If the average voltage value of the feedback position that is calculated in the closed stop is not within the limits (4.3 ~ 4.55 V).		1. Actuator problem (Valve sticking, foreign material) 2. Electric problem (Faulty throttle valve) 3. Electric problem (Throttle valve connector, wiring harness, faulty ECU, ECU connector)
E00005104	"P02E8"	Throttle valve Feedback Position value is less than minimum operation range(0.25 V).		1. Electric problem (Faulty throttle valve, throttle valve connector, wiring harness throttle valve to ECU) 2. Electric problem (Faulty ECU, ECU connector)
E00005103	"P02E9"	Throttle valve Feedback Position value is more than maximum operation range(4.75 V).		1. Electric problem (Faulty throttle valve, throttle valve connector, wiring harness throttle valve to ECU) 2. Electric problem (Faulty ECU, ECU connector)
E00005122	"P02EA"	The absolute value of the difference of the learned voltage values in the mechanical end stops and the first learned voltage value is greater than 0.3 V for long time.		1. Actuator problem (Valve sticking, foreign material) 2. Electric problem (Faulty throttle valve) 3. Electric problem (Throttle valve connector, wiring harness, faulty ECU, ECU connector)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00005123	"P02EB"	The absolute value of the difference of the learned voltage values in the mechanical end stops and the first learned voltage value is greater than 0.3 V for short time.		1. Actuator problem (Valve sticking, foreign material) 2. Electric problem (Faulty throttle valve) 3. Electric problem (Throttle valve connector, wiring harness, faulty ECU, ECU connector)
E00009115	"P0121"	The hand pedal position track1 sensor signal is higher than maximum threshold (5 V).	Engine torque reduction Level 1 (Mid)	1. Electric problem (Faulty pedal track1 sensor, pedal sensor connector) 2. Electric problem (Wiring harness pedal to ECU) 3. Electric problem (ECU connector, faulty ECU)
E00009104	"P0122"	The accel pedal position track1 sensor signal is lower than minimum threshold (0 V).	Engine torque reduction Level 1 (Mid)	1. Electric problem (Faulty pedal track1 sensor, pedal sensor connector) 2. Electric problem (Wiring harness pedal to ECU) 3. Electric problem (ECU connector, faulty ECU)
E00009103	"P0123"	The accel pedal position track1 sensor signal is higher than maximum threshold (5 V).	Engine torque reduction Level 1 (Mid)	1. Electric problem (Faulty pedal track1 sensor, pedal sensor connector) 2. Electric problem (Wiring harness pedal to ECU) 3. Electric problem (ECU connector, faulty ECU)
E00009117	"P0124"	The hand pedal position track1 sensor signal is lower than minimum threshold (0 V).	Engine torque reduction Level 1 (Mid)	1. Electric problem (Faulty pedal track1 sensor, pedal sensor connector) 2. Electric problem (Wiring harness pedal to ECU) 3. Electric problem (ECU connector, faulty ECU)
E00009111	"P2135"	The difference between values of dual track pedals are bigger than maximum threshold (Normally 9%).	Engine torque reduction Level 1 (Mid)	1. Electric problem (Faulty pedal sensor, pedal sensor connector) 2. Electric problem (Wiring harness pedal to ECU) 3. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00009112	"P2136"	The difference between values of dual track pedals are bigger than maximum threshold (Normally 9%).	Engine torque reduction Level 1 (Mid)	1. Electric problem (Faulty pedal sensor, pedal sensor connector) 2. Electric problem (Wiring harness pedal to ECU) 3. Electric problem (ECU connector, faulty ECU)
E00009119	"U0606"	CAN frame has a time out for the number of cycles (4).	Engine torque reduction Level 1 (Mid)	1. Electric problem (VCU, abnormal network) 2. Electric problem (CAN wiring harness insulation, Resistance)
E00009723	"P2265"	Water in Fuel sensor raw value is within the threshold to detect water (<2.90 V). And 20 minutes have elapsed since the error was detected.	Engine torque reduction Level 2 (Severe)	1. Water in fuel problem (Water is detected in the fuel filter after 20 minutes). 2. Electric problem (WIF sensor connector, wiring harness WIF to ECU, faulty WIF sensor, faulty ECU, ECU connector).
E00009704	"P2266"	Water in Fuel Feedback raw signal value is less than minimum threshold (0.2 V).	Engine torque reduction Level 2 (Severe)	1. Electric problem (WIF sensor connector) 2. Electric problem (Wiring harness WIF to ECU, Faulty WIF sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00009703	"P2267"	Water in Fuel Feedback raw signal value is more than maximum threshold (4.83 V).	Engine torque reduction Level 2 (Severe)	1. Electric problem (WIF sensor connector) 2. Electric problem (Wiring harness WIF to ECU, faulty WIF sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00009714	"P2269"	Water in Fuel sensor raw value is within the threshold to detect water (<2.90 V).		1. Water in fuel problem (Water is detected in the fuel filter) 2. Electric problem (WIF sensor connector, wiring harness WIF to ECU, faulty WIF sensor, faulty ECU, ECU connector)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00009805	"P250A"	The oil combination sensor hardware detects an open or short circuit error at sensor itself.		1. Electric problem (Oil combination sensor) 2. Electric problem (Wiring harness ECU to Oil combination sensor, oil combination sensor connector) 3. Electric problem (Faulty ECU, ECU connector)
E00009804	"P250C"	The oil combination sensor signal is shorted circuit to earth error.		1. Electric problem (Oil combination sensor) 2. Electric problem (Wiring harness ECU to Oil combination sensor, oil combination sensor connector) 3. Electric problem (Faulty ECU, ECU connector)
E00009803	"P250D"	The oil combination sensor signal is shorted circuit to battery error.		1. Electric problem (Oil combination sensor). 2. Electric problem (Wiring harness ECU to Oil combination sensor, oil combination sensor connector). 3. Electric problem (Faulty ECU, ECU connector).
E00009818	"P250F"	The oil level height be lower than minimum level step3. In the incline condition, the engine oil level can be recognised at a lower or higher depending on the tilt angle. If the equipment was on incline condition, check the oil level on the flat ground condition.		1. The oil level height be lower than minimum level step3. 2. In the incline condition, the engine oil level can be recognised at a lower or higher depending on the tilt angle 3. Electric problem (Oil combination sensor)
E00009822	"P350D"	The oil combination sensor signal response time is exceeded the threshold.		1. Electric problem (Oil combination sensor) 2. Electric problem (Wiring harness ECU to oil combination sensor, oil combination sensor connector) 3. Electric problem (Faulty ECU, ECU connector)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00009823	"P350E"	The oil combination sensor hardware detects a voltage out of range error at sensor itself.		1. Electric problem (Oil combination sensor) 2. Electric problem (Wiring harness ECU to oil combination sensor, oil combination sensor connector) 3. Electric problem (Faulty ECU, ECU connector)
E00009824	"P350F"	The oil level height be lower than minimum level step2. In the incline condition, the engine oil level can be recognised at a lower or higher depending on the tilt angle. If the equipment was on incline condition, check the oil level on the flat ground condition.		1. The oil level height be lower than minimum level step2 2. In the incline condition, the engine oil level can be recognised at a lower or higher depending on the tilt angle 3. Electric problem (Oil combination sensor)
E00010001	"P1522"	Engine oil pressure sensor value is below the threshold (170 kPa ~ 250 kPa, depend on engine speed) value at engine running condition.	Engine torque reduction Level 2 (Severe). Engine speed reduced to 1200 rpm.	1. Oil level low problem (Oil change period, oil leakage) 2. Oil path problem (Oil filter or oil suction pipe clogging) 3. Oil path problem (Oil filter or oil pump broken) 4. Electric problem (Oil pressure sensor connector, oil pressure sensor, wiring harness sensor to ECU, faulty ECU, ECU connector)
E00010003	"P0523"	Engine oil pressure sensor value is more than maximum threshold (4.7 V).	Engine torque reduction Level 2 (Severe). Engine speed reduced to 1200 rpm.	1. Electric problem (Oil pressure sensor connector) 2. Electric problem (Wiring harness oil pressure sensor to ECU, faulty oil pressure sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00010004	"P0522"	Engine oil pressure sensor value is less than minimum threshold (0.27 V).	Engine torque reduction Level 2 (Severe). Engine speed reduced to 1200 rpm.	1. Electric problem (Oil pressure sensor connector) 2. Electric problem (Wiring harness oil pressure sensor to ECU, faulty oil pressure sensor) 3. Electric problem (Faulty ECU, ECU connector)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00010203	"P0108"	Intake manifold pressure sensor value is more than maximum threshold (4.75 V).	Engine Torque Reduction Variable	1. Electric problem (Intake manifold pressure sensor connector) 2. Electric problem (Wiring harness intake manifold pressure sensor to ECU, faulty intake manifold pressure sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00010204	"P0107"	Intake manifold pressure sensor value is less than minimum threshold (0.25 V).	Engine Torque Reduction Variable	1. Electric problem (Intake manifold pressure sensor connector) 2. Electric problem (Wiring harness intake manifold pressure sensor to ECU, faulty intake manifold pressure sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00010503	"P00AD"	Intake manifold temperature sensor value is more than maximum threshold (4.92 V).	Engine Torque Reduction Variable	1. Electric problem (Intake manifold temperature sensor connector) 2. Electric problem (Wiring harness intake manifold temperature sensor to ECU, faulty intake manifold temperature sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00010504	"P00AC"	Intake manifold temperature sensor value is less than minimum threshold (0.15 V).	Engine Torque Reduction Variable	1. Electric problem (Intake manifold temperature sensor connector) 2. Electric problem (Wiring harness intake manifold temperature sensor to ECU, faulty intake manifold temperature sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00010516	"P10AD"	Intake manifold temperature is increased more than normal operation threshold (128°C (262.4°F)).		1. Intake manifold temperature is exceeded than engine limit 2. Electric problem (Intake manifold temperature sensor connector, wiring harness ECU to intake manifold temperature sensor, intake manifold temperature sensor) 3. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00010803	"P2229"	Atmospheric Pressure value is more than Maximum operation pressure (>115 kPa).		1. Electric problem (Faulty atmospheric pressure sensor in ECU) 2. Atmospheric problem (Too high atmospheric pressure > 1150hPa, almost underground mine condition (< -1500m))
E00010804	"P2228"	Atmospheric Pressure value is less than minimum operation pressure (< 50 kPa).		1. Electric problem (Faulty atmospheric pressure sensor in ECU) 2. Atmospheric problem (Too low atmospheric pressure < 500hPa, high altitude condition > 5000m)
E00011000	"P1118"	If the coolant temperature is increased more than the threshold, fault code is raised (110° C (230°F)).		1. Cooling problem (Low coolant, thermostat broken - fully closed) 2. Electric problem (Faulty coolant temperature sensor) 3. Cooling problem (Faulty of water pump)
E00011003	"P0118"	Coolant temperature signal voltage is more than 4.94 V.	Engine Torque Reduction Variable	1. Electric problem (Coolant temperature sensor connector) 2. Electric problem (Wiring harness coolant temperature sensor to ECU, faulty coolant temperature sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00011004	"P0117"	Coolant temperature signal voltage is almost 0 V (123 mV).	Engine Torque Reduction Variable	1. Electric problem (Coolant temperature sensor connector) 2. Electric problem (Wiring harness coolant temperature sensor to ECU, faulty coolant temperature sensor) 3. Electric problem (Faulty ECU, ECU connector)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00011010	"P011E"	If the coolant temperature is not increased more than the threshold during restricted condition, fault code is raised.	Engine torque reduction Level 1 (Mid)	1. Thermostat problem (Broken or normally open) 2. Electric problem (Coolant temperature sensor connector, wiring harness coolant temperature sensor to ECU, faulty coolant temperature sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00013201	"P00BC"	The intake manifold pressure is lower than estimated target minimum threshold.	Engine torque reduction Level 2 (Severe)	1. Air Path problem (Leakage of compressor outlet to intake manifold (hose, CAC)) 2. Air Path problem (Leakage of exhaust manifold to EGR path (EGR, cooler, pipe)) 3. Electric problem (Faulty intake manifold pressure sensor, faulty intake manifold temperature sensor, faulty air mass flow sensor)
E00013203	"P0103"	Air mass flow signal is higher than maximum operation frequency (1000 us).	Engine Torque Reduction Variable	1. Electric problem (Air mass flow sensor connector) 2. Electric problem (Wiring harness air mass flow sensor to ECU, faulty air mass flow sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00013204	"P0102"	Air mass flow signal is less than minimum operation frequency (70 us).	Engine Torque Reduction Variable	1. Electric problem (Air mass flow sensor connector) 2. Electric problem (Wiring harness air mass flow sensor to ECU, faulty air mass flow sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00013205	"P0101"	The supply voltage exceeds the thresholds (16 V).		1. Electric problem (Battery voltage too high / low) 2. Electric problem (Alternator, alternator wiring harness)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00013219	"P0100"	If there is short circuit to battery OR open load on the signal line.	Engine Torque Reduction Variable	1. Electric problem (Air mass flow sensor connector) 2. Electric problem (Wiring harness air mass flow sensor to ECU, faulty air mass flow sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00013221	"P00BE"	Air mass difference between air flow meter and calculated air flow into the cylinder is out of the threshold, fault code is raised.	Engine Torque Reduction Variable	1. Air path problem (Leakage of air cleaner to compressor inlet) 2. Installation problem (reverse installation of the air mass flow sensor) 3. Electric problem (Faulty intake manifold pressure sensor, faulty intake manifold temperature sensor, faulty air mass flow sensor)
E00015710	"P0087"	If the high pressure pump delivery quantity exceeds the plausibility limit of the volume flow balance (evaluated over the product life and supplemented to include tolerances), an error will be detected.	Engine torque reduction Level 1 (Mid)	1. Fuel LPC problem (No fuel in tank, fuel leakage before HP pump, fuel filter plugged, fuel return line clogging) 2. Fuel HPC problem (Injector close stuck, faulty HP pump, metering unit sticking, leaking) 3. Electric problem (Metering unit connector, wiring harness metering unit to ECU) * LPC (Low pressure circuit) / HPC (High pressure circuit)
E00015711	"P0002"	If the rail pressure governor deviation exceeds the limiting value (Normally 70~150 bar) based on the engine speed and the set value of the Fuel Metering unit volume is greater than the upper limit, an error will be detected.	Engine torque reduction Level 1 (Mid)	1. Fuel LPC problem (No fuel in tank, fuel leakage before HP pump, fuel filter plugged, fuel return line clogging) 2. Fuel HPC problem (Injector close stuck, faulty HP pump, metering unit sticking, leaking) 3. Electric problem (Metering unit connector, wiring harness metering unit to ECU) * LPC (Low pressure circuit) / HPC (High pressure circuit)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00015726	"P190C"	If the rail pressure falls below the limiting value (Normally 120 bar) based on the engine speed, an error will be detected.	Engine torque reduction Level 1 (Mid)	1. Fuel LPC problem (No fuel in tank, fuel leakage before HP pump, fuel filter plugged, fuel return line clogging) 2. Fuel HPC problem (Injector close stuck, faulty HP pump, metering unit sticking, leaking) 3. Electric problem (Metering unit connector, wiring harness metering unit to ECU) * LPC (Low pressure circuit) / HPC (High pressure circuit)
E00015727	"P190B"	If the rail pressure exceeds the limiting value (Normally 1950 bar), an error will be detected.	Engine torque reduction Level 1 (Mid)	1. Fuel LPC problem (No fuel in tank, fuel leakage before HP pump, fuel filter plugged, fuel return line clogging) 2. Fuel HPC problem (Injector close stuck, faulty HP pump, metering unit sticking, leaking) 3. Electric problem (Metering unit connector, wiring harness metering unit to ECU) * LPC (Low pressure circuit) / HPC (High pressure circuit)
E00015728	"P1934"	The fault is occurred when If PRV (Pressure relief valve) open fault (P000F) occurs but rail pressure does not decrease. There can be a problem with PRV itself.	Engine torque reduction Level 2 (Severe); Engine shutdown	1. Common rail pressure relief valve (PRV) is not opened at overpressure condition. (PRV failure)
E00017100	"P1073"	The sensed value of environment temperature sensor is greater than a threshold (129.96°C (265.93°F)).		1. Electric problem (Environment temperature sensor connector) 2. Electric problem (Wiring harness ECU to environment temperature sensor, environment temperature sensor, ECU connector, faulty ECU)
E00017103	"P0073"	The raw voltage value of environment temperature sensor is above a threshold (4.84 V).		1. Electric problem (Environment temperature sensor connector) 2. Electric problem (Wiring harness ECU to environment temperature sensor, environment temperature sensor, ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00017104	"P0072"	The raw voltage value of environment temperature sensor is below a threshold (0.56 V).		1. Electric problem (Environment temperature sensor connector) 2. Electric problem (Wiring harness ECU to environment temperature sensor, environment temperature sensor, ECU connector, faulty ECU)
E00017200	"P107D"	Inlet air temperature is increased more than normal operation threshold (125°C (257° F)).		1. Inlet air temperature is exceeded than engine limit 2. Electric problem (Inlet air temperature sensor connector, wiring harness ECU to inlet air temperature sensor, inlet air temperature sensor, ECU connector, faulty ECU)
E00017203	"P007D"	Inlet air temperature raw signal value is more than maximum operation threshold (4.91 V).		1. Electric problem (Inlet air temperature sensor connector) 2. Electric problem (Wiring harness inlet air temperature sensor to ECU, faulty inlet air temperature sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00017204	"P007C"	Inlet air temperature raw signal value is less than minimum operation threshold (0.06 V).		1. Electric problem (Inlet air temperature sensor connector) 2. Electric problem (Wiring harness inlet air temperature sensor to ECU, faulty inlet air temperature sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00017301	"P0421"	If calculated DOC efficiency is lower than threshold at DPF regeneration.		1. Electric problem (Faulty DPF (SCRf) in temperature sensor) 2. Air path problem (Leakage of turbine out to DOC in) 3. Hardware problem (DOC was poisoned by sulfur) 4. Injector problem (Injector close stuck, not controlled well) 5. Hardware problem (Faulty DOC)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00017400	"P1183"	Fuel temperature is increased more than normal operation threshold (80°C (176° F)).		1. Fuel temperature is exceeded than engine limit 2. Electric problem (Fuel temperature sensor connector, wiring harness ECU to fuel temperature sensor, fuel temperature sensor, ECU connector, faulty ECU)
E00017403	"P0183"	Fuel temperature raw signal value is more than maximum operation threshold (4.95 V).		1. Electric problem (Fuel temperature sensor connector) 2. Electric problem (Wiring harness fuel temperature sensor to ECU, faulty fuel temperature sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00017404	"P0182"	Fuel temperature raw signal value is less than minimum operation threshold (0.11 V).		1. Electric problem (Fuel temperature sensor connector) 2. Electric problem (Wiring harness fuel temperature sensor to ECU, faulty fuel temperature sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00017511	"P0196"	The oil combination sensor hardware detects a temperature out of range error at sensor itself.		1. Electrical problem (Oil combination sensor) 2. Electrical problem (Wiring harness ECU to oil combination sensor, oil combination sensor connector) 3. Electrical problem (Faulty ECU, ECU connector)
E00017715	"P273F"	Transmission oil temperature is above the operation range.	Engine torque reduction Level 1 (Mid)	1. Cooling problem (Transmission oil over heating) 2. Electric problem (Connector, wiring harness, switch)
E00017716	"P274F"	Transmission oil temperature is above the operation range.	Engine torque reduction Level 1 (Mid)	1. Cooling problem (Transmission oil over heating) 2. Electric problem (Connector, wiring harness, switch)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00019000	"P0219"	Engine speed is too higher than threshold.		1. Electric problem (Crank sensor connector) 2. Electric problem (Wiring harness crank sensor to ECU, Faulty crank sensor) 3. Electric problem (Faulty ECU, ECU connector) 4. Hardware problem (Faulty trigger wheel)
E00044400	"P1563"	Battery voltage is more than maximum warning operation voltage (15 V).		1. Electric problem (Alternator, alternator wiring harness) 2. Electric problem (Battery, wiring harness, battery terminal, connector) 3. Electric problem (External battery charger)
E00044401	"P1562"	Battery voltage is less than minimum warning operation voltage (10 V).		1. Electric problem (Alternator, alternator wiring harness) 2. Electric problem (Battery, wiring harness, battery terminal, connector) 3. Electric problem (External battery charger)
E00044402	"P1565"	Power stage diagnosis disabled error due to battery voltage is less than minimum power stage operation voltage (6.5 V). * Power stage operation range refers to the area where the ECU can control external actuators such as EGR and throttle valve.		1. Electric problem (Alternator, alternator wiring harness) 2. Electric problem (Battery, wiring harness, battery terminal, connector) 3. Electric problem (External battery charger)
E00044403	"P0563"	Battery voltage is more than maximum operation voltage (16 V).	Engine torque reduction Level 1 (Mid)	1. Electric problem (Alternator, alternator wiring harness) 2. Electric problem (Battery, wiring harness, battery terminal, connector) 3. Electric problem (External battery charger)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00044404	"P0562"	Battery voltage is less than minimum operation voltage (6 V).	Engine torque reduction Level 1 (Mid)	1. Electric problem (Alternator, alternator wiring harness) 2. Electric problem (Battery, wiring harness, battery terminal, connector) 3. Electric problem (External battery charger)
E00044412	"P1564"	Power stage diagnosis disabled error due to battery voltage is more than maximum operation voltage (16 V). * Power stage operation range refers to the area where the ECU can control external actuators such as EGR and throttle valve.		1. Electric problem (Alternator, alternator wiring harness) 2. Electric problem (Battery, wiring harness, battery terminal, connector) 3. Electric problem (External battery charger)
E00062612	"P0512"	The activated time of starter switch is longer than threshold (60 sec). If the cranking request time is too long, the switch can be considered to stuck.		1. Electric problem (Starter switch connector) 2. Electric problem (Wiring harness ECU to starter switch, starter switch) 3. Electric problem (ECU connector, faulty ECU)
E00063602	"P0372"	If the crank shaft signal is disturbed one or more of the reasons.	Engine torque reduction Level 2 (Severe). Engine speed reduced to 1200 rpm.	1. Electric problem (Crank sensor connector) 2. Electric problem (Wiring harness crank sensor to ECU, faulty crank sensor) 3. Electric problem (Faulty ECU, ECU connector) 4. Hardware problem (Faulty trigger wheel)
E00063608	"P0374"	The engine is rotating but there is no crankshaft signal detectable.	Engine torque reduction Level 2 (Severe). Engine speed reduced to 1200 rpm.	1. Electric problem (Crank sensor connector) 2. Electric problem (Wiring harness crank sensor to ECU, faulty crank sensor) 3. Electric problem (Faulty ECU, ECU connector) 4. Hardware problem (Faulty trigger wheel)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00063702	"P0344"	In between of several camshaft revolutions there are too many or too less camshaft edges present or the distance or the series of the camshaft edges is implausible.		1. Electric problem (CAM sensor connector) 2. Electric problem (Wiring harness CAM sensor to ECU, faulty CAM sensor) 3. Electric problem (Faulty ECU, ECU connector) 4. Hardware problem (Faulty CAM shaft)
E00063708	"P0342"	In between of several crankshaft revolutions there is not any camshaft edge present.		1. Electric problem (CAM sensor connector) 2. Electric problem (Wiring harness CAM sensor to ECU, faulty CAM sensor) 3. Electric problem (Faulty ECU, ECU connector) 4. Hardware problem (Faulty CAM shaft)
E00063730	"P0340"	Cam signal drift higher than threshold.		1. Electric problem (CAM sensor connector) 2. Electric problem (Wiring harness CAM sensor to ECU, faulty CAM sensor) 3. Electric problem (Faulty ECU, ECU connector) 4. Hardware problem (Faulty CAM shaft)
E00063902	"U0029"	CAN communication error.	Engine torque reduction Level 1 (Mid)	1. Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out (<6 V)) 2. After ECU reflash 3. Electric problem (CAN wiring harness-insulation, resistance) 4. Electric problem (ECU connector, faulty VCU, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00063919	"U0028"	CAN Bus OFF.	Engine torque reduction Level 1 (Mid)	1. Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out (<6 V)) 2. After ECU reflash 3. Electric problem (CAN wiring harness-insulation, resistance) 4. Electric problem (ECU connector, faulty VCU, faulty ECU)
E00065102	"P268C"	If the monitoring for missing or faulty programming of the injector adjustment values, the fault is active.		1. Coding problem (The injector code (IQA) is not updated at fresh ECU or after ECU reset.) 2. Electric problem (Faulty ECU)
E00065104	"P02EE"	The injector of cylinder #1 is shorted.		1. Electric problem (Injector connector) 2. Electric problem (Wiring harness injector to ECU, faulty injector) 3. Electric problem (Faulty ECU, ECU connector)
E00065105	"P0201"	The injector of cylinder #1 is opened.		1. Electric problem (Injector connector) 2. Electric problem (Wiring harness injector to ECU, faulty injector) 3. Electric problem (Faulty ECU, ECU connector)
E00065122	"P32EE"	The injector of cylinder #1 is shorted between high-side to low-side in the injector.		1. Electric problem (Injector connector) 2. Electric problem (Wiring harness injector to ECU, faulty injector) 3. Electric problem (Faulty ECU, ECU connector)
E00065202	"P268D"	If the monitoring for missing or faulty programming of the injector adjustment values, the fault is active.		1. Coding problem (The injector code (IQA) is not updated at fresh ECU or after ECU reset.) 2. Electric problem (Faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00065204	"P02EF"	The injector of cylinder #2 is shorted.		1. Electric problem (Injector connector) 2. Electric problem (Wiring harness injector to ECU, faulty injector) 3. Electric problem (Faulty ECU, ECU connector)
E00065205	"P0202"	The injector of cylinder #2 is opened.		1. Electric problem (Injector connector) 2. Electric problem (Wiring harness injector to ECU, faulty injector) 3. Electric problem (Faulty ECU, ECU connector)
E00065222	"P32EF"	The injector of cylinder #2 is shorted between high-side to low-side in the injector.		1. Electric problem (Injector connector) 2. Electric problem (Wiring harness injector to ECU, faulty injector) 3. Electric problem (Faulty ECU, ECU connector)
E00065302	"P268E"	If the monitoring for missing or faulty programming of the injector adjustment values, the fault is active.		1. Coding problem (The injector code (IQA) is not updated at fresh ECU or after ECU reset.) 2. Electric problem (Faulty ECU)
E00065304	"P02F0"	The injector of cylinder #3 is shorted.		1. Electric problem (Injector connector) 2. Electric problem (Faulty ECU, ECU connector)
E00065305	"P0203"	The injector of cylinder #3 is opened.		1. Electric problem (Injector connector) 2. Electric problem (Faulty ECU, ECU connector)
E00065322	"P32F0"	The injector of cylinder #3 is shorted between high-side to low-side in the injector.		1. Electric problem (Injector connector) 2. Electric problem (Faulty ECU, ECU connector)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00065402	"P268F"	If the monitoring for missing or faulty programming of the injector adjustment values, the fault is active.		1. Coding problem (The injector code (IQA) is not updated at fresh ECU or after ECU reset.) 2. Electric problem (Faulty ECU)
E00065404	"P02F1"	The injector of cylinder #4 is shorted.		1. Electric problem (Injector connector) 2. Electric problem (Wiring harness injector to ECU, faulty injector)
E00065405	"P0204"	The injector of cylinder #4 is opened.		1. Electric problem (Injector connector) 2. Electric problem (Wiring harness injector to ECU, faulty injector)
E00065422	"P32F1"	The injector of cylinder #4 is shorted between high-side to low-side in the injector.		1. Electric problem (Injector connector) 2. Electric problem (Wiring harness injector to ECU, faulty injector)
E00067603	"P0384"	Glow plug relay is connected to battery (Short to Battery).		1. Electric problem (Relay, wiring harness, connector)
E00067604	"P0383"	Glow plug relay is connected to earth (Short to Earth).		1. Electric problem (Relay, wiring harness, connector)
E00067605	"P0380"	Glow plug relay is not connected (open).		1. Electric problem (Relay, wiring harness, connector)
E00072907	"P0640"	The battery voltage drop is insufficient even though the glow plug is in operation (0.2 V).		1. Electric problem (Relay, wiring harness, connector)
E00097012	"U1003"	External shut off request by Electronic Brake Controller 1 message. This item is not a fault and indicates that the VCU has issued an emergency stop request.		1. External shut off request by Electronic Brake Controller 1 message.
E00097022	"P0215"	Engine shut off request by hardwire.		1. Engine shut off request by hardwire switch

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00097503	"P028E"	The hardware detects a short circuit to battery error on the PWM output power stage for the Fan actuator.		1. Electric problem (FAN controller connector) 2. Electric problem (Wiring harness ECU to FAN controller, FAN controller) 3. Electric problem (Faulty ECU, ECU connector)
E00097504	"P028D"	The hardware detects a short circuit to earth error PWM output power stage for the Fan actuator.		1. Electric problem (FAN controller connector) 2. Electric problem (Wiring harness ECU to FAN controller, FAN controller) 3. Electric problem (Faulty ECU, ECU connector)
E00097505	"P028A"	The hardware detects an open load error on the PWM output power stage for the Fan actuator.		1. Electric problem (FAN controller connector) 2. Electric problem (Wiring harness ECU to FAN controller, FAN controller) 3. Electric problem (Faulty ECU, ECU connector)
E00098703	"P1931"	Lamp wiring is shorted to battery.	Engine shutdown	1. Electric problem (Lamp connector) 2. Electric problem (Wiring harness Lamp to ECU, faulty lamp) 3. Electric problem (Faulty ECU, ECU connector)
E00098704	"P192F"	Lamp wiring is shorted to earth.	Engine shutdown	1. Electric problem (Lamp connector) 2. Electric problem (Wiring harness Lamp to ECU, faulty lamp) 3. Electric problem (Faulty ECU, ECU connector)
E00098705	"P192E"	Lamp wiring is opened.		1. Electric problem (Lamp connector) 2. Electric problem (Wiring harness Lamp to ECU, faulty lamp) 3. Electric problem (Faulty ECU, ECU connector)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00107603	"P0004"	If the high pressure pump delivery quantity exceeds the threshold based on the pressure at overrun mode, an error will be detected.	Engine torque reduction Level 1 (Mid); Engine speed reduced to 1200 rpm	1. Fuel LPC problem (No fuel in tank, fuel leakage before HP pump, fuel filter plugged, fuel return line clogging) 2. Fuel HPC problem (Injector close stuck, faulty HP pump, metering unit sticking, leaking) 3. Electric problem (Metering unit connector, wiring harness metering unit to ECU) * LPC (Low pressure circuit) / HPC (High pressure circuit)
E00107604	"P0003"	If the high pressure pump delivery quantity exceeds the threshold based on the pressure at idle mode, an error will be detected.	Engine torque reduction Level 1 (Mid); Engine speed reduced to 1200 rpm	1. Fuel LPC problem (No fuel in tank, fuel leakage before HP pump, fuel filter plugged, fuel return line clogging) 2. Fuel HPC problem (Injector close stuck, faulty HP pump, metering unit sticking, leaking) 3. Electric problem (Metering unit connector, wiring harness metering unit to ECU) * LPC (Low pressure circuit) / HPC (High pressure circuit)
E00107616	"P0254"	If the rail pressure governor deviation falls below the limiting value (Normally -200 ~ -117 bar) and the high pressure pump delivery quantity falls to the threshold, an error will be detected.	Engine torque reduction Level 1 (Mid); Engine speed reduced to 1200 rpm	1. Fuel LPC problem (No fuel in tank, fuel leakage before HP pump, fuel filter plugged, fuel return line clogging) 2. Fuel HPC problem (Injector close stuck, faulty HP pump, metering unit sticking, leaking) 3. Electric problem (Metering unit connector, wiring harness metering unit to ECU) * LPC (Low pressure circuit) / HPC (High pressure circuit)
E00107620	"P0252"	The rail pressure falls below the minimum threshold for injection (100 bar).		1. Fuel LPC problem (No fuel in tank, fuel leakage before HP pump, fuel filter plugged, fuel return line clogging) 2. Fuel HPC problem (Injector close stuck, faulty HP pump, metering unit sticking, leaking) 3. Electric problem (Metering unit connector, wiring harness metering unit to ECU) * LPC (Low pressure circuit) / HPC (High pressure circuit)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00108103	"P2381"	Lamp wiring is shorted to battery.		1. Electric problem (Lamp connector) 2. Electric problem (Wiring harness Lamp to ECU, faulty lamp) 3. Electric problem (Faulty ECU, ECU connector)
E00108104	"P1904"	Lamp wiring is shorted to earth.		1. Electric problem (Lamp connector) 2. Electric problem (Wiring harness Lamp to ECU, faulty lamp) 3. Electric problem (Faulty ECU, ECU connector)
E00108105	"P0381"	Lamp wiring is opened.		1. Electric problem (Lamp connector) 2. Electric problem (Wiring harness Lamp to ECU, faulty lamp) 3. Electric problem (Faulty ECU, ECU connector)
E00120700	"P0669"	ECU temperature is increased more than normal operation threshold (175°C (347° F)).		1. ECU temperature is exceeded than engine limit 2. Electric problem (Faulty ECU)
E00120703	"P06AE"	ECU temperature sensor is shorted to battery.		1. Electric problem (ECU temperature sensor - inner part of ECU, faulty ECU)
E00120704	"P06AD"	ECU temperature sensor is shorted to earth.		1. Electric problem (ECU temperature sensor - inner part of ECU, faulty ECU)
E00138200	"P018D"	Fuel filter pressure is higher than the maximum threshold (>200 kPa).	Engine torque reduction Level 1 (Mid)	1. LPC problem (Overflow valve failure) 2. Electrical problem (Fuel filter pressure sensor connector, wiring harness from fuel filter pressure sensor to ECU, faulty fuel filter pressure sensor) 3. Electrical problem (Faulty ECU, ECU connector)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00138201	"P018C"	Fuel filter pressure is lower than the minimum threshold (<50 kPa).	Engine torque reduction Level 2 (Severe)	1. LPC problem (Fuel filter plugged, faulty fuel tank cap, fuel line clogging, fuel waxing at cold condition, no fuel, fuel electric feed pump failure) 2. Electrical problem (Electric fuel feed pump connector, wiring harness from electric fuel feed pump or ECU, faulty electric fuel feed pump) 3. Electrical problem (Fuel filter pressure sensor connector, wiring harness from Fuel filter pressure sensor to ECU, faulty fuel filter pressure sensor) 4. Electrical problem (Faulty ECU, ECU connector)
E00138203	"P01C3"	Fuel filter pressure raw signal value is above than maximum threshold (4.75 V).		1. Electric problem (Fuel filter pressure sensor connector) 2. Electric problem (Wiring harness fuel filter pressure sensor to ECU, faulty fuel filter pressure sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00138204	"P01C2"	Fuel filter pressure raw signal value is less than minimum threshold (0.25 V).		1. Electric problem (Fuel filter pressure sensor connector) 2. Electric problem (Wiring harness fuel filter pressure sensor to ECU, faulty fuel filter pressure sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00138207	"P01C4"	Fuel filter pressure is below than warning threshold.		1. LPC problem (Fuel filter plugged, faulty fuel tank cap, fuel line clogging, fuel waxing at cold condition, no fuel) 2. Electric problem (Faulty fuel filter pressure sensor, faulty ECU, ECU connector)
E00138213	"P01C5"	Fuel filter pressure is below than torque reduction threshold.	Engine torque reduction Level 1 (Mid)	1. LPC problem (Fuel filter plugged, faulty fuel tank cap, fuel line clogging, fuel waxing at cold condition, no fuel) 2. Electric problem (Faulty fuel filter pressure sensor, faulty ECU, ECU connector)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00148507	"P0685"	The fault is detected, if main relay was not opened by time (150ms) after commanding to open main relay during shutdown.		1. Electric problem (Faulty main relay, wiring harness ECU power supply and earth) 2. Electric problem (Faulty ECU)
E00148511	"P068A"	The fault is detected when the main relay has been opened without any request.		1. Electric problem (Abnormal engine power shut down) 2. Electric problem (Faulty main relay, wiring harness ECU power supply and earth) 3. Electric problem (Faulty ECU)
E00156803	"P2547"	The multi-torque switch raw value is higher than threshold.		1. Electric problem (Multi-torque switch) 2. Electric problem (Wiring harness multi-torque switch t to ECU, faulty multi-torque switch) 3. Electric problem (Faulty ECU, ECU connection)
E00156804	"P2546"	The multi-torque switch raw value is less than threshold.		1. Electric problem (Multi-torque switch) 2. Electric problem (Wiring harness multi-torque switch to ECU, faulty multi-torque switch) 3. Electric problem (Faulty ECU, ECU connection)
E00161203	"P062D"	The 1st injector bank is short circuit. #1 & #4 injector		1. Electric problem (Faulty injector insulation, water ingress, injector bank short to battery or earth) 2. Electric problem (Wiring harness injector to ECU) 3. Electric problem (Faulty ECU)
E00161212	"P062E"	The 2nd injector bank is short circuit. #2 & #3 injector		1. Electric problem (Faulty injector insulation, water ingress, injector bank short to battery or earth) 2. Electric problem (Wiring harness injector to ECU) 3. Electric problem (Faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00163903	"P0528"	The FAN speed is higher than the maximum threshold.		1. Electric problem (FAN controller connector) 2. Electric problem (Wiring harness ECU to FAN controller, FAN controller) 3. Electric problem (Faulty ECU, ECU connector)
E00163904	"P0529"	The FAN speed is lower than the minimum threshold.		1. Electric problem (FAN controller connector) 2. Electric problem (Wiring harness ECU to FAN controller, FAN controller) 3. Electric problem (Faulty ECU, ECU connector)
E00163911	"P0527"	A long period error is detected when the signal period is greater than the maximum measurement limit of the timer.		1. Electric problem (FAN controller connector) 2. Electric problem (Wiring harness ECU to FAN controller, FAN controller) 3. Electric problem (Faulty ECU, ECU connector)
E00186701	"P2505"	The ECU temperature is higher than threshold for SCR system monitoring (105°C (221°F)).		1. Engine room cooling problem (The ECU temperature is too high.) 2. Electric problem (Faulty ECU)
E00186703	"P2508"	The fault is detected when ABE is active due to overvoltage detection.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E00186704	"P2507"	The fault is detected when ABE is active due to undervoltage detection.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00186711	"P2511"	The fault is detected when WDA/ABE is active due to unknown reason.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E00186719	"P2509"	The fault is detected when WDA is active due to in query-response communication.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E00186722	"P2506"	The reset system provides an mechanism to transfer the ECU from an faulty state into a safety state. This is done by resetting the controller, this fault is set for alarm purpose. Check the other faults that have occurred together to determine why the ECU was reset.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E00186723	"P3506"	The reset system provides an mechanism to transfer the ECU from an faulty state into a safety state. This is done by resetting the controller, this fault is set for alarm purpose. Check the other faults that have occurred together to determine why the ECU was reset.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E00278900	"P1546"	Turbine inlet temperature is increased more than normal operation threshold (830°C (1526°F)).	Engine torque reduction Level 1 (Mid)	1. Turbine inlet temperature is exceeded than engine limit 2. Electric problem (Turbine inlet temperature sensor connector, wiring harness ECU to turbine inlet temperature sensor, turbine inlet temperature sensor) 3. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00278903	"P0546"	Turbine inlet temperature sensor value is more than maximum threshold (3.45 V).	Engine Torque Reduction Variable	1. Electric problem (Turbine inlet temperature sensor connector) 2. Electric problem (Wiring harness turbine inlet temperature sensor to ECU, faulty turbine inlet temperature sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00278904	"P0545"	Turbine inlet temperature sensor value is less than minimum threshold (0.27 V).	Engine Torque Reduction Variable	1. Electric problem (Turbine inlet temperature sensor connector) 2. Electric problem (Wiring harness turbine inlet temperature sensor to ECU, faulty turbine inlet temperature sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00278911	"P0544"	If the Turbine in temperature is out of the threshold during restricted condition, fault code is raised ($\pm 300^{\circ}\text{C}$ (572°F)).		1. Air path problem (Exhaust leakage (exhaust manifold, EGR path)) 2. Air path problem (Faulty turbocharger) 3. Air path problem (Intake air restriction too high (Air filter plugged)) 4. Injector problem (Injector open stuck) 5. Electric problem (Faulty turbine inlet temperature sensor) 6. Electric problem (Faulty ECU, ECU connector)
E00279103	"P2145"	If the pins of EGR H-bridge have been shorted to battery or H-Bridge circuit included EGR valve is damaged.	Engine Torque Reduction Variable	1. Electric problem (EGR valve connector, faulty ECU valve motor) 2. Electric problem (Wiring harness EGR to ECU) 3. Electric problem (Faulty ECU)
E00279104	"P2144"	If the pins of EGR H-bridge have been shorted to earth or H-Bridge circuit included EGR valve is damaged.	Engine Torque Reduction Variable	1. Electric problem (EGR valve connector, faulty ECU valve motor) 2. Electric problem (Wiring harness EGR to ECU) 3. Electric problem (Faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00279105	"P2143"	If the pins of EGR H-bridge have been opened or H-Bridge circuit included EGR valve is damaged.	Engine Torque Reduction Variable	1. Electric problem (EGR valve connector, faulty ECU valve motor) 2. Electric problem (Wiring harness EGR to ECU) 3. Electric problem (Faulty ECU)
E00303114	"P205E"	The DEF tank temperature is more than threshold (70°). * DEF temperature is really high due to high ambient temperature and continuous high load operation. Therefore, in case of this fault, only the alarm is done. However, if the fault occurs even though the machine is not working continuously and the ambient temperature are not high, a cooling line check is required. In general, the fault had not been occurred during 1~2hrs consecutive machine operating in hot ambient conditions (>40° C (104°F)).		1. DEF temperature is really high due to high ambient temperature and continuous high load operation 2. Electric problem (DEF tank coolant valve connector, Wiring harness ECU to DEF tank coolant valve, DEF Coolant valve) 3. Electric problem (ECU connector, Faulty ECU)
E00303116	"P1045"	The difference between DEF Tank temperature sensor and Environment temperature sensor is higher than threshold (35°C (63°F)). This fault is used to determine if the DEF Tank temperature sensor was drift (offset).		1. Electric problem (DEF temperature sensor, wiring harness in the DEF module) 2. Electric problem (CAN wiring harness-insulation, resistance)
E00303118	"P1044"	The difference between DEF Tank temperature sensor and Environment temperature sensor is lower than threshold (-55°C (-99°F)). This fault is used to determine if the DEF Tank temperature sensor was drift (offset).		1. Electric problem (DEF temperature sensor, wiring harness in the DEF module) 2. Electric problem (CAN wiring harness-insulation, resistance)
E00321603	"P2395"	NOx signal is higher than maximum threshold (3000 ppm).		1. Electric problem (NOx sensor connector, wiring harness NOx sensor controller to sensing part, NOx sensor) 2. Electric problem (CAN wiring harness-insulation, resistance)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00321604	"P2397"	NOx signal is less than minimum threshold (-100ppm).		1. Electric problem (NOx sensor connector, wiring harness NOx sensor controller to sensing part, NOx sensor) 2. Electric problem (CAN wiring harness-insulation, resistance)
E00321703	"P23A7"	Lambda signal is higher than maximum threshold. (3.1).		1. Electric problem (NOx sensor connector, wiring harness NOx sensor controller to sensing part, NOx sensor) 2. Electric problem (CAN wiring harness-insulation, resistance)
E00321907	"U030D"	A fault is detected if the heater won't stay heated up after dew point release (600 sec).	Engine Torque Reduction Variable	1. Electric problem (NOx sensor) 2. Electric problem (NOx sensor connector, wiring harness NOx sensor controller to sensing part, CAN wiring harness-insulation, resistance)
E00322405	"P2203"	NOx sensor control unit detects an open circuit.	Engine Torque Reduction Variable	1. Electric problem (NOx sensor connector, wiring harness NOx sensor controller to sensing part, NOx sensor) 2. Electric problem (CAN wiring harness-insulation, resistance)
E00322406	"P2202"	NOx sensor control unit detects a short circuit.	Engine Torque Reduction Variable	1. Electric problem (NOx sensor connector, wiring harness NOx sensor controller to sensing part, NOx sensor) 2. Electric problem (CAN wiring harness-insulation, resistance)
E00322603	"P2396"	NOx signal is higher than maximum threshold (3000 ppm).		1. Electric problem (NOx sensor connector, wiring harness NOx sensor controller to sensing part, NOx sensor) 2. Electric problem (CAN wiring harness-insulation, resistance)
E00322604	"P2398"	NOx signal is less than minimum threshold (-100 ppm).		1. Electric problem (NOx sensor connector, wiring harness NOx sensor controller to sensing part, NOx sensor) 2. Electric problem (CAN wiring harness-insulation, resistance)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00322703	"P23A8"	Lambda signal is higher than maximum threshold (3.1).		1. Electric problem (NOx sensor connector, wiring harness NOx sensor controller to sensing part, NOx sensor) 2. Electric problem (CAN wiring harness-insulation, resistance)
E00322907	"U030E"	A fault is detected if the heater won't stay heated up after dew point release (600 sec).	Engine Torque Reduction Variable	1. Electric problem (NOx sensor) 2. Electric problem (NOx sensor connector, wiring harness NOx sensor controller to sensing part, CAN wiring harness-insulation, resistance)
E00323405	"P2216"	NOx sensor control unit detects an open circuit.	Engine Torque Reduction Variable	1. Electric problem (NOx sensor connector, wiring harness NOx sensor controller to sensing part, NOx sensor) 2. Electric problem (CAN wiring harness-insulation, resistance)
E00323406	"P2215"	NOx sensor control unit detects a short circuit.	Engine Torque Reduction Variable	1. Electric problem (NOx sensor connector, wiring harness NOx sensor controller to sensing part, NOx sensor) 2. Electric problem (CAN wiring harness-insulation, resistance)
E00323600	"P049B"	The EGR rate positive response is too slow than threshold time.	Engine Torque Reduction Variable	1. Air path problem (EGR cooler plugged, tampering by user) 2. Air path problem (EGR path leakage, intake air path leakage) 3. Electrical problem (Faulty air mass flow sensor, faulty MAP sensor)
E00323616	"P0408"	The limit for the maximum permissible positive closed-loop EGR rate control deviation of the exhaust gas recirculation control has been exceeded over than 10 sec.	Engine Torque Reduction Variable	1. Air path problem (EGR cooler plugged, tampering by user) 2. Air path problem (EGR path leakage, intake air path leakage) 3. Electrical problem (Faulty air mass flow sensor, faulty MAP sensor)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00324200	"P1033"	DPF(SCRf) inlet temperature is increased more than normal operation threshold (830°C (1526°F)).		1. DPF(SCRf) inlet temperature is exceeded than engine limit 2. Electric problem (DPF(SCRf) inlet temperature sensor connector, Wiring harness ECU to DPF(SCRf) inlet temperature sensor, DPF(SCRf) inlet temperature sensor) 3. Electric problem (ECU connector, Faulty ECU)
E00324203	"P2033"	DPF(SCRf) inlet temperature sensor value is more than maximum threshold (3.54 V).	Engine Torque Reduction Variable	1. Electric problem (DPF(SCRf) inlet temperature sensor connector) 2. Electric problem (Wiring harness DPF(SCRf) inlet temperature sensor to ECU, faulty DPF(SCRf) inlet temperature sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00324204	"P2032"	DPF(SCRf) inlet temperature sensor value is less than minimum threshold (0.33 V).	Engine Torque Reduction Variable	1. Electric problem (DPF(SCRf) inlet temperature sensor connector) 2. Electric problem (Wiring harness DPF(SCRf) inlet temperature sensor to ECU, faulty DPF(SCRf) inlet temperature sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00324211	"P2034"	If the DPF(SCRf) in temperature is out of the threshold during restricted condition, fault code is raised ($\pm 200^{\circ}\text{C}$ (392°F)).	Engine Torque Reduction Variable	1. Electric problem (DPF(SCRf) in temperature sensor connector) 2. Tampering (DPF(SCRf) in temperature sensor is not installed well for tampering, reduced DEF consumption) 3. Electric problem (Faulty DPF(SCRf) in temperature sensor) 4. Air path problem (Exhaust gas leakage)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00325103	"P2455"	The DPF differential pressure sensor signal is more than maximum threshold (4.67 V).	Engine Torque Reduction Variable	1. Electric problem (Differential pressure sensor connector) 2. Electric problem (Wiring harness ECU to differential pressure sensor, faulty differential pressure sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00325104	"P2454"	The DPF differential pressure sensor signal is less than minimum threshold (0.27 V).	Engine Torque Reduction Variable	1. Electric problem (Differential pressure sensor connector) 2. Electric problem (Wiring harness ECU to differential pressure sensor, faulty differential pressure sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00325113	"P3052"	The DPF differential pressure sensor was drift than threshold at drift check condition.		1. DPF differential pressure sensor drift 2. Electric problem (Differential pressure sensor connector, wiring harness ECU to differential pressure sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00325118	"P1454"	The DPF differential pressure is less than minimum pressure dependent on exhaust gas flow (Ref : <1 kPa).	Engine Torque Reduction Variable	1. DPF differential pressure sensor hose open or leakage 2. Electric problem (Differential pressure sensor connector, wiring harness ECU to differential pressure sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00336014	"P263D"	The DEF pressure line heating is needed, but it cannot be heated due to some fault or hardware issue. In this case, the SCR system should be shut off for protecting. ("Afterrun" is performed.)	Engine Torque Reduction Variable	1. Electric problem (DEF pressure line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF pressure line heater) 3. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00336103	"P2047"	The Dosing valve actuator power stage is shorted to battery.	Engine Torque Reduction Variable	1. Electric problem (Dosing valve connector) 2. Electric problem (Wiring harness dosing valve to ECU, faulty dosing valve) 3. Electric problem (ECU connector, faulty ECU)
E00336104	"P2048"	The Dosing valve actuator power stage is shorted to earth.	Engine Torque Reduction Variable	1. Electric problem (Dosing valve connector) 2. Electric problem (Wiring harness dosing valve to ECU, faulty dosing valve) 3. Electric problem (ECU connector, faulty ECU)
E00336105	"P2049"	The Dosing valve actuator power stage output is opened.	Engine Torque Reduction Variable	1. Electric problem (Dosing valve connector) 2. Electric problem (Wiring harness dosing valve to ECU, faulty dosing valve) 3. Electric problem (ECU connector, faulty ECU)
E00336113	"P202E"	The Dosing valve actuator power stage is over temperature.	Engine Torque Reduction Variable	1. Electric problem (Dosing valve connector) 2. Electric problem (Wiring harness dosing valve to ECU, faulty dosing valve) 3. Electric problem (ECU connector, faulty ECU)
E00336114	"P2C11"	The dosing valve is detected as blocked if no opening signal is detected by the dosing valve driver.	Engine Torque Reduction Variable	1. The dosing valve nozzle tip is clogged due to DEF crystallization (deposit). 2. The DEF hose line is clogged. 3. Electric problem (Dosing valve connector, wiring harness ECU to dosing valve, dosing valve) 4. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00336122	"P2050"	The Dosing valve actuator HS (High side) power stage is shorted to battery.	Engine Torque Reduction Variable	1. Electric problem (Dosing valve connector) 2. Electric problem (Wiring harness dosing valve to ECU, faulty dosing valve) 3. Electric problem (ECU connector, faulty ECU)
E00336123	"P2051"	The Dosing valve actuator HS (High side) power stage is shorted to earth.	Engine Torque Reduction Variable	1. Electric problem (Dosing valve connector) 2. Electric problem (Wiring harness dosing valve to ECU, faulty dosing valve) 3. Electric problem (ECU connector, faulty ECU)
E00336127	"P208E"	The dosing valve will be blocked if no opening process is detected by the dosing valve driver and the operating conditions are within the evaluation range. It is a similar fault to judge the clogging of the dosing valve as P204A (DEF pressure check error at DETECTIONMODE). However, the diagnosis condition is different. The P204A diagnoses at DETECTIONMODE, P208E diagnoses at "METERINGCONTROL" state	Engine Torque Reduction Variable	1. DEF line problem (DEF hose line or dosing valve is clogged) 2. Electric problem (Supply module connector, wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00336303	"P20B4"	The DEF Tank heating coolant valve output is shorted to battery.	Engine Torque Reduction Variable	1. Electric problem (DEF tank heating coolant valve connector) 2. Electric problem (Heater relay, wiring harness related DEF tank heating coolant valve) 3. Electric problem (ECU connector, faulty ECU)
E00336304	"P20B3"	The DEF Tank heating coolant valve output is shorted to earth.	Engine Torque Reduction Variable	1. Electric problem (DEF tank heating coolant valve connector) 2. Electric problem (Heater relay, wiring harness related DEF tank heating coolant valve) 3. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00336305	"P20B1"	The DEF Tank heating coolant valve output is opened.	Engine Torque Reduction Variable	1. Electric problem (DEF tank heating coolant valve connector) 2. Electric problem (Heater relay, wiring harness related DEF tank heating coolant valve) 3. Electric problem (ECU connector, faulty ECU)
E00336307	"P30B1"	The DEF Tank heating coolant valve output is over temperature.	Engine Torque Reduction Variable	1. Electric problem (DEF tank heating coolant valve connector) 2. Electric problem (Heater relay, wiring harness related DEF tank heating coolant valve) 3. Electric problem (ECU connector, faulty ECU)
E00350903	"P0659"	The ECU sensor supply1 voltage is higher than maximum threshold (5.2 V).	Engine torque reduction Level 1 (Mid)	1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Sensor or actuator failure used by ECU 5 V supply) 3. Electric problem (Wiring harness related ECU 5 V supply) 4. Electric problem (Faulty ECU)
E00350904	"P0658"	The ECU sensor supply1 voltage is lower than minimum threshold (4.8 V).	Engine torque reduction Level 1 (Mid)	1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Sensor or actuator failure used by ECU 5 V supply) 3. Electric problem (Wiring harness related ECU 5 V supply) 4. Electric problem (Faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00350905	"P1657"	The ECU sensor supply1 voltage lies outside of the threshold.	Engine torque reduction Level 1 (Mid)	1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Sensor or actuator failure used by ECU 5 V supply) 3. Electric problem (Wiring harness related ECU 5 V supply) 4. Electric problem (Faulty ECU)
E00350906	"P0657"	The ECU sensor supply1 voltage is shorted to earth.	Engine torque reduction Level 1 (Mid)	1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Sensor or actuator failure used by ECU 5 V supply) 3. Electric problem (Wiring harness related ECU 5 V supply) 4. Electric problem (Faulty ECU)
E00350911	"P0641"	The sensor supply voltage is higher than monitoring threshold.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Fault sensor or actuator used by ECU 5 V supply) 3. Electric problem (Faulty wiring harness)
E00351003	"P2671"	The ECU sensor supply2 voltage is higher than maximum threshold (5.2 V).	Engine torque reduction Level 1 (Mid)	1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Sensor or actuator failure used by ECU 5 V supply) 3. Electric problem (Wiring harness related ECU 5 V supply) 4. Electric problem (Faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00351004	"P2670"	The ECU sensor supply2 voltage is lower than minimum threshold (4.8 V).	Engine torque reduction Level 1 (Mid)	1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Sensor or actuator failure used by ECU 5 V supply) 3. Electric problem (Wiring harness related ECU 5 V supply) 4. Electric problem (Faulty ECU)
E00351005	"P1669"	The ECU sensor supply2 voltage lies outside of the threshold.	Engine torque reduction Level 1 (Mid)	1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Sensor or actuator failure used by ECU 5 V supply) 3. Electric problem (Wiring harness related ECU 5 V supply) 4. Electric problem (Faulty ECU)
E00351006	"P2669"	The ECU sensor supply2 voltage is shorted to earth.	Engine torque reduction Level 1 (Mid)	1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Sensor or actuator failure used by ECU 5 V supply) 3. Electric problem (Wiring harness related ECU 5 V supply) 4. Electric problem (Faulty ECU)
E00351011	"P0642"	The sensor supply voltage is lower than monitoring threshold.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Fault sensor or actuator used by ECU 5 V supply) 3. Electric problem (Faulty wiring harness)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00351103	"P2686"	The ECU sensor supply3 voltage is higher than maximum threshold (5.2 V).	Engine torque reduction Level 1 (Mid)	1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Sensor or actuator failure used by ECU 5 V supply) 3. Electric problem (Wiring harness related ECU 5 V supply) 4. Electric problem (Faulty ECU)
E00351104	"P2685"	The ECU sensor supply3 voltage is lower than minimum threshold (4.8 V).	Engine torque reduction Level 1 (Mid)	1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Sensor or actuator failure used by ECU 5 V supply) 3. Electric problem (Wiring harness related ECU 5 V supply) 4. Electric problem (Faulty ECU)
E00351105	"P1684"	The ECU sensor supply3 voltage lies outside of the threshold.	Engine torque reduction Level 1 (Mid)	1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Sensor or actuator failure used by ECU 5 V supply) 3. Electric problem (Wiring harness related ECU 5 V supply) 4. Electric problem (Faulty ECU)
E00351106	"P2684"	The ECU sensor supply3 voltage is shorted to earth.	Engine torque reduction Level 1 (Mid)	1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Sensor or actuator failure used by ECU 5 V supply) 3. Electric problem (Wiring harness related ECU 5 V supply) 4. Electric problem (Faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00351600	"P106D"	The DEF quality signal exceeds the maximum threshold (Normally 45%, dependent on Emission). * This fault can also occur if there is air bubble and foreign material around the DEF quality sensor.	Engine Torque Reduction Variable	1. Detecting problem (The sensor raw value is distorted by air bubble or foreign material) 2. Electric problem (DEF quality sensor, wiring harness in the DEF module) 3. Bad DEF (But high DEF quality is very unlikely case) 4. Electric problem (CAN wiring harness-insulation, resistance)
E00351601	"P106C"	The DEF quality signal is lower the minimum threshold (Normally 27.5%, dependent on Emission). * This fault can also occur if there is air bubble and foreign material around the DEF quality sensor.	Engine Torque Reduction Variable	1. Detecting problem (The sensor raw value is distorted by air bubble or foreign material) 2. Electric problem (DEF quality sensor, wiring harness in the DEF module) 3. Bad DEF (Customer dilutes it for reducing the DEF consumption rate) 4. Electric problem (CAN wiring harness-insulation, resistance)
E00351612	"P106E"	DEF quality Diagnosis is considered as tampering if the signal used to prevent mis diagnosis due to temporary air bubble is kept too long.		1. Detection problem (Distorted by air bubble time is too long.) 2. Tampering (DEF quality signal is tampered) 3. Bad DEF
E00351718	"P203F"	If the remaining DEF is less than the empty threshold (Normally 2.5%).	Engine Torque Reduction Variable	1. Refill problem (DEF level is low <2.5%) 2. Electric problem (DEF level sensor, wiring harness in the DEF module) 3. Electric problem (CAN wiring harness-insulation, resistance)
E00352003	"U1028"	The error is reported if its FMI is equal 3 (Open circuit).	Engine Torque Reduction Variable	1. Electric problem (DEF quality sensor, wiring harness in the DEF module) 2. Electric problem (CAN wiring harness-insulation, resistance)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00352004	"U1030"	The error is reported if its FMI is equal 4 (Short circuit).	Engine Torque Reduction Variable	1. Electric problem (DEF quality sensor, wiring harness in the DEF module) 2. Electric problem (CAN wiring harness-insulation, resistance)
E00353203	"P203A"	The error is reported if its FMI is equal 3 (Open circuit).	Engine Torque Reduction Variable	1. Electric problem (DEF quality sensor, wiring harness in the DEF module) 2. Electric problem (CAN wiring harness-insulation, resistance)
E00353204	"P2041"	The error is reported if its FMI is equal 4 (Short circuit).	Engine Torque Reduction Variable	1. Electric problem (DEF quality sensor, wiring harness in the DEF module) 2. Electric problem (CAN wiring harness-insulation, resistance)
E00369503	"P25BC"	If DPF regeneration inhibit switch is shorted to battery. The switch is connected directly to ECU.		1. Electric problem (DPF regeneration switch connector) 2. Electric problem (Wiring harness DPF regeneration switch to ECU, faulty DPF regeneration switch) 3. Electric problem (Faulty ECU, ECU connector)
E00369603	"P25BB"	If DPF regeneration enable switch is shorted to battery. The switch is connected directly to ECU.		1. Electric problem (DPF regeneration switch connector) 2. Electric problem (Wiring harness DPF regeneration switch to ECU, faulty DPF regeneration switch) 3. Electric problem (Faulty ECU, ECU connector)
E00369611	"P25BA"	If DPF regeneration inhibit switch is active and DPF regeneration enable switch is also activated. The switch signal is connected directly to ECU.		1. Electric problem (DPF regeneration switch connector) 2. Electric problem (Wiring harness DPF regeneration switch to ECU, faulty DPF regeneration switch) 3. Electric problem (Faulty ECU, ECU connector)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00369703	"P2611"	Lamp wiring is shorted to battery.		1. Electric problem (Lamp connector) 2. Electric problem (Wiring harness lamp to ECU, faulty lamp) 3. Electric problem (Faulty ECU, ECU connector)
E00369704	"P260F"	Lamp wiring is shorted to earth.		1. Electric problem (Lamp connector) 2. Electric problem (Wiring harness lamp to ECU, faulty lamp) 3. Electric problem (Faulty ECU, ECU connector)
E00369705	"P260E"	Lamp wiring is opened.		1. Electric problem (Lamp connector) 2. Electric problem (Wiring harness lamp to ECU, faulty lamp) 3. Electric problem (Faulty ECU, ECU connector)
E00371514	"P246B"	If particulate filter regeneration is disabled, i.e., if bit 0 of PFItRgn_stLck = TRUE, an error will be detected.		1. DPF regeneration could not be success with max allowable time (lock up mode) - internal fault
E00372016	"P242F"	DPF ash loading is more than maximum threshold. Ash cleaning is needed, and ash cleaning interval is dependent on After-treatment system size.		1. DPF ash cleaning is needed
E00408203	"P025D"	If the fuel metering unit signal is short circuit to battery, fault code is raised.	Engine torque reduction Level 1 (Mid)	1. Electric problem (Metering unit connector) 2. Electric problem (Wiring harness metering unit to ECU, faulty metering unit) 3. Electric problem (Faulty ECU, ECU connection)
E00408204	"P025C"	If the fuel metering unit signal is short circuit to earth, fault code is raised.	Engine torque reduction Level 1 (Mid)	1. Electric problem (Metering unit connector) 2. Electric problem (Wiring harness metering unit to ECU, faulty metering unit) 3. Electric problem (Faulty ECU, ECU connection)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00408205	"P025A"	If the fuel metering unit signal is opened, fault code is raised.	Engine torque reduction Level 1 (Mid)	1. Electric problem (Metering unit connector) 2. Electric problem (Wiring harness metering unit to ECU, faulty metering unit) 3. Electric problem (Faulty ECU, ECU connection)
E00408207	"P025B"	If the fuel metering unit signal is over temperature, fault code is raised.	Engine torque reduction Level 1 (Mid)	1. Electric problem (Metering unit connector) 2. Electric problem (Wiring harness metering unit to ECU, faulty metering unit) 3. Electric problem (Faulty ECU, ECU connection)
E00433500	"P1450"	If DEF pressure exceeds the maximum threshold (10.5 bar) for longer than 10 sec, an error will be set at "METERINGCONTROL" state.	Engine Torque Reduction Variable	1. DEF line problem (DEF hose line or dosing valve is clogged) 2. Electric problem (Supply module connector, wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00433501	"P1451"	If DEF pressure falls below the first minimum pressure threshold (4 bar) for longer than 10 sec, or the second minimum pressure threshold (3 bar) for longer than 0.5 sec, an error will be set at "METERINGCONTROL" state.	Engine Torque Reduction Variable	1. Low DEF level 2. DEF line problem (DEF hose line or dosing valve is clogged, supply module filter is clogged, hose line are swapped) 3. Electric problem (Supply module connector, wiring harness ECU to supply module, supply module) 4. Electric problem (ECU connector, faulty ECU)
E00433502	"P1457"	When system attempts to build up the pressure in the dosing line, if this pressure threshold (6.5 bar) cannot be reached within 25 s for longer than maximum number of attempts (3), fault will be set.	Engine Torque Reduction Variable	1. Low DEF level 2. DEF line problem (DEF hose line or dosing valve is opened, hose line are swapped.) 3. Electric problem (Supply module connector, wiring harness ECU to supply module, supply module) 4. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00433512	"P1452"	The DEF pressure is higher than threshold (12.5 bar) for longer than 10 sec, fault will be set except below condition. 1) when the supply module is defrosting. 2) when the DEF Reverting valve is actuated for pressure reduction in the "DETECTIONMODE" state.	Engine Torque Reduction Variable	1. DEF line problem (DEF hose line or dosing valve is clogged) 2. Electric problem (Supply module connector, wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00433515	"P1459"	The desired DEF pressure reduction (<0.5 bar) could not be achieved within 40 sec.	Engine Torque Reduction Variable	1. The DEF backflow hose line is clogged. 2. Electric problem (Supply module connector, wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00433516	"P1460"	The DEF pressure is below the minimum pressure threshold at "AFTERRUN PRESSURECOMPENSATION" state.	Engine Torque Reduction Variable	1. The DEF backflow hose line is clogged. 2. Electric problem (Supply module connector, wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00433518	"P1458"	When system attempts to build up the pressure in the dosing line, if this pressure threshold (6.5 bar) cannot be reached within 25 s for longer than maximum number of attempts (3), fault will be set. This fault is occurred after P1458 (DEF pressure build up error at PRESSUREBUILDUP).	Engine Torque Reduction Variable	1. Low DEF level 2. DEF line problem (DEF hose line or dosing valve is opened, hose line are swapped) 3. Electric problem (Supply module connector, wiring harness ECU to supply module, supply module) 4. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00434402	"P1893"	If the backflow line is blocked, the pressure will not drop below the threshold by actuation of the backflow pump within the time threshold. If a blockage is detected in backflow line, the state is left with an error and the counter is incremented. If the counter exceeds the maximum acceptable number of repetitions the fault is set.	Engine Torque Reduction Variable	1. The DEF backflow hose line is clogged. 2. Electric problem (Supply module connector, wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00435405	"P221D"	The DEF pressure line heater circuit is opened.		1. Electric problem (DEF pressure line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF pressure line heater) 3. Electric problem (ECU connector, faulty ECU)
E00435406	"P221C"	The DEF pressure line heater circuit is opened or shorted to earth.		1. Electric problem (DEF pressure line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF pressure line heater) 3. Electric problem (ECU connector, faulty ECU)
E00435505	"P221F"	The DEF Backflow line heater circuit is opened.		1. Electric problem (DEF backflow line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF backflow line heater) 3. Electric problem (ECU connector, faulty ECU)
E00435506	"P221E"	The DEF Backflow line heater circuit is opened or shorted to earth.		1. Electric problem (DEF backflow line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF backflow line heater) 3. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00435605	"P215F"	The DEF Suction line heater circuit is opened.		1. Electric problem (DEF suction line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF suction line heater) 3. Electric problem (ECU connector, faulty ECU)
E00435606	"P215E"	The DEF Suction line heater circuit is opened or shorted to earth.		1. Electric problem (DEF suction line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF suction line heater) 3. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00436414	"P20EE"	The SCR average efficiency is below the eta threshold. It is used to monitor NOx conversion efficiency by using NOx sensor before and after SCR. Diagnoses when the NOx reduction efficiency drops below about 30%. Calculate the calculated average efficiency during NOx 10 g accumulation (time varies according to mode, normally over 30 minutes). And if this value falls below 6th consecutive the diagnosis threshold, the fault is occurred. If the efficiency is higher than the threshold even once in the middle, it heals immediately. * Do not clear fault only, re-update MAP or change the ECU first without operating test. The diagnostic criterion must be operated under stable temperature conditions for a certain period of time, which may take a long time to diagnose. Therefore, when exchanging ECU, the values are reset and appear to have improved, but if the root cause is not improved, the fault will be reoccurred.	Engine torque reduction Level 1 (Mid)	1. Electric problem (When the upstream and downstream NOx sensors are conversely connected) 2. Electric problem (NOx sensor failure, sensor drift) 3. Bad DEF (Check if DEF concentration fault is occurred at same time) 4. SCR failure (not common, please perform DPF regeneration and data monitor before change SCR system)
E00436504	"P2046"	The error is reported if its FMI is equal 4 (Short circuit).	Engine Torque Reduction Variable	1. Electric problem (DEF temperature sensor, wiring harness in the DEF module) 2. Electric problem (CAN wiring harness-insulation, resistance)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00436514	"P1227"	The DEF tank temperature has not risen by the threshold (3°C (5.4°F)) and within 3600 sec. The DEF tank temperature is not risen as expected. This monitoring will run only under the following condition: • DEF Tank heater (Coolant valve) is activated. • The remaining urea tank level is higher than threshold (20%). • DEF Tank temperature is lower than (-16°C (3.2°F)) or higher than (-8°C (17.6°F)) • DEF Tank temperature is lower than (20°C (68°F)). • The engine coolant temperature is greater than (49.96°C (121.9°F))	Engine Torque Reduction Variable	1. Electric problem (DEF tank temperature sensor, wiring harness in the DEF tank module) 2. Electric problem (DEF tank coolant valve connector, wiring harness ECU to DEF tank coolant valve) 3. Electric problem (CAN wiring harness-insulation, resistance)
E00437403	"P208D"	The DEF Supply pump motor signal output is shorted to battery.	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00437404	"P208C"	The DEF Supply pump motor signal output is shorted to earth.	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00437405	"P208A"	The DEF Supply pump motor signal output is opened.	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00437407	"P208B"	The DEF Supply pump motor signal output is over temperature.	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00437408	"P108A"	The fault is detected when the actual pump motor speed deviates from the set pump motor speed for more than five seconds. The pump speed is calculated by internal electronics.	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00437409	"P108B"	The fault is detected when the actual pump motor speed deviates from the set pump motor speed for more than five seconds. The pump speed is calculated by internal electronics. If the DEF Supply Pump Motor Speed Deviation Fault has been occurred more than 5 times in the same driving cycle, it is considered to permanent fault.	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00437412	"P108C"	The DEF Supply pump motor does not switch to pump actuation mode.	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00478115	"P24A3"	The DPF soot loading is exceed 120%. There is no chance to heat up or burn soot within very short time driving, physically. So it should be needed the manual regeneration by DPF switch.	Engine Torque Reduction Level 2 (Severe)	1. DPF soot loading is exceed 120%

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00478116	"P2463"	The DPF soot loading is exceed 110%. There is no chance to heat up or burn soot within very short time driving, physically. So it should be needed the manual regeneration by DPF switch. If the ECU DPF regeneration memory is reset, the DPF regeneration is induced for safety.	Engine torque reduction Level 1 (Mid)	1. DPF soot loading is exceed 110% 2. ECU DPF regeneration memory is reset. If the ECU memory is reset, the DPF regeneration is induced for safety
E00506703	"P0593"	Lamp wiring is shorted to battery.		1. Electric problem (Lamp connector) 2. Electric problem (Wiring harness lamp to ECU, faulty lamp) 3. Electric problem (Faulty ECU, ECU connector)
E00506704	"P0592"	Lamp wiring is shorted to earth.		1. Electric problem (Lamp connector) 2. Electric problem (Wiring harness lamp to ECU, faulty lamp) 3. Electric problem (Faulty ECU, ECU connector)
E00506705	"P0591"	Lamp wiring is opened.		1. Electric problem (Lamp connector) 2. Electric problem (Wiring harness lamp to ECU, faulty lamp) 3. Electric problem (Faulty ECU, ECU connector)
E00509903	"P055D"	Lamp wiring is shorted to battery.		1. Electric problem (Lamp connector) 2. Electric problem (Wiring harness lamp to ECU, faulty lamp) 3. Electric problem (Faulty ECU, ECU connector)
E00509904	"P055C"	Lamp wiring is shorted to earth.		1. Electric problem (Lamp connector) 2. Electric problem (Wiring harness lamp to ECU, faulty lamp) 3. Electric problem (Faulty ECU, ECU connector)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00509905	"P055B"	Lamp wiring is opened.		1. Electric problem (Lamp connector) 2. Electric problem (Wiring harness lamp to ECU, faulty lamp) 3. Electric problem (Faulty ECU, ECU connector)
E00531303	"P0193"	The rail pressure sensor raw signal is more than maximum threshold (4.83 V).	Engine torque reduction Level 1 (Mid); Engine speed reduced to 1200 rpm	1. Electric problem (Rail pressure sensor connector) 2. Electric problem (Wiring harness rail pressure sensor to ECU, rail pressure sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00531304	"P0192"	The rail pressure sensor raw signal is less than minimum threshold (0.36 V).	Engine torque reduction Level 1 (Mid); Engine speed reduced to 1200 rpm	1. Electric problem (Rail pressure sensor connector) 2. Electric problem (Wiring harness rail pressure sensor to ECU, rail pressure sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00541904	"P02E2"	If the pins of Throttle valve H-bridge have been shorted to earth or H-Bridge circuit included Throttle valve is damaged.		1. Electric problem (Throttle valve connector, faulty throttle valve motor) 2. Electric problem (Wiring harness throttle valve to ECU) 3. Electric problem (Faulty ECU)
E00541903	"P02E3"	If the pins of Throttle valve H-bridge have been shorted to battery or H-Bridge circuit included Throttle valve is damaged.		1. Electric problem (Throttle valve connector, faulty throttle valve motor) 2. Electric problem (Wiring harness throttle valve to ECU) 3. Electric problem (Faulty ECU)
E00541905	"P02E0"	If the pins of Throttle valve H-bridge have been opened or H-Bridge circuit included Throttle valve is damaged.		1. Electric problem (Throttle valve connector, faulty throttle valve motor) 2. Electric problem (Wiring harness throttle valve to ECU) 3. Electric problem (Faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00543510	"P1453"	If the DEF pressure is not within the admissible limits (± 0.5 bar) for longer than 50 sec.	Engine Torque Reduction Variable	1. DEF line problem (DEF hose line or dosing valve is clogged) 2. Electric problem (Supply module connector, wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00543512	"P204A"	The ECU checks whether the dosing valve is physically blocked by checking whether the pressure drops normally by opening the dosing valve with the pressure in the pressure line at 9 bar. If the DEF pressure is not dropped below threshold (7.5 bar) within 15 sec, the dosing valve is considered to blockage. If a blockage is detected, the state is left with error and the counter is incremented. If the counter exceeds the maximum acceptable number of repetitions the fault is set.	Engine Torque Reduction Variable	1. DEF line problem (DEF hose line or dosing valve is clogged) 2. Electric problem (Supply module connector, wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00543603	"P20A3"	The DEF Reverting valve signal output is shorted to battery.	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00543604	"P20A2"	The DEF Reverting valve signal output is shorted to earth.	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00543605	"P20A0"	The DEF Reverting valve signal output is opened.	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00543607	"P20A1"	The DEF Reverting valve signal output is over temperature.	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00543611	"P20A5"	The DEF pump pressure is not dropped less than 0.9 bar in 15 sec at pressure reduction control mode.	Engine Torque Reduction Variable	1. The DEF backflow hose line is clogged. 2. Electric problem (Supply module connector, wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00543614	"P1461"	The DEF pressure difference is lower than threshold (3 bar) at "PRESSUREREDUCTION" state. It is a similar fault to judge the clogging back flow line as P1459 (DEF Pressure reduction error at PRESSUREREDUCTION). However, this fault is especially focused on judge of the DEF Reverting valve operation.	Engine Torque Reduction Variable	1. The DEF backflow hose line is clogged. 2. Electric problem (Supply module connector, wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00549103	"P20C0"	The DEF Pressure line heater relay output is shorted to battery.	Engine Torque Reduction Variable	1. Electric problem (DEF pressure line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF pressure line heater) 3. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00549104	"P20BF"	The DEF Pressure line heater relay output is shorted to earth.	Engine Torque Reduction Variable	1. Electric problem (DEF pressure line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF pressure line heater) 3. Electric problem (ECU connector, faulty ECU)
E00549105	"P20BD"	The DEF Pressure line heater relay output is opened.	Engine Torque Reduction Variable	1. Electric problem (DEF pressure line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF pressure line heater) 3. Electric problem (ECU connector, faulty ECU)
E00549107	"P30BD"	The DEF Pressure line heater relay output is over temperature.	Engine Torque Reduction Variable	1. Electric problem (DEF pressure line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF pressure line heater) 3. Electric problem (ECU connector, faulty ECU)
E00549112	"P20BE"	The Pressure line heater feedback voltage is between Low threshold and High threshold (2000 mV and 4750 mV). 2 to 4.75 V is the value measured by the ECU internal resistance when the current has not flowed normally in the feedback line. The hose heater plausibility fault is diagnosed when the current does not flow normally to the hose heating line even though the hose heater relay is operated. Therefore, it is used to check if the actual heater is working when the relay operates.	Engine Torque Reduction Variable	1. Electric problem (Battery supply into the main relay, DEF pressure line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF pressure line heater, DEF pressure line heater) 3. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00557122	"P009B"	Common rail pressure relief valve (PRV) open counter is exceeded than guideline (50). The PRV open occurs when the rail pressure rises above 1850 bar, so if the fault recurs within a short time, a low pressure circuit (LPC) check is required. * LPC : Whole system from Fuel tank to Fuel high pressure pump.		1. Common rail pressure relief valve (PRV) open counter is exceeded than guideline.
E00557123	"P009C"	If there is any malfunction related to FIE system. the PRV (pressure relief valve) is forced to open for protection FIE system and driver by performing of rail pressure increment.	Engine torque reduction Level 1 (Mid); Engine speed reduced to 1200 rpm	1. If there is any malfunction related to FIE system. the PRV (pressure relief valve) is forced to open for protection FIE system and driver by performing of rail pressure increment.
E00557124	"P009D"	If there is any malfunction related to FIE system. the PRV (pressure relief valve) is forced to open for protection FIE system and driver by performing of rail pressure and injection quantity increment.	Engine torque reduction Level 1 (Mid); Engine speed reduced to 1200 rpm	1. If there is any malfunction related to FIE system. the PRV (pressure relief valve) is forced to open for protection FIE system and driver by performing of rail pressure and injection quantity increment.
E00557125	"P000F"	Common rail pressure relief valve (PRV) is open. The PRV open occurs when the rail pressure rises above 1850 bar, so the Fuel system (LPC & HPC) check is required.	Engine torque reduction Level 1 (Mid); Engine speed reduced to 1200 rpm	1. Fuel LPC problem (No fuel in tank, fuel leakage before HP pump, fuel filter plugged, fuel return line clogging) 2. Fuel HPC problem (Injector close stuck, faulty HP pump, metering unit sticking, leaking) 3. Electric problem (Metering unit connector, wiring harness metering unit to ECU) * LPC (Low pressure circuit) / HPC (High pressure circuit)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00557127	"P009F"	The averaged rail pressure is outside the expected tolerance range for detection of the opened pressure relief valve.		1. Fuel LPC problem (No fuel in tank, fuel leakage before HP pump, fuel filter plugged, fuel return line clogging) 2. Fuel HPC problem (Injector close stuck, faulty HP pump, metering unit sticking, leaking) 3. Electric problem (Metering unit connector, wiring harness metering unit to ECU) * LPC (Low pressure circuit) / HPC (High pressure circuit)
E00557128	"P018F"	Common rail pressure relief valve (PRV) open accumulated time is exceeded than guideline (300 minutes). The PRV open occurs when the rail pressure rises above 1950 bar, so if the fault recurs within a short time, a low pressure circuit (LPC) and high pressure circuit (HPC) check is required. * LPC: Whole system from Fuel tank to Fuel high pressure pump. * HPC: Whole system from high pressure pump to Injector.	Engine torque reduction Level 1 (Mid); Engine speed reduced to 1200 rpm	1. Common rail pressure relief valve (PRV) open accumulated time is exceeded than guideline.
E00562914	"P246C"	The DPF differential pressure is more than maximum pressure dependent on exhaust gas flow. This fault occurs when the soot in the DPF is overloaded. Therefore, if this fault continues to recur in a short time, it is necessary to improve the phenomenon that soot accumulates excessively. For example, air leak of Intake system, Injector failure etc.	Engine torque reduction Level 1 (Mid)	1. DPF fully clogging 2. Electric problem (Differential pressure sensor connector, wiring harness ECU to differential pressure sensor) 3. Electric problem (Faulty ECU, ECU connector)
E00570605	"P214F"	The DEF Supply module heater circuit is opened.		1. Electric problem (DEF Supply module heater connector) 2. Electric problem (Heater relay, wiring harness related DEF supply module heater) 3. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00570606	"P21DD"	The DEF Supply module heater circuit is opened or shorted to earth.		1. Electric problem (DEF Supply module heater connector) 2. Electric problem (Heater relay, wiring harness related DEF supply module heater) 3. Electric problem (ECU connector, faulty ECU)
E00570612	"P23B3"	After defrosting of the supply module the temperature of the supply module heater has not risen by the value (3°C (5.4°F)) but the temperature of the supply module has risen.	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00570614	"P23B4"	The difference between the sensed value of supply module heater temperature and the ambient air temperature is greater than a threshold (15°C (27°F)). It means that check the sensor drift when the machine is at cold soaking condition.	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00570622	"P23B2"	After defrosting of the supply module the temperature of the supply module heater has not risen by the threshold (3°C (5.4°F)) and the temperature of the supply module has not risen by the threshold (3°C (5.4°F)).	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00574603	"P21C4"	The DEF Main heater relay output is shorted to battery.	Engine Torque Reduction Variable	1. Electric problem (Battery supply into the main relay) 2. Electric problem (Heater relay, wiring harness related DEF main heater relay) 3. Electric problem (ECU connector, faulty ECU)
E00574604	"P21C3"	The DEF Main heater relay output is shorted to earth.	Engine Torque Reduction Variable	1. Electric problem (Battery supply into the main relay) 2. Electric problem (Heater relay, wiring harness related DEF main heater relay) 3. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00574605	"P21C2"	The DEF Main heater relay output is opened.	Engine Torque Reduction Variable	1. Electric problem (Battery supply into the main relay) 2. Electric problem (Heater relay, wiring harness related DEF main heater relay) 3. Electric problem (ECU connector, faulty ECU)
E00574606	"P05ED"	At least one DEF line heater circuit is shorted to battery.		1. Electric problem (DEF line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF line heater) 3. Electric problem (ECU connector, faulty ECU)
E00574607	"P31C5"	The DEF Main heater relay output is over temperature.	Engine Torque Reduction Variable	1. Electric problem (Battery supply into the main relay) 2. Electric problem (Heater relay, wiring harness related DEF main heater relay) 3. Electric problem (ECU connector, faulty ECU)
E00596503	"P21C9"	The relay control output is shorted to battery.	Engine Torque Reduction Variable	1. Electric problem (Battery supply into the SCR main relay) 2. Electric problem (Faulty SCR main relay, wiring harness related SCR main relay) 3. Electric problem (ECU connector, faulty ECU)
E00596504	"P21C8"	The relay control output is shorted to earth.	Engine Torque Reduction Variable	1. Electric problem (Battery supply into the SCR main relay) 2. Electric problem (Faulty SCR main relay, wiring harness related SCR main relay) 3. Electric problem (ECU connector, faulty ECU)
E00596505	"P21C7"	The relay control output is opened.	Engine Torque Reduction Variable	1. Electric problem (Battery supply into the SCR main relay) 2. Electric problem (Faulty SCR main relay, wiring harness related SCR main relay) 3. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00632303	"P2634"	The relay control output is shorted to battery.	Engine Torque Reduction Level 2 (Severe)	1. Electric problem (Electric fuel feed pump connector) 2. Electric problem (Wiring harness ECU to electric fuel feed pump, electric fuel feed pump) 3. Electric problem (Faulty ECU, ECU connector)
E00632304	"P2633"	The relay control output is shorted to earth.	Engine Torque Reduction Level 2 (Severe)	1. Electric problem (Electric fuel feed pump connector) 2. Electric problem (Wiring harness ECU to electric fuel feed pump, electric fuel feed pump) 3. Electric problem (Faulty ECU, ECU connector)
E00632305	"P2632"	The relay control output is opened.	Engine Torque Reduction Level 2 (Severe)	1. Electric problem (Electric fuel feed pump connector) 2. Electric problem (Wiring harness ECU to electric fuel feed pump, electric fuel feed pump) 3. Electric problem (Faulty ECU, ECU connector)
E00632313	"P2635"	The fuel filter absolute pressure is below the diagnosis threshold at ignition OFF condition. If the electric fuel feed pump does not operate under the ignition off condition, the fuel filter pressure value will not rise above the threshold (105 kPa(abs)).		1. Fuel LPC problem (No fuel in tank, fuel leakage before HP pump, fuel filter plugged, fuel return line clogging) 2. Fuel HPC problem (Injector close stuck, faulty HP pump, metering unit sticking, leaking) 3. Electric problem (Electric fuel feed pump connector) 4. Electric problem (Wiring harness ECU to electric fuel feed pump, electric fuel feed pump) 5. Electric problem (Faulty ECU, ECU connector) * LPC (Low pressure circuit) / HPC (High pressure circuit)
E00638519	"U1033"	CAN frame has a time out for the number of cycles (4).		1. Electric problem (VCU, abnormal network) 2. Electric problem (CAN wiring harness insulation, resistance)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00687503	"P204D"	The DEF Supply pump pressure sensor value is more than maximum threshold (3.30 V).	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00687504	"P204C"	The Sensed raw voltage value SCR_uRawUPmpP is less than SCR_SRCUPmpP.uMin_C.	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00687516	"P304D"	The difference between DEF Supply pump pressure sensor and atmospheric pressure sensor is higher than threshold (0.5 bar). This fault is used to determine if the DEF supply pump pressure sensor was drift (offset).	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00687518	"P304C"	The difference between DEF Supply pump pressure sensor and atmospheric pressure sensor is lower than threshold (-0.5 bar). This fault is used to determine if the DEF supply pump pressure sensor was drift (offset).	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00691503	"P3611"	Lamp wiring is shorted to battery.		1. Electric problem (Lamp connector) 2. Electric problem (Wiring harness lamp to ECU, faulty lamp) 3. Electric problem (Faulty ECU, ECU connector)
E00691504	"P360F"	Lamp wiring is shorted to earth.		1. Electric problem (Lamp connector) 2. Electric problem (Wiring harness lamp to ECU, faulty lamp) 3. Electric problem (Faulty ECU, ECU connector)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00691505	"P360E"	Lamp wiring is opened.		1. Electric problem (Lamp connector) 2. Electric problem (Wiring harness lamp to ECU, faulty lamp) 3. Electric problem (Faulty ECU, ECU connector)
E00691603	"P1908"	Lamp wiring is shorted to battery.		1. Electric problem (Lamp connector) 2. Electric problem (Wiring harness lamp to ECU, faulty lamp) 3. Electric problem (Faulty ECU, ECU connector)
E00691604	"P1907"	Lamp wiring is shorted to earth.		1. Electric problem (Lamp connector) 2. Electric problem (Wiring harness lamp to ECU, faulty lamp) 3. Electric problem (Faulty ECU, ECU connector)
E00691605	"P1906"	Lamp wiring is opened.		1. Electric problem (Lamp connector) 2. Electric problem (Wiring harness lamp to ECU, faulty lamp) 3. Electric problem (Faulty ECU, ECU connector)
E00706903	"P20C4"	The DEF Backflow line heater relay output is shorted to battery.	Engine Torque Reduction Variable	1. Electric problem (DEF backflow line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF backflow line heater) 3. Electric problem (ECU connector, faulty ECU)
E00706904	"P20C3"	The DEF Backflow line heater relay output is shorted to earth.	Engine Torque Reduction Variable	1. Electric problem (DEF backflow line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF backflow line heater) 3. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00706905	"P20C1"	The DEF Backflow line heater relay output is opened.	Engine Torque Reduction Variable	1. Electric problem (DEF backflow line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF backflow line heater) 3. Electric problem (ECU connector, faulty ECU)
E00706907	"P30C1"	The DEF Backflow line heater relay output is over temperature.	Engine Torque Reduction Variable	1. Electric problem (DEF backflow line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF backflow line heater) 3. Electric problem (ECU connector, faulty ECU)
E00706912	"P20C2"	The Backflow line heater feedback voltage is between Low threshold and High threshold (2000 mV and 4750 mV). 2 to 4.75 V is the value measured by the ECU internal resistance when the current has not flowed normally in the feedback line. The hose heater plausibility fault is diagnosed when the current does not flow normally to the hose heating line even though the hose heater relay is operated. Therefore, it is used to check if the actual heater is working when the relay operates.	Engine Torque Reduction Variable	1. Electric problem (Battery supply into the main relay, DEF backflow line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF backflow line heater, DEF backflow line heater) 3. Electric problem (ECU connector, faulty ECU)
E00710712	"P23B5"	After defrosting of the supply module the temperature of the supply module has not risen by the value (3°C (5.4°F)) but the temperature of the supply module heater has risen.	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00710714	"P23B6"	The difference between the sensed value of supply module temperature and the ambient air temperature is greater than a threshold (15°C (27°F)). It means that check the sensor drift when the machine is at cold soaking condition.	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00741603	"P20BC"	The DEF Supply module heater relay output is shorted to battery.	Engine Torque Reduction Variable	1. Electric problem (DEF supply module connector) 2. Electric problem (Heater relay, wiring harness related DEF supply module) 3. Electric problem (ECU connector, faulty ECU)
E00741604	"P20BB"	The DEF Supply module heater relay output is shorted to earth.	Engine Torque Reduction Variable	1. Electric problem (DEF supply module connector) 2. Electric problem (Heater relay, wiring harness related DEF supply module) 3. Electric problem (ECU connector, faulty ECU)
E00741605	"P20B9"	The DEF Supply module heater relay output is opened.	Engine Torque Reduction Variable	1. Electric problem (DEF supply module connector) 2. Electric problem (Heater relay, wiring harness related DEF supply module) 3. Electric problem (ECU connector, faulty ECU)
E00741607	"P30B9"	The DEF Supply module heater relay output is over temperature.	Engine Torque Reduction Variable	1. Electric problem (DEF supply module connector) 2. Electric problem (Heater relay, wiring harness related DEF supply module) 3. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00741612	"P20BA"	The Supply module heater feedback voltage is between Low threshold and High threshold (2000 mV and 4750 mV). 2 to 4.75 V is the value measured by the ECU internal resistance when the current has not flowed normally in the feedback line. The hose heater plausibility fault is diagnosed when the current does not flow normally to the hose heating line even though the hose heater relay is operated. Therefore, it is used to check if the actual heater is working when the relay operates.	Engine Torque Reduction Variable	1. Electric problem (Battery supply into the main relay, DEF supply module heater connector) 2. Electric problem (Heater relay, wiring harness related DEF supply module heater, DEF supply module heater) 3. Electric problem (ECU connector, faulty ECU)
E00753812	"P06F0"	The received DEF supply module temperature duty cycle is in the failure range (90~95%).	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00753813	"P06F1"	received DEF supply module temperature duty cycle is in the invalid range. 1) DEF supply module temperature duty cycle < 15% or; 2) DEF supply module temperature duty cycle (85~90%) or; 3) DEF supply module temperature duty cycle > 95%.	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00753822	"P20AC"	The received DEF supply module heater temperature duty cycle is in the failure range (90~95%).	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00753823	"P20AD"	The received DEF supply module heater temperature duty cycle is in the invalid range. 1) DEF supply module heater temperature duty cycle < 15% or; 2) DEF supply module heater temperature duty cycle (85~90%) or; 3) DEF supply module heater temperature duty cycle > 95%.	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00753824	"P20B0"	When temperature measurement is not enabled even after sending start sequence for maximum number of times.	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00753825	"P20FF"	The time period of the received DEF supply module PWM signal is out of the specified range of 150 ms to 250 ms.	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00753826	"P056D"	When valid Sync is not received OR When two Sync signals or two temperature information signals are received consecutively OR valid sync and temperature signal for only one information is received consecutively.	Engine Torque Reduction Variable	1. Electric problem (Supply module connector) 2. Electric problem (Wiring harness ECU to supply module, supply module) 3. Electric problem (ECU connector, faulty ECU)
E00754003	"P20C8"	The DEF Suction line heater relay output is shorted to battery.	Engine Torque Reduction Variable	1. Electric problem (DEF Suction line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF suction line heater) 3. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00754004	"P20C7"	The DEF Suction line heater relay output is shorted to earth.	Engine Torque Reduction Variable	1. Electric problem (DEF Suction line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF suction line heater) 3. Electric problem (ECU connector, faulty ECU)
E00754005	"P20C5"	The DEF Suction line heater relay output is opened.	Engine Torque Reduction Variable	1. Electric problem (DEF Suction line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF suction line heater) 3. Electric problem (ECU connector, faulty ECU)
E00754007	"P30C5"	The DEF Suction line heater relay output is over temperature.	Engine Torque Reduction Variable	1. Electric problem (DEF Suction line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF suction line heater) 3. Electric problem (ECU connector, faulty ECU)
E00754012	"P20C6"	The Suction line heater feedback voltage is between Low threshold and High threshold (2000 mV and 4750 mV). 2 to 4.75 V is the value measured by the ECU internal resistance when the current has not flowed normally in the feedback line. The hose heater plausibility fault is diagnosed when the current does not flow normally to the hose heating line even though the hose heater relay is operated. Therefore, it is used to check if the actual heater is working when the relay operates.	Engine Torque Reduction Variable	1. Electric problem (Battery supply into the main relay, DEF suction line heater connector) 2. Electric problem (Heater relay, wiring harness related DEF suction line heater, DEF suction line heater) 3. Electric problem (ECU connector, faulty ECU)
E00774803	"P0617"	The starter relay HS/LS power stage output is opened or the starter relay LS power stage output is shorted to battery. *HS = High side, LS = Low side		1. Electric problem (Starter connector) 2. Electric problem (Wiring harness ECU to starter, starter) 3. Electric problem (ECU connector, faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E00774804	"P0616"	The starter relay HS power stage output is shorted to earth. *HS = High side, LS = Low side		1. Electric problem (Starter connector) 2. Electric problem (Wiring harness ECU to starter, starter) 3. Electric problem (ECU connector, faulty ECU)
E00774805	"P0615"	The starter relay HS/LS power stage output is opened. *HS = High side, LS = Low side		1. Electric problem (Starter connector) 2. Electric problem (Wiring harness ECU to starter, starter) 3. Electric problem (ECU connector, faulty ECU)
E00774903	"P26E6"	The starter relay HS power stage output is shorted to battery.		1. Electric problem (Starter connector) 2. Electric problem (Wiring harness ECU to starter, starter) 3. Electric problem (ECU connector, faulty ECU)
E00774904	"P26E5"	The starter relay LS power stage output is shorted to earth.		1. Electric problem (Starter connector) 2. Electric problem (Wiring harness ECU to starter, starter) 3. Electric problem (ECU connector, faulty ECU)
E00774905	"P26E4"	The starter relay LS power stage output is opened.		1. Electric problem (Starter connector) 2. Electric problem (Wiring harness ECU to starter, starter) 3. Electric problem (ECU connector, faulty ECU)
E00861412	"P213E"	Injection cut-off request by ECU internal calculation for safety based on malfunction of accel pedal, injection control, etc.	Engine Torque Reduction Level 2 (Severe); Engine shutdown	1. Injection cut-off request by ECU internal calculation for safety based on malfunction of accel pedal, injection control, etc.. 2. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 3. Electric problem (ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E05529612	"P062F"	Fault is set when data for when the number of blocks that could not be read from memory media is greater or equal to threshold.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E05555212	"P0630"	If a block cannot be written more than 3 times, an error will be registered.	Engine shutdown	1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E05734419	"U01B7"	CAN frame has a time out for the number of cycles (4).		1. Electric problem (VCU, abnormal network) 2. Electric problem (CAN wiring harness insulation, resistance)
E06144119	"U01B9"	CAN frame has a time out for the number of cycles (4).		1. Electric problem (VCU, abnormal network) 2. Electric problem (CAN wiring harness insulation, resistance)
E06145419	"U029D"	CAN frame has a time out for the number of cycles (4).	Engine Torque Reduction Variable	1. Electric problem (Upstream NOx sensor connector, upstream NOx sensor power, upstream NOx sensor, abnormal network) 2. Electric problem (CAN wiring harness insulation, resistance)
E06145519	"U029E"	CAN frame has a time out for the number of cycles (4).	Engine Torque Reduction Variable	1. Electric problem (Downstream NOx sensor connector, downstream NOx sensor power, downstream NOx sensor, abnormal network) 2. Electric problem (CAN wiring harness insulation, resistance)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E06492319	"U02A2"	CAN frame has a time out for the number of cycles (4).	Engine Torque Reduction Variable	1. Electric problem (DEF tank module connector, DEF tank module, abnormal network) 2. Electric problem (CAN wiring harness insulation, resistance)
E06511019	"U0619"	CAN frame has a time out for the number of cycles (4).	Engine Torque Reduction Variable	1. Electric problem (DEF tank module connector, DEF tank module, abnormal network) 2. Electric problem (CAN wiring harness insulation, resistance)
E06516419	"U1001"	CAN frame has a time out for the number of cycles (4).		1. Electric problem (VCU, abnormal network) 2. Electric problem (CAN wiring harness insulation, resistance)
E06524119	"U1031"	Fault is detected if a timeout of the AUXIO1 frame has occurred. (status of vehicle cut off [Safety bar]).		1. Electric problem (VCU, abnormal network) 2. Electric problem (CAN wiring harness insulation, resistance)
E06526519	"U1032"	CAN frame has a time out for the number of cycles (4).		1. Electric problem (VCU, abnormal network) 2. Electric problem (CAN wiring harness insulation, resistance)
E06527219	"P0218"	CAN frame has a time out for the number of cycles (4).		1. Electric problem (VCU, abnormal network) 2. Electric problem (CAN wiring harness insulation, resistance)
E06532019	"U0632"	CAN frame has a time out for the number of cycles (4).		1. Electric problem (VCU, abnormal network) 2. Electric problem (CAN wiring harness insulation, resistance)
E06532031	"U1039"	FAN control error is occurred.		1. Electric problem (FAN module & wiring harness of FAN module)
E06540019	"U0608"	CAN frame has a time out for the number of cycles (4).	Engine torque reduction Level 1 (Mid)	1. Electric problem (VCU, abnormal network) 2. Electric problem (CAN wiring harness insulation, resistance)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E06540022	"U013C"	CAN frame has a time out for the number of cycles (4).	Engine torque reduction Level 1 (Mid)	1. Electric problem (VCU, abnormal network) 2. Electric problem (CAN wiring harness insulation, resistance)
E06540023	"U043D"	The error is reported when the Rolling Counter of the CAN frame received is not equal.	Engine torque reduction Level 1 (Mid)	1. Electric problem (VCU, abnormal network) 2. Electric problem (CAN wiring harness insulation, resistance)
E06540119	"U010F"	CAN frame has a time out for the number of cycles (4).		1. Electric problem (VCU, abnormal network) 2. Electric problem (CAN wiring harness insulation, resistance)
E06540219	"U01B8"	CAN frame has a time out for the number of cycles (4).		1. Electric problem (VCU, abnormal network) 2. Electric problem (CAN wiring harness insulation, resistance)
E10433209	"P2383"	If the O2 concentration is above the defined threshold (Sensor is probably not mounted correctly).	Engine Torque Reduction Variable	1. Tampering (NOx sensor tampering like to mount outside for reducing of DEF consumption) 2. Electric problem (NOx sensor connector, wiring harness NOx sensor controller too sensing part, NOx sensor) 3. Electric problem (CAN wiring harness-insulation, resistance)
E10438509	"P2384"	If the O2 concentration is above the defined threshold (Sensor is probably not mounted correctly).	Engine Torque Reduction Variable	1. Tampering (NOx sensor tampering like to mount outside for reducing of DEF consumption) 2. Electric problem (NOx sensor connector, wiring harness NOx sensor controller too sensing part, NOx sensor) 3. Electric problem (CAN wiring harness-insulation, resistance)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E52060112	"P160B"	The SPI-communication is monitored by the CY327 driver. A fault is detected if the received data has incorrect check -bytes or a data transfer is not possible.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E52061812	"P060B"	If the value converted by the ADC channel is greater than the applicable threshold (166 mV), after the debounce counter has reached the final value (8).		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E52064112	"P160F"	Multiple errors are detected while testing the complete ROM memory.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E52064212	"P1610"	This fault is detected when the MM (Monitoring Module) does not receive the whole response from CPU during shut-off path test.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E52064312	"P101A"	The current energising time is greater than the maximum permitted energising time after overrun demand by the driver.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E52069612	"P160C"	If the value converted by the ADC, does not lie between minimum(4.70 V) and maximum (4.8 V) after the debounce counter has reached the final value (255).		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E52069712	"P160D"	If the ratio correction value converted by the ADC, does not lie between minimum (0.95) and maximum (1.05) after the debounce counter has reached the final value (8).		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E52069812	"P060C"	If the ECU query response is late 5 times.	Engine torque reduction Level 2 (Severe); Engine shutdown	1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E52069912	"P160E"	If the ECU SPI response is late 5 times.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E52070012	"P1611"	This fault is detected when the any error found during the execution of the shut-off path test.	Engine torque reduction Level 2 (Severe); Engine shutdown	1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E52070112	"P1612"	This fault is detected when the wrong set MM Response time during shut-off path test.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E52070212	"P1613"	This fault is detected when the errors detected in the SPI communication during shut-off path test.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E52070312	"P1615"	The WDA is not working correct during shut-off path test.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E52070412	"P1616"	The OS timeout error during shut-off path test.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E52070512	"P1617"	The positive test failure error during shut-off path test.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E52070612	"P1618"	The shut-off path test time is longer than threshold.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E52070703	"P1619"	The overvoltage is detected during shut-off path test.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E52070704	"P1614"	When the under voltage is detected during shut-off path test.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E52072312	"P12E5"	The inducement Level 1 is activated by EGR valve blocked group fault and the fault is currently present. This fault is only intended to inform about the SCR inducement status. Check the other faults that have occurred together to determine why the SCR inducement was active.		1. SCR Inducement Fault Level1 (Group1 – EGR Block)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E52072412	"P12E6"	The inducement Level 2 is activated by EGR valve blocked group fault and the fault is currently present. This fault is only intended to inform about the SCR inducement status. Check the other faults that have occurred together to determine why the SCR inducement was active.		1. SCR Inducement Fault Level2 (Group1 – EGR Block)
E52072512	"P12E7"	The inducement Level 3 is activated by EGR valve blocked group fault and the fault is currently present. This fault is only intended to inform about the SCR inducement status. Check the other faults that have occurred together to determine why the SCR inducement was active.		1. SCR Inducement Fault Level3 (Group1 – EGR Block)
E52072612	"P12E8"	The inducement Warning is activated by EGR valve blocked group fault and the fault is currently present. This fault is only intended to inform about the SCR inducement status. Check the other faults that have occurred together to determine why the SCR inducement was active.		1. SCR Inducement Fault Warning (Group1 – EGR Block)
E52072712	"P12E9"	The inducement Level 1 is activated by Dosing interrupt group fault and the fault is currently present. This fault is only intended to inform about the SCR inducement status. Check the other faults that have occurred together to determine why the SCR inducement was active.		1. SCR Inducement Fault Level1 (Group2 – Dosing Interrupt)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E52072812	"P12EA"	The inducement Level 2 is activated by Dosing interrupt group fault and the fault is currently present. This fault is only intended to inform about the SCR inducement status. Check the other faults that have occurred together to determine why the SCR inducement was active.		1. SCR Inducement Fault Level2 (Group2 – Dosing Interrupt)
E52072912	"P12EB"	The inducement Level 3 is activated by Dosing interrupt group fault and the fault is currently present. This fault is only intended to inform about the SCR inducement status. Check the other faults that have occurred together to determine why the SCR inducement was active.		1. SCR Inducement Fault Level3 (Group2 – Dosing Interrupt)
E52073012	"P12EC"	The inducement Warning is activated by Dosing interrupt group fault and the fault is currently present. This fault is only intended to inform about the SCR inducement status. Check the other faults that have occurred together to determine why the SCR inducement was active.		1. SCR Inducement Fault Warning (Group2 – Dosing Interrupt)
E52073612	"P12F2"	The inducement Level 1 is activated by DEF quality group fault and the fault is currently present. This fault is only intended to inform about the SCR inducement status. Check the other faults that have occurred together to determine why the SCR inducement was active.		1. SCR Inducement Fault Level1 (Group4 – DEF Quality)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E52073712	"P12F3"	The inducement Level 2 is activated by DEF quality group fault and the fault is currently present. This fault is only intended to inform about the SCR inducement status. Check the other faults that have occurred together to determine why the SCR inducement was active.		1. SCR Inducement Fault Level2 (Group4 – DEF Quality)
E52073812	"P12F4"	The inducement Level 3 is activated by DEF quality group fault and the fault is currently present. This fault is only intended to inform about the SCR inducement status. Check the other faults that have occurred together to determine why the SCR inducement was active.		1. SCR Inducement Fault Level3 (Group4 – DEF Quality)
E52073912	"P12F5"	The inducement Warning is activated by DEF quality group fault and the fault is currently present. This fault is only intended to inform about the SCR inducement status. Check the other faults that have occurred together to determine why the SCR inducement was active.		1. SCR Inducement Fault Warning (Group4 – DEF Quality)
E52074012	"P12F6"	The inducement Level 1 is activated by Tampering group fault and the fault is currently present. This fault is only intended to inform about the SCR inducement status. Check the other faults that have occurred together to determine why the SCR inducement was active.		1. SCR Inducement Fault Level1 (Group5 – Tampering)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E52074112	"P12F7"	The inducement Level 2 is activated by Tampering group fault and the fault is currently present. This fault is only intended to inform about the SCR inducement status. Check the other faults that have occurred together to determine why the SCR inducement was active.		1. SCR Inducement Fault Level2 (Group5 – Tampering)
E52074212	"P12F8"	The inducement Level 3 is activated by Tampering group fault and the fault is currently present. This fault is only intended to inform about the SCR inducement status. Check the other faults that have occurred together to determine why the SCR inducement was active.		1. SCR Inducement Fault Level3 (Group5 – Tampering)
E52074312	"P12F9"	The inducement Warning is activated by Tampering group fault and the fault is currently present. This fault is only intended to inform about the SCR inducement status. Check the other faults that have occurred together to determine why the SCR inducement was active.		1. SCR Inducement Fault Warning (Group5 – Tampering)
E52079012	"P1303"	The inducement Level1 is activated by Repeat offense condition. For discourage repeat tampering and repeat use of poor DEF, The SCR inducement fault is monitored during 40 hrs after healing the SCR inducement fault. If the SCR inducement fault is occurred within 40 hrs, the time of engine speed and torque de-rate process is shorten than normal SCR inducement process.		1. SCR inducement repeat offense level1

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E52079112	"P1304"	The inducement Level2 is activated by Repeat offense condition. For discourage repeat tampering and repeat use of poor DEF, The SCR inducement fault is monitored during 40 hrs after healing the SCR inducement fault. If the SCR inducement fault is occurred within 40 hrs, the time of engine speed and torque de-rate process is shorten than normal SCR inducement process.		1. SCR inducement repeat offense level2
E52079212	"P1305"	The inducement Level3 is activated by Repeat offense condition. For discourage repeat tampering and repeat use of poor DEF, The SCR inducement fault is monitored during 40 hrs after healing the SCR inducement fault. If the SCR inducement fault is occurred within 40 hrs, the time of engine speed and torque de-rate process is shorten than normal SCR inducement process.		1. SCR inducement repeat offense level3
E52079612	"P1012"	Implausible accelerator pedal voltage.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Faulty pedal sensor, pedal sensor connector) 3. Electric problem (Wiring harness related ECU power and earth, ECU connector) 4. Electric problem (Faulty ECU)
E52079712	"P1013"	Implausible engine speed.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E52080012	"P1016"	Implausible Injector ZFC (zero fuel quantity calibration).		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E52080212	"P1018"	Implausible Post2 injection shut off error.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E52080312	"P1019"	Implausible Post3 injection (Pol3) efficiencies.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E52080412	"P101B"	Implausible injection wave correction of the injection quantity correction.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E52080512	"P101C"	Implausible rail pressure.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)

E-CODE	P-CODE	DESCRIPTION	RESULTS	CHECK
E52080612	"P101D"	Error in the torque comparison between the permissible engine torque and the current plausible actual torque.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)
E52080812	"P1021"	Implausible hand pedal voltage.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Faulty pedal sensor, pedal sensor connector) 3. Electric problem (Wiring harness related ECU power and earth, ECU connector) 4. Electric problem (Faulty ECU)
E52080912	"P1022"	Implausible starter control.		1. Electric problem (Abnormal engine shut down (The battery is removed at engine running or ignition on condition, battery out <6 V)) 2. Electric problem (Wiring harness related ECU power and earth, ECU connector) 3. Electric problem (Faulty ECU)

Service Codes List - Gateway Controller

The gateway controller is located in the cab, under the right armrest cover.

CODE	DESCRIPTION	RESULTS
"M0116"	Air filter switch not connected	All functions allowed
"M0117"	Air filter plugged	[air f] is displayed in error code menu
"M0144"	Air filter de-rate level 1	[air f] is displayed in error code menu; engine torque/speed reduced by 25%
"M0145"	Air filter de-rate level 2	[air f] is displayed in error code menu; engine torque/speed reduced by 60%
"M0309"	Battery voltage low	All functions allowed
"M0310"	Battery voltage high	All functions allowed
"M0311"	Battery voltage extremely high	All functions allowed

CODE	DESCRIPTION	RESULTS
"M0314"	Battery voltage extremely low	All functions allowed
"M0322"	Battery voltage out of range low	All functions allowed
"M0414"	Engine oil pressure extremely low	All functions allowed
"M0610"	Engine speed high	All functions allowed
"M0611"	Engine speed extremely high	All functions allowed
"M0613"	Engine speed no signal	Drive disabled
"M0615"	Engine speed shutdown	Engine shutdown
"M0618"	Engine speed out of range	All functions allowed
"M0710"	Hydraulic fluid temperature high	All functions allowed
"M0711"	Hydraulic fluid temperature extremely high	Drive reduced
"M0715"	Hydraulic fluid temperature shutdown	Drive reduced
"M0810"	Engine coolant temperature high	Engine torque limited
"M0811"	Engine coolant temperature extremely high	Engine torque limited
"M0815"	Engine coolant temperature shutdown	Engine shutdown
"M0826"	Engine coolant temperature pre shutdown	All functions allowed. Not displayed on display screen
"M0909"	Fuel level low	All functions allowed
"M0921"	Fuel level out of range high	All functions allowed
"M0922"	Fuel level out of range low	All functions allowed
"M1009"	Fuel filter pressure low	Engine torque / speed reduced by 25%
"M1014"	Fuel filter pressure extremely low	Engine torque / speed reduced by 60%
"M1021"	Fuel filter pressure out of range high	No engine cranking (starter not controlled)
"M1022"	Fuel filter pressure out of range low	No engine cranking (starter not controlled)
"M1117"	Fuel filter plugged	All functions allowed
"M1119"	Fuel filter extremely plugged	Engine torque / speed reduced by 60%
"M1144"	Fuel filter de-rate level 1	Engine torque / speed reduced by 25%
"M1145"	Fuel filter de-rate level 2	Engine torque / speed reduced by 60%
"M1302"	Fuel pump output error ON	Not allowed to crank the engine until next key cycle
"M1303"	Fuel pump output error OFF	Engine shutdown
"M1402"	Fuel solenoid output error ON	Not allowed to crank the engine until next key cycle
"M1403"	Fuel solenoid output error OFF	Engine shutdown
"M1428"	Fuel solenoid output internal failure	Engine shutdown
"M1502"	Fuel solenoid relay error ON	Not allowed to crank the engine until next key cycle
"M1503"	Fuel solenoid relay error OFF	Engine shutdown
"M1821"	Frame levelling pot out of range high	Frame levelling movement disabled

CODE	DESCRIPTION	RESULTS
"M1822"	Frame levelling pot out of range low	Frame levelling movement disabled
"M2101"	Glow plug output error ON	All functions allowed if STB : Glow plugs are always active
"M2103"	Glow plug output error OFF	Glow plug function disabled
"M2202"	Starter output error ON	On ignition, starter is active but engine does not crank
"M2203"	Starter output error OFF	Engine does not crank
"M2207"	Starter output error open circuit	Engine does not crank
"M2405"	Crab valve output short to battery	Drive reduced
"M2406"	Crab valve output short to earth	All functions allowed excepted crab function
"M2407"	Crab valve output open circuit	All functions allowed excepted crab function
"M2505"	4 wheels valve short to battery	Drive reduced
"M2506"	4 wheels valve short to earth	4 wheels steer mode not available
"M2507"	4 wheels valve open circuit	4 wheels steer mode not available
"M2702"	Fan inverter output error ON	Fan inverter is active
"M2703"	Fan inverter output error OFF	Fan inverter not available
"M2707"	Fan inverter output open circuit	Fan inverter not available
"M2805"	Fan PWM output short to battery	Fan inverter not available
"M2806"	Fan PWM output short to earth	Fan inverter not available
"M2807"	Fan PWM output open circuit	Fan inverter not available
"M2832"	Fan PWM output overcurrent	Fan inverter not available
"M2910"	Engine exhaust gas temperature high	Engine exhaust gas temperature > 750°C. Engine torque limited by ECU engine controller from 800°C.
"M3128"	Interrupted power failure	Engine shutdown
"M3204"	Workgroup controller no communication	Workgroup functions disabled
"M3404"	Display controller no communication	No information displayed
"M3504"	DCU controller no communication	SCR system disabled. Engine torque limited by ECU engine controller
"M3604"	Engine controller no communication	Engine speed error, drive disabled, engine shutdown if engine controller in failure
"M3704"	Drive controller no communication	Drive functions & Aux functions disabled
"M3905"	Cab buzzer short to battery	Cab buzzer disabled
"M4028"	Wrong mapping of ECU controller detected: engine horse power mismatch	Engine torque limited
"M4109"	Alternator voltage low	All functions allowed
"M4110"	Alternator voltage high	All functions allowed
"M4228"	Wrong mapping of DCU controller detected: horse power mismatch	Engine torque limited

CODE	DESCRIPTION	RESULTS
"M4605"	Wait to start lamp output short to battery	Wait to start lamp (orange) disabled
"M4721"	Sensor supply out of range high	Impact on inching function
"M4722"	Sensor supply out of range low	Impact on inching function
"M5005"	Front worklights output short to battery	Front worklights permanently lighted on.
"M5006"	Front worklights output short to earth	Front worklights not available.
"M5007"	Front worklights output open circuit	Front worklights not available.
"M5102"	Rear worklights short to battery or open circuit	If open circuit: rear worklights not available. If stb: rear worklights permanently lighted on.
"M5103"	Rear worklights output short to earth	Rear worklights not available.
"M5205"	Electronic battery disconnect output open circuit or short to battery	If open circuit: no power supply If STB: electronic battery disconnect always closed: all functions allowed but it could stay closed when the key switch is off.
"M5206"	Electronic battery disconnect output short to earth	No power supply on the machine
"M5207"	Electronic battery disconnect output open circuit	No power supply on the machine
"M5302"	Electronic battery disconnect stuck	Machine always supplied although key switch off
"M5303"	Electronic battery disconnect open error (unstuck)	No power supply on the machine
"M5421"	Hand throttle: analog signal out of range high	Hand throttle disabled
"M5422"	Hand throttle: analog signal out of range low	Hand throttle disabled
"M5428"	Hand throttle in error (redundancy error)	Hand throttle disabled
"M5810"	Fuel temperature high	Fuel temperature is higher than 86°C (187F) Engine Torque limited by ECU from Fuel temperature > 90°C
"M5811"	Fuel temperature extremely high	Fuel temperature is higher than 88°C (190F) Engine Torque limited by ECU from Fuel temperature > 90°C
"M5815"	Fuel temperature in shutdown	Fuel temperature is higher than 90°C (194F). Engine shutdown.
"M6004"	Cab controller no communication	Cab functions disabled
"M6105"	Safety valve short to battery	Workgroup functions disabled
"M6106"	Safety valve short to earth	Workgroup functions disabled
"M6107"	Safety valve open circuit	Workgroup functions disabled
"M6132"	Safety valve overcurrent	Workgroup functions disabled
"M7748"	Multiple key on active (service tool and keyswitch)	Not allowed to crank the engine
"M7815"	Emergency Stop Switch In Shutdown	Not allowed to crank the engine
"M8021"	Throttle pedal analog signal out of range high	Engine speed is set to 1200 rpm (limp home)
"M8022"	Throttle pedal analog signal out of range low	Engine speed is set to 1200 rpm (limp home)
"M8028"	Throttle pedal in error (redundancy error)	Engine speed is set to 1200 rpm (limp home)

CODE	DESCRIPTION	RESULTS
"M8450"	REGEN requested but inhibited	
"M8602"	Receiver input error ON	
"M8703"	Attachment run input error OFF	
"M8848"	Selection mode switch multiple	
"M9504"	ACD Keypad No Communication	Keypad functions disabled
"M9604"	Single keypad no communication	Keypad functions disabled
"M9704"	Primary keypad no communication	Primary keypad functions disabled
"M9804"	Secondary keypad no communication	Keypad functions disabled
"M9999"	Bad constant data table	Gateway function disabled Not able to crank the engine

Service Codes List - Drive Controller

The drive controller is located inside the frame, next to the battery and the frame fuse box.

CODE	DESCRIPTION	RESULTS
"D0217"	Hydraulic filter plugged	All functions allowed
"D0321"	Battery voltage out of range high	All functions disabled
"D0322"	Battery voltage out of range low	All functions disabled
"D0421"	Inching pedal out of range high	Drive reduced to 20% inching
"D0422"	Inching pedal out of range low	Drive reduced to 20% inching
"D0428"	Inching pedal in error	Drive reduced to 30% inching
"D0605"	Vehicle speed short to battery	No vehicle speed available, gear shift allowed only at neutral
"D0606"	Vehicle speed short to earth	No vehicle speed available, gear shift allowed only at neutral
"D0607"	Vehicle speed open circuit	No vehicle speed available, gear shift allowed only at neutral
"D0611"	Vehicle speed extremely high	Drive disabled then engine shutdown after 10 s
"D0613"	Vehicle speed no signal	No vehicle speed available, gear shift allowed only at neutral
"D0645"	Vehicle speed sensor disagree	Drive reduced
"D0721"	Hydraulic fluid temperature out of range high	All functions allowed
"D0722"	Hydraulic fluid temperature out of range low	All functions allowed
"D0821"	Frame levelling pressure sensor out of range high	All functions allowed
"D0822"	Frame levelling pressure sensor out of range low	All functions allowed
"D0909"	Park brake pressure low	Drive disabled (parking brake is detected applied)
"D0910"	Park brake pressure high	All functions allowed
"D0911"	Park brake pressure extremely high	All functions allowed

CODE	DESCRIPTION	RESULTS
"D0921"	Park brake pressure out of range high	All functions allowed
"D0922"	Park brake pressure out of range low	All functions allowed
"D1005"	Passive brake output short to battery	Drive reduced to 30% inching
"D1006"	Passive brake output short to earth	Park brake is applied
"D1007"	Passive brake output open circuit	Park brake is applied
"D1032"	Passive brake output overcurrent	Park brake is applied
"D1128"	Park brake dashboard switch in error	Activation / deactivation of park brake with switch not possible
"D1145"	Park brake dashboard switch disagree	Activation / deactivation of park brake with switch not possible
"D1207"	Vehicle speed sensor 1 open circuit	Drive reduced
"D1221"	Vehicle speed sensor 1 out of range high	Drive reduced
"D1222"	Vehicle speed sensor 1 out of range low	Drive reduced
"D1307"	Vehicle speed sensor 2 open circuit	Drive reduced
"D1321"	Vehicle speed sensor 2 out of range high	Drive reduced
"D1322"	Vehicle speed sensor 2 out of range low	Drive reduced
"D1402"	Brake light output error on	All functions allowed
"D1403"	Brake light output error off	All functions allowed
"D1407"	Brake light output open circuit	All functions allowed
"D1433"	Brake light output internal failure	All functions allowed
"D1502"	Brake light relay error on	All functions allowed
"D1503"	Brake light relay error off	All functions allowed
"D1605"	Drive pump forward coil short to battery	Drive disabled
"D1606"	Drive pump forward coil short to earth	Forward disabled
"D1607"	Drive pump forward coil open circuit	Forward disabled
"D1632"	Drive pump forward coil overcurrent	Drive disabled
"D1705"	Drive pump reverse coil short to battery	Drive disabled
"D1706"	Drive pump reverse coil short to earth	Reverse disabled
"D1707"	Drive pump reverse coil open circuit	Reverse disabled
"D1732"	Drive pump reverse coil overcurrent	Drive disabled
"D2002"	Low speed output (hydraulic motor) error on	Drive reduced to 30% inching
"D2003"	Low speed output (hydraulic motor) error off	Drive reduced to 30% inching
"D2007"	Low speed output (hydraulic motor) open circuit	Drive reduced to 30% inching
"D2033"	Low speed output (hydraulic motor) controller internal failure	Drive reduced to 30% inching

CODE	DESCRIPTION	RESULTS
"D2102"	Low speed relay error on	Drive reduced to 30% inching
"D2103"	Low speed relay error off	Drive reduced to 30% inching
"D2202"	Defeat valve output (hydraulic motor) error on	All functions allowed
"D2203"	Defeat valve output (hydraulic motor) error off	All functions allowed
"D2207"	Defeat valve output (hydraulic motor) open circuit	All functions allowed
"D2233"	Defeat valve output controller internal failure	All functions allowed
"D2302"	Defeat valve relay error on	All functions allowed
"D2303"	Defeat valve relay error off	All functions allowed
"D2405"	Drive motor solenoid short to battery	Drive reduced
"D2406"	Drive motor solenoid short to earth	Drive reduced
"D2407"	Drive motor solenoid open circuit	Drive reduced
"D2432"	Drive motor solenoid overcurrent	Drive reduced
"D2502"	Left stabiliser on the floor error ON	All functions allowed
"D2503"	Left stabiliser on the floor error OFF	All functions allowed
"D2609"	Hydraulic steering pressure low	All functions allowed
"D2621"	Hydraulic steering pressure out of range high	All functions allowed
"D2702"	Right stabiliser on the floor error ON	All functions allowed
"D2703"	Right stabiliser on the floor error OFF	All functions allowed
"D2821"	Left stabiliser pressure sensor out of range high	All functions allowed
"D2822"	Left stabiliser pressure sensor out of range low	All functions allowed
"D2921"	Right stabiliser pressure sensor out of range high	All functions allowed
"D2922"	Right stabiliser pressure sensor out of range low	All functions allowed
"D3005"	Stabilisers right output short to battery	Auxiliary / Power quick-tach / Stabilisers / Frame Levelling disable
"D3006"	Stabilisers right output short to earth	All functions allowed
"D3007"	Stabilisers right output open circuit	All functions allowed
"D3024"	Stabilisers right output not in neutral	Auxiliary / Power quick-tach / Stabilisers / Frame Levelling disable
"D3105"	Stabilisers left output short to battery	Auxiliary / Power quick-tach / Stabilisers / Frame Levelling disable
"D3106"	Stabilisers left output short to earth	All functions allowed
"D3107"	Stabilisers left output open circuit	All functions allowed
"D3124"	Stabilisers left output not in neutral	Auxiliary / Power quick-tach / Stabilisers / Frame Levelling disable
"D3204"	Workgroup controller no communication	Aux disabled
"D3304"	Gateway controller no communication	All functions disabled

CODE	DESCRIPTION	RESULTS
"D3404"	Display controller no communication	All functions disabled
"D3604"	Engine controller no communication	Drive disabled
"D3723"	Programming or constant data invalid	Drive disabled
"D3728"	Controller failure	Drive disabled
"D3796"	Interrupted power	All functions allowed
"D3797"	Controller programmed	All functions allowed
"D3821"	Drive forward pressure out of range high	Drive reduced
"D3822"	Drive forward pressure out of range low	Drive reduced
"D3828"	Drive forward pressure in error	Drive reduced
"D3899"	Drive pressure sensor calibration needed	Drive reduced
"D3921"	Drive reverse pressure out of range high	Drive reduced
"D3922"	Drive reverse pressure out of range low	Drive reduced
"D3928"	Drive reverse pressure in error	Drive reduced
"D4004"	Joystick no communication	Drive disabled / boom movement disabled
"D4011"	Joystick right roller out of NEUTRAL (auxiliary)	Aux disabled
"D4028"	Joystick grip fault	Drive disabled / boom movement disabled
"D4113"	FNR lever no signal	Drive disabled
"D4128"	FNR multiple inputs active	Drive disabled
"D4228"	Boom Suspension/Float Switch On	Boom Suspension and Float disabled
"D4402"	Power Quicktach output Error On	Power Quicktach function not available
"D4403"	Power Quicktach output Error Off	Power Quicktach function not available
"D4407"	Power Quicktach Output Open circuit	Power Quicktach disabled
"D4502"	Power Quicktach Relay feedback Error On	Quicktach disabled
"D4503"	Power Quicktach Relay feedback Error On	Quicktach disabled
"D4528"	Power Quicktach Switch in error	Quicktach disabled
"D4621"	Voltage sensor 5 V out of range high	All functions disabled
"D4622"	Voltage sensor 5 V out of range low	All functions disabled
"D4705"	Frame levelling output short to battery	Auxiliary / Power quick-tach / Stabilisers / Frame Levelling disable
"D4706"	Frame levelling output short to earth	All functions allowed
"D4707"	Frame levelling output open circuit	All functions allowed
"D4724"	Frame levelling output not in neutral	Auxiliary / Power quick-tach / Stabilisers / Frame Levelling disable
"D4802"	Park brake reserve pressure valve output error on	All functions allowed
"D4803"	Park brake reserve pressure valve output error off	All functions allowed

CODE	DESCRIPTION	RESULTS
"D4807"	Park brake reserve pressure valve output open circuit	All functions allowed
"D4902"	Park brake reserve pressure valve relay feedback error on	All functions allowed
"D4903"	Park brake reserve pressure valve relay feedback error off	All functions allowed
"D5002"	Redundancy park brake output error on	Park brake cannot be applied if it has been released
"D5003"	Redundancy park brake output error off	All functions allowed
"D5007"	Redundancy park brake output open circuit	All functions allowed
"D5033"	Redundancy park brake output internal failure	All functions allowed
"D5102"	Redundancy park brake relay error on	Park brake cannot be applied if it has been released
"D5103"	Redundancy park brake relay error off	All functions allowed
"D5421"	Auxiliary spool sensor out of range high	Auxiliary / Power Quick-tach / Stabilisers / Frame levelling disable
"D5422"	Auxiliary spool sensor out of range low	Auxiliary / Power Quick-tach / Stabilisers / Frame levelling disable
"D5424"	Auxiliary spool sensor not in neutral	Auxiliary / Power Quick-tach / Stabilisers / Frame levelling disable
"D5425"	Auxiliary spool sensor unresponsive	Auxiliary / Power Quick-tach / Stabilisers / Frame levelling disable
"D5521"	Swash plate sensor1 out of range high	Drive reduced
"D5522"	Swash plate sensor1 out of range low	Drive reduced
"D5621"	Swash plate sensor2 out of range high	Drive reduced
"D5622"	Swash plate sensor2 out of range low	Drive reduced
"D5715"	Swash plate shutdown	Engine shutdown
"D5724"	Swash plate not in neutral	Engine cranking disabled
"D5725"	Swash plate unresponsive	Drive disabled
"D5726"	Swash plate commanded position not reachable	Drive disabled
"D5744"	Swash plate dual fault	Drive reduced
"D5745"	Swash plate disagree	Drive reduced
"D5746"	Swash plate unresponsive	Drive disabled
"D5786"	Swash plate safe stop failure	Electrical park brake is applied automatically to stop the machine.
"D5815"	Safe start shutdown	Engine shutdown
"D5824"	Safe start swash out of neutral	Drive disabled
"D6202"	Creep light error on	All functions allowed
"D6203"	Creep light error off	All functions allowed
"D6302"	Creep switch error on	All functions allowed

CODE	DESCRIPTION	RESULTS
"D6421"	Voltage sensor 10V out of range high	All functions disabled
"D6422"	Voltage sensor 10V out of range low	All functions disabled
"D6505"	Gear 1 (gearbox) short to battery	Drive disabled
"D6506"	Gear 1 (gearbox) short to earth	Drive disabled
"D6507"	Gear 1 (gearbox) open circuit	Drive disabled
"D6605"	Gear 2 (gearbox) short to battery	Drive disabled
"D6606"	Gear 2 (gearbox) short to earth	Drive disabled
"D6607"	Gear 2 (gearbox) open circuit	Drive disabled
"D6702"	Gearshift sensor error on	All functions allowed
"D6760"	Gearshift sensor - shift didn't start / no shift	Autoshift disabled
"D6761"	Gearshift sensor - shift too long / locked	Drive disabled
"D6824"	Frame levelling switch not in neutral	Frame levelling and stabilisers disabled
"D6902"	Gear switch 1/2 error on (dashboard)	All functions allowed
"D7002"	High/low speed switch error on (left lever)	All functions allowed
"D7209"	Service brake pressure low	Emergency brake enabled
"D7210"	Service brake pressure high	All functions allowed
"D7214"	Service brake pressure extremely low	All functions allowed
"D7221"	Service brake pressure out of range high	All functions allowed
"D7222"	Service brake pressure out of range low	All functions allowed
"D7309"	Service brake reserve pressure low	All functions allowed
"D7310"	Service brake reserve pressure high	All functions allowed
"D7321"	Service brake reserve pressure out of range high	All functions allowed
"D7322"	Service brake reserve pressure out of range low	All functions allowed
"D7428"	Boom Suspension Error	Boom Suspension disabled
"D7509"	Park brake reserve pressure low	All functions allowed
"D7605"	Aux female output short to battery	Auxiliary disabled
"D7606"	Aux female output short to earth	Auxiliary disabled
"D7607"	Aux female output open circuit	Auxiliary disabled
"D7632"	Aux female output overcurrent	Auxiliary disabled
"D7705"	Aux male output short to battery	Auxiliary disabled
"D7706"	Aux male output short to earth	Auxiliary disabled
"D7707"	Aux male output open circuit	Auxiliary disabled
"D7732"	Aux male output overcurrent	Auxiliary disabled
"D7802"	DEF tank elec fan relay error ON	

CODE	DESCRIPTION	RESULTS
"D7803"	SCR elec fan relay error OFF	
"D7902"	ACD switches error ON	Aux disabled
"D8110"	LS pump pressure high	All functions allowed
"D8121"	LS pump pressure out of range high	All main valve movements allowed at reduced speed.
"D8122"	LS pump pressure out of range low	All main valve movements allowed at reduced speed.
"D8202"	Boom suspension valve error ON	All boom movements disabled
"D8203"	Boom suspension valve error OFF	Boom suspension disabled
"D8205"	Boom Suspension Output Short To Battery	All Boom movements disabled Boom Suspension disabled
"D8206"	Boom Suspension Output Short To Earth	Boom Suspension disabled
"D8207"	Boom suspension open circuit	Boom suspension disabled
"D8232"	Boom suspension overcurrent	Boom suspension disabled
"D8302"	Stabilisers ON/OFF output valve error ON	All functions allowed
"D8303"	Stabilisers ON/OFF output valve error OFF	Stabilisers control not available
"D8307"	Stabilisers ON/OFF output open circuit	Stabilisers control not available
"D8402"	Stabilisers ON/OFF relay feedback error ON	All functions allowed
"D8403"	Stabilisers ON/OFF relay feedback error OFF	Stabilisers control not available
"D8505"	Stabilisers left UP output short to battery	Stabilisers control not available
"D8506"	Stabilisers left UP output short to earth	Stabilisers control not available
"D8507"	Stabilisers left UP output open circuit	Stabilisers control not available
"D8605"	Stabilisers left DOWN output short to battery	Stabilisers control not available
"D8606"	Stabilisers left DOWN output short to earth	Stabilisers control not available
"D8607"	Stabilisers left DOWN output open circuit	Stabilisers control not available
"D8705"	Stabilisers right UP output short to battery	Stabilisers control not available
"D8706"	Stabilisers right UP output short to earth	Stabilisers control not available
"D8707"	Stabilisers right UP output open circuit	Stabilisers control not available
"D8805"	Stabilisers right DOWN output short to battery	Stabilisers control not available
"D8806"	Stabilisers right DOWN output short to earth	Stabilisers control not available
"D8807"	Stabilisers right DOWN output open circuit	Stabilisers control not available
"D8902"	Stabilisers active switch error ON	Stabilisers control not available
"D9099"	Drive calibration required, minimum current + swash plate calibration	All functions allowed
"D9199"	Swash plate neutral range calibration required (drive pump)	All functions allowed

CODE	DESCRIPTION	RESULTS
"D9299"	Swash plate maximal range calibration required (drive pump)	All functions allowed
"D9302"	Trailer brake supplementary line output error on	Trailer park brake is released and corresponding coupler cannot be unplugged
"D9303"	Trailer brake supplementary line output error off	Trailer park brake is applied
"D9307"	Trailer brake supplementary line output open circuit	Trailer park brake is applied
"D9333"	Trailer brake supplementary line output internal failure	Trailer park brake is derate
"D9402"	Trailer brake supplementary line relay error on	Trailer park brake is released and corresponding coupler cannot be unplugged
"D9403"	Trailer brake supplementary line relay error off	Trailer park brake is applied
"D9509"	Trailer brake reserve pressure low	All functions allowed
"D9605"	Redundancy park brake output, short to battery	Park brake cannot be applied if it has been released
"D9606"	Redundancy park brake output, short to earth	All functions allowed
"D9607"	Redundancy park brake output open circuit	All functions allowed
"D9702"	Boom Drain Output Error ON	Workgroup disabled Boom Suspension & Float disabled
"D9703"	Boom Drain Output Error OFF	Boom Suspension & Float disabled
"D9707"	Boom Drain Output Error Open Circuit	Boom Suspension & Float disabled
"D9733"	Boom Drain Output Internal Failure	Boom Suspension & Float disabled
"D9802"	Boom Drain Relay Feedback Output Error ON	Workgroup disabled Boom Suspension & Float disabled
"D9803"	Boom Drain Relay Feedback Output Error OFF	Boom Suspension & Float disabled
"D9999"	Bad constant data table	Not applicable

Service Codes List - Workgroup Controller

The workgroup controller is located in the rear frame, left of the boom.

CODE	DESCRIPTION	RESULTS
"W0321"	Battery voltage out of range high	Workgroup disabled
"W0322"	Battery voltage out of range low	Workgroup disabled
"W0721"	Hydraulic fluid temperature out of range high	All functions allowed
"W0722"	Hydraulic fluid temperature out of range low	All functions allowed
"W1005"	PVG32 Lift Up/Down valve short to battery	Boom lifting and lowering disabled
"W1006"	PVG32 Lift Up/Down valve short to earth	Boom lifting and lowering disabled
"W1007"	PVG32 Lift Up/Down valve open circuit	Boom lifting and lowering disabled
"W1028"	PVG32 Lift Up/Down valve in error, from main valve diagnostic	Boom lifting and lowering disabled

CODE	DESCRIPTION	RESULTS
"W1105"	PVG32 Tilt valve short to battery	Tilt disabled
"W1106"	PVG32 Tilt valve short to earth	Tilt disabled
"W1107"	PVG32 Tilt valve open circuit	Tilt disabled
"W1128"	PVG32 Tilt valve in error, from main valve diagnostic	Tilt disabled
"W1205"	PVG32 Extend/Retract valve short to battery	Boom extend and retract disabled
"W1206"	PVG32 Extend/Retract valve short to earth	Boom extend and retract disabled
"W1207"	PVG32 Extend/Retract valve open circuit	Boom extend and retract disabled
"W1228"	PVG32 Extend/Retract valve in error, from main valve diagnostic	Boom extend and retract disabled
"W1305"	PVG32 Auxiliary valve short to battery	Auxiliary disabled
"W1306"	PVG32 Auxiliary valve short to earth	Auxiliary disabled
"W1307"	PVG32 Auxiliary valve open circuit	Auxiliary disabled
"W1328"	PVG32 Auxiliary valve in error, from main valve diagnostic	Auxiliary disabled
"W1405"	PVG32 Frame Levelling valve short to battery	Frame levelling movement disabled
"W1406"	PVG32 Frame Levelling valve short to earth	Frame levelling movement disabled
"W1407"	PVG32 Frame Levelling valve open circuit	Frame levelling movement disabled
"W1428"	PVG32 Frame Levelling valve in error, from main valve diagnostic	Frame levelling movement disabled
"W1824"	Frame Levelling potentiometer out of neutral	Frame levelling movement disabled
"W2205"	Lift up output short to battery	Lift Up disabled
"W2206"	Lift up output short to earth	Lift Up disabled
"W2207"	Lift up output open circuit	Lift Up disabled
"W2232"	Lift up output overcurrent	Lift Up disabled
"W2299"	Lift Up Coil Calibration required	All functions allowed
"W2305"	Lift down output short to battery	Lift Down disabled
"W2306"	Lift down output short to earth	Lift Down disabled
"W2307"	Lift down output open circuit	Lift Down disabled
"W2332"	Lift down output overcurrent	Lift Down disabled
"W2399"	Lift Down Coil Calibration required	All functions allowed
"W2405"	Tilt out output short to battery	Tilt out disabled
"W2406"	Tilt out output short to earth	Tilt out disabled
"W2407"	Tilt out output open circuit	Tilt out disabled
"W2432"	Tilt out output overcurrent	Tilt out disabled
"W2505"	Tilt back output short to battery	Tilt back disabled

CODE	DESCRIPTION	RESULTS
"W2506"	Tilt back output short to earth	Tilt back disabled
"W2507"	Tilt back output open circuit	Tilt back disabled
"W2532"	Tilt back output overcurrent	Tilt back disabled
"W2605"	Extend output short to battery	Extend disabled
"W2606"	Extend output short to earth	Extend disabled
"W2607"	Extend output open circuit	Extend disabled
"W2632"	Extend output overcurrent	Extend disabled
"W2705"	Retract output short to battery	Retract disabled
"W2706"	Retract output short to earth	Retract disabled
"W2707"	Retract output open circuit	Retract disabled
"W2732"	Retract output overcurrent	Retract disabled
"W2821"	Extend Sensor Out Of Range High	Extend and Retract disabled
"W2822"	Extend Sensor Out Of Range Low	Extend and Retract disabled
"W2824"	Extend Sensor Not in Neutral	Extend and Retract disabled
"W2825"	Extend Sensor Unresponsive	All functions allowed
"W2921"	Tilt Pressure Sensor Out Of Range High	Power Bobtach Unlock function disabled
"W2922"	Tilt Pressure Sensor Out Of Range Low	Power Bobtach Unlock function disabled
"W2928"	Tilt Pressure Sensor In Error	Power Bobtach Unlock function disabled
"W3223"	Programming or constant data invalid	Workgroup disabled
"W3228"	Controller failure	Workgroup disabled
"W3296"	Interrupted power	All functions allowed
"W3297"	Controller programmed	All functions allowed
"W3304"	Gateway controller no communication	Workgroup disabled
"W3404"	Display controller no communication	Workgroup disabled
"W3604"	Engine controller no communication	All functions allowed
"W3704"	Drive controller no communication	Auxiliary disabled
"W3804"	LLMC no communication	Workgroup reduced
"W3818"	LLMC out of range	Workgroup reduced
"W3844"	LLMC not matching	Workgroup reduced
"W3845"	LLMC not matching level 2	Aggravating movements disabled
"W3904"	LLMI no communication	Workgroup reduced
"W3918"	LLMI out of range	Workgroup reduced
"W4004"	Joystick no communication	Workgroup disabled
"W4005"	Joystick X axis out of NEUTRAL (tilt)	Tilt disabled

CODE	DESCRIPTION	RESULTS
"W4007"	Joystick Y axis out of NEUTRAL (lift)	Lift disabled
"W4010"	Joystick left roller out of NEUTRAL (extend retract)	Extend and retract disabled
"W4028"	Joystick grip fault	Extend and retract disabled
"W4204"	Receiver No Communication	Manbasket mode error Orange LED on transmitter will flash fast. 3 beeps every 10 seconds at transmitter.
"W4205"	Remote Left Joystick X Axis OON	Manbasket mode error Orange LED on transmitter will flash fast. 3 beeps every 10 seconds at transmitter.
"W4206"	Remote Right Joystick X Axis OON	Manbasket mode error Orange LED on transmitter will flash fast. 3 beeps every 10 seconds at transmitter.
"W4207"	Remote Left Joystick Y Axis OON	Manbasket mode error Orange LED on transmitter will flash fast. 3 beeps every 10 seconds at transmitter.
"W4208"	Remote Right Joystick Y Axis OON	Manbasket mode error Orange LED on transmitter will flash fast. 3 beeps every 10 seconds at transmitter.
"W4215"	Remote Left Joystick X axis in error	Manbasket mode error Orange LED on transmitter will flash fast. 3 beeps every 10 seconds at transmitter.
"W4216"	Remote Right Joystick X axis in error	Manbasket mode error Orange LED on transmitter will flash fast. 3 beeps every 10 seconds at transmitter.
"W4217"	Remote Left Joystick Y axis in error	Manbasket mode error Orange LED on transmitter will flash fast. 3 beeps every 10 seconds at transmitter.
"W4218"	Remote Right Joystick Y axis in error	Manbasket mode error Orange LED on transmitter will flash fast. 3 beeps every 10 seconds at transmitter.
"W4320"	Manbasket mode : Remote control not connected to manbasket harness (from receiver CAN bus signal)	Manbasket mode error Orange LED on transmitter will flash fast. 3 beeps every 10 seconds at transmitter. With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor
"W4321"	Manbasket mode : Remote control not connected to Manbasket harness (from GACD controller status)	Manbasket mode error Orange LED on transmitter will flash fast. 3 beeps every 10 seconds at transmitter With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor
"W4325"	Manbasket mode : Manbasket detection in error	Manbasket mode error Orange LED on transmitter will flash slowly. 3 beeps every 10 seconds at transmitter With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor

CODE	DESCRIPTION	RESULTS
"W4326"	Manbasket mode : Manbasket not detected on carriage	Manbasket mode error Orange LED on transmitter will flash slowly. 3 beeps every 10 seconds at transmitter With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor
"W4327"	Manbasket mode : Manbasket not detected on carriage with GACD on or Remote control active	Manbasket mode error Orange LED on transmitter will flash slowly. 3 beeps every 10 seconds at transmitter With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor
"W4330"	Manbasket mode : Manbasket Retract switch in error	Manbasket mode error Orange LED on transmitter will flash slowly. 3 beeps every 10 seconds at transmitter With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor
"W4331"	Manbasket mode : No boom extension when expected (boom retract switch ON)	Manbasket mode error Orange LED on transmitter will flash slowly. 3 beeps every 10 seconds at transmitter With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor
"W4335"	Manbasket mode : Stabilisers in error	Manbasket mode error Orange LED on transmitter will flash slowly. 3 beeps every 10 seconds at transmitter With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor
"W4336"	Manbasket mode : Stabilisers not on the ground	Manbasket mode error Orange LED on transmitter will flash slowly. 3 beeps every 10 seconds at transmitter With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor
"W4340"	Manbasket mode : Boom angle in error	Manbasket mode error Orange LED on transmitter will flash slowly. 3 beeps every 10 seconds at transmitter With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor
"W4341"	Manbasket mode : Boom lift movement when not expected	All workgroup movements disabled. Safety valve turned off. Manbasket mode error orange LED on transmitter will flash slowly 3 beeps every 10 seconds at transmitter.
"W4342"	Manbasket mode : No Boom lift movement when expected	Manbasket mode error Orange LED on transmitter will flash slowly. 3 beeps every 10 seconds at transmitter With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor

CODE	DESCRIPTION	RESULTS
"W4343"	Manbasket mode : Boom angle limit exceeded	Manbasket mode error Orange LED on transmitter will flash slowly. 3 beeps every 10 seconds at transmitter
"W4345"	Manbasket mode : LLM in error	LLM Red LED on transmitter will flash slowly. 3 beeps every 10 seconds at transmitter With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor
"W4346"	Manbasket mode : LLM in reduced zone	LLM Red LED on transmitter will flash slowly 3 beeps every 10 seconds at transmitter Max speed of aggravating movements is reduced.
"W4347"	Manbasket mode : Longitudinal stability : Max allowed value reached.	LLM Red LED on transmitter will be steady on. Continuous beep at transmitter All aggravating movements are stopped
"W4350"	Manbasket mode : Frame Levelling in error	Manbasket mode error Orange LED on transmitter will flash slowly 3 beeps every 10 seconds at transmitter With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor
"W4351"	Manbasket mode : Frame Levelling angle exceeded (out of the range $[-2^\circ; +2^\circ]$)	Manbasket mode error Orange LED on transmitter will flash slowly. 3 beeps every 10 seconds at transmitter Error code W4351 is displayed at Cab display LCD screen General warning icon is steady on at Cab display Recoverable when all transmitter joysticks are at neutral. Boom lifting = not allowed Boom extend = not allowed Frame levelling = not allowed on aggravating side
"W4355"	Manbasket mode : Interlocking pin in error	Locking Red LED on transmitter will flash slowly. 3 beeps every 10 seconds at transmitter With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor
"W4356"	Manbasket mode : Interlocking pin unlocked	Locking Red LED on transmitter will flash slowly. 3 beeps every 10 seconds at transmitter With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor
"W4360"	Manbasket mode : Manbasket Overload in error	Manbasket mode error LED on transmitter will flash slowly. 3 beeps every 10 seconds at transmitter With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor
"W4361"	Manbasket mode : Manbasket Overload	Manbasket Overload LED on transmitter will flash slowly. 3 beeps every 10 seconds at transmitter All Workgroup movements are disabled
"W4362"	Manbasket mode : Manbasket Overload in error Level 2	Manbasket mode error LED on transmitter will flash slowly. 3 beeps every 10 seconds at transmitter

CODE	DESCRIPTION	RESULTS
"W4365"	Manbasket mode : Tilt angle in error	Manbasket mode error Orange LED on transmitter will flash slowly. 3 beeps every 10 seconds at transmitter With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor
"W4366"	Manbasket mode : Tilt angle limit exceeded (out of the range $[-4^\circ ; +4^\circ]$)	Manbasket mode error Orange LED on transmitter will flash slowly. 3 beeps every 10 seconds at transmitter All movements disabled excepted : Tilt in (when boom lifting or lowering request) if tilt angle $> +4^\circ$ Tilt out (when boom lifting or lowering request) if tilt angle $< -4^\circ$
"W4370"	Manbasket mode : FNR in error	Manbasket mode error Orange LED on transmitter will flash slowly. 3 beeps every 10 seconds at transmitter With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor
"W4371"	Manbasket mode : Park brake in error	Manbasket mode error Orange LED on transmitter will flash slowly. 3 beeps every 10 seconds at transmitter With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor
"W4372"	Manbasket mode : Swash plate position in error	Manbasket mode error Orange LED on transmitter will flash slowly. 3 beeps every 10 seconds at transmitter With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor
"W4404"	Manbasket mode : GACD controller no communication on CAN Bus	Manbasket mode error Orange LED on transmitter will flash fast. 3 beeps every 10 seconds at transmitter. With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor
"W4621"	Vsensor 5 V supply out of range high	Workgroup disabled
"W4622"	Vsensor 5 V supply out of range low	Workgroup disabled
"W4902"	Blue lights output short to battery or open circuit	If STB: Blue Lights permanently lighted on if OC: Blue Lights disabled
"W4903"	Blue lights output short to earth	Blue lights not available
"W5005"	Rear diverter 1 output short to battery	Auxiliary disabled
"W5006"	Rear diverter 1 output short to earth	Auxiliary disabled
"W5007"	Rear diverter 1 output open circuit	Auxiliary disabled
"W5102"	Rear diverter 2 output Error ON	Auxiliary disabled
"W5103"	Rear diverter 2 output Error OFF	Auxiliary disabled
"W5107"	Rear diverter 2 output Open Circuit	Auxiliary disabled

CODE	DESCRIPTION	RESULTS
"W5202"	Rear diverter 2 output Relay Feedback Error ON	Auxiliary disabled
"W5203"	Rear diverter 2 output Relay Feedback Error OFF	Auxiliary disabled
"W5302"	Front / Rear diverter sensor Error ON	Auxiliary disabled
"W5302"	Front / Rear diverter sensor Error ON	Auxiliary disabled
"W5303"	Front / Rear diverter sensor Error OFF	Auxiliary disabled
"W5303"	Front / Rear diverter sensor Error OFF	Auxiliary disabled
"W5402"	Boom worklights output short to battery or open circuit	If STB: Boom Worklights permanently lighted on if OC: Boom Worklights disabled
"W5403"	Boom worklights output short to earth	Boom Worklights not available
"W5502"	Mirror worklights output short to battery or open circuit	If STB: Mirror Worklights permanently lighted on if OC: Mirror Worklights disabled
"W5503"	Mirror worklights output short to earth	Mirror Worklights not available
"W5602"	Mirror defrost output short to battery or open circuit	If STB: Mirror Defrost permanently lighted on if OC: Mirror Defrost disabled
"W5603"	Mirror defrost output short to earth	Mirror Defrost not available
"W6021"	Inclinometer sensor input Out of Range High	All functions allowed
"W6022"	Inclinometer sensor input Out of Range Low	All functions allowed
"W6098"	Calibration performed	All functions allowed
"W6099"	Inclinometer Calibration required	All functions allowed
"W6102"	Inclinometer lamp error ON	All functions allowed
"W6103"	Inclinometer lamp error OFF	All functions allowed
"W6521"	Boom angle 1 out of range high	All functions allowed
"W6522"	Boom angle 1 out of range low	All functions allowed
"W6621"	Boom angle 2 out of range high	All functions allowed
"W6622"	Boom angle 2 out of range low	All functions allowed
"W6744"	Boom angle in error	All functions allowed
"W6798"	Boom angle calibration performed	All functions allowed
"W6799"	Boom angle calibration required	All functions allowed
"W6802"	Boom retract switch short to battery	All functions allowed
"W6803"	Boom retract switch short to earth or open circuit	All functions allowed
"W6902"	Boom retract switch 2 Short to Battery	Cushion retract disabled
"W6903"	Boom retract switch 2 Short to earth or Open Circuit	Cushion retract disabled
"W6928"	Boom retract switch 2 In Error	Cushion retract disabled
"W7002"	Boom drain output error ON	Workgroup disabled. Boom suspension disabled.
"W7003"	Boom drain output error OFF	Boom suspension disabled

CODE	DESCRIPTION	RESULTS
"W7007"	Boom drain output error open circuit	Boom suspension disabled
"W7033"	Boom drain output internal failure	Boom suspension disabled
"W7102"	Boom drain relay feedback output error ON	Workgroup disabled Boom suspension disabled
"W7103"	Boom drain relay feedback output error OFF	Boom suspension disabled
"W7428"	Boom suspension error	Boom suspension disabled
"W7528"	Boom suspension/float switch ON	Boom suspension or boom float disabled
"W7602"	Boom suspension icon error ON	All functions allowed
"W7603"	Boom suspension icon error OFF	All functions allowed
"W7705"	Boom float output short o battery	Boom float disabled
"W7706"	Boom float output short to earth	Boom float disabled
"W7707"	Boom float output open circuit	Boom float disabled
"W8002"	Power Quicktach output error ON	Power Quicktach function not available
"W8003"	Power Quicktach output error OFF	Power Quicktach function not available
"W8005"	Power Quicktach output short to battery	Power Quicktach disabled
"W8006"	Power Quicktach output short to earth	Power Quicktach disabled
"W8007"	Power Quicktach output open circuit	Power Quicktach disabled
"W8128"	Power Quicktach switch in error	Quicktach disabled
"W8202"	Power Quicktach Relay feedback error ON	Quicktach disabled
"W8203"	Power Quicktach relay feedback error OFF	Quicktach disabled
"W8302"	Electromagnet output error ON	RC Engine Speed control function not available
"W8303"	Electromagnet output error OFF	RC Engine Speed control function not available
"W8307"	Electromagnet output open circuit	RC Engine Speed control function not available
"W8402"	Electromagnet relay feedback error ON	RC Engine Speed control function not available
"W8403"	Electromagnet relay feedback error OFF	RC Engine Speed control function not available
"W8502"	Manplatform detection switch short to battery	Manbasket mode error Orange LED on transmitter will flash slowly 3 beeps every 10 seconds at transmitter Error code displayed at Cab LCD screen With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor
"W8503"	Manplatform detection switch short to earth or open circuit	Manbasket mode error Orange LED on transmitter will flash slowly 3 beeps every 10 seconds at transmitter Error code displayed at Cab LCD screen With Boom Angle $\leq 0^\circ$: No possibility to crank the engine from Manplatform With Boom Angle $> 0^\circ$ with MB mode active : Allowed movements are those that will help the operator to reach the floor
"W8611"	Winch overloaded	Winch flashing on the LCD screen for 5s Boom Up, Extend, Tilt In and Aux- (hook up) are disabled

CODE	DESCRIPTION	RESULTS
"W8628"	Winch inputs in error	Winch considered overloaded
"W8702"	Power Quicktach boom output error ON	Quicktach disabled
"W8703"	Power Quicktach boom output error OFF	Quicktach disabled
"W8707"	Power Quicktach boom output open circuit	Quicktach disabled
"W8802"	Power Quicktach boom relay feedback error ON	Quicktach disabled
"W8803"	Power Quicktach boom relay feedback error OFF	Quicktach disabled
"W8902"	Power lift output error ON	Boom lifting and lowering reduced
"W8903"	Power lift output error OFF	Boom lifting and lowering reduced
"W8907"	Power lift output error open circuit	Boom lifting and lowering reduced
"W9002"	Power lift relay error OFF	Boom lifting and lowering reduced
"W9003"	Workgroup controller bad table	Not applicable
"W9999"	Power Quicktach output error OFF	Power Quicktach function not available

Service Codes List - LLMI controller

CODE	DESCRIPTION	RESULTS
"I0000"	Last Calibration Successfully Performed	Only stored (not displayed)
"I0100"	Calibration Test: Zero Calibration Valid	Only stored (not displayed)
"I0101"	Calibration Test: Button Fault	Only stored (not displayed)
"I0102"	Calibration Test: LLMI Zero Calibration Deviation Fault	Only stored (not displayed)
"I0103"	Calibration Test: LLMI Zero Calibration Deviation Fault AND Button Fault	Only stored (not displayed)
"I0104"	Calibration Test: LLMC Zero Calibration Deviation Fault	Only stored (not displayed)
"I0105"	Calibration Test: LLMC Zero Calibration Deviation Fault AND Button Fault	Only stored (not displayed)
"I0106"	Calibration Test: LLMI AND LLMC Zero Calibration Deviation Fault	Only stored (not displayed)
"I0107"	Calibration Test: LLMI AND LLMC Zero Calibration Deviation Fault AND Button Fault	Only stored (not displayed)
"I0314"	LLMI undervoltage	No LLMI display - Workgroup functions reduced; Battery Voltage < 9 V
"I0315"	LLMI overvoltage	No LLMI display - Workgroup functions reduced; Battery Voltage > 16 V
"I3001"	LLMI Sensor in Error: Sensor Not Calibrated or Calibration Corrupted	
"I3003"	LLMI Sensor in Error: Sensor Power Fault	
"I3004"	LLMI Sensor in Error: Sensor Strain Gauge Power Fault	
"I3005"	LLMI Sensor in Error: Sensor Watchdog Fault	

CODE	DESCRIPTION	RESULTS
"I3006"	LLMI Sensor in Error: Sensor RAM Corrupted	
"I3007"	LLMI Sensor in Error: Sensor Program Memory Corrupted	
"I3012"	LLMI Sensor in Error: Sensor Gauge Fault	
"I3014"	LLMI sensor offset	No LLMI display - Workgroup functions reduced; Calibrate the system
"I3015"	LLMI sensor out of range	No LLMI display - Workgroup functions reduced; Calibrate the system
"I3016"	LLMI sensor default	No LLMI display - Workgroup functions reduced
"I3017"	LLMI sensor ID error	No LLMI display - Workgroup functions reduced; Calibrate the system
"I3018"	LLMI sensor RX out of delay	No LLMI display - Workgroup functions reduced
"I3113"	LLMI calibration values out of range	No LLMI display - Workgroup functions reduced; Redo the calibration correctly
"I3121"	LLMI calibration values inverted	No LLMI display - Workgroup functions reduced; Redo the calibration correctly
"I3122"	LLMI calibration values too close	No LLMI display - Workgroup functions reduced; Redo the calibration correctly
"I3123"	LLMI calibration timeout	No LLMI display - Workgroup functions reduced; Redo the calibration in less than 5 minutes
"I3901"	LLMI EEPROM failure	No LLMI display - Workgroup functions reduced
"I3903"	LLMI external watchdog default	No LLMI display - Workgroup functions reduced
"I3904"	LLMI wrong RAM test	No LLMI display - Workgroup functions reduced
"I3905"	LLMI wrong program checksum	No LLMI display - Workgroup functions reduced
"I3909"	LLMI test button error	No test available

Service Codes List - LLMC Controller

CODE	DESCRIPTION	RESULTS
"C0314"	LLMC undervoltage	Workgroup functions reduced
"C0315"	LLMC overvoltage	Workgroup functions reduced
"C3001"	LLMC Sensor in Error: Sensor Not Calibrated or Calibration Corrupted	
"C3003"	LLMC Sensor in Error: Sensor Power Fault	
"C3004"	LLMC Sensor in Error: Sensor Strain Gauge Power Fault	
"C3005"	LLMC Sensor in Error: Sensor Watchdog Fault	
"C3006"	LLMC Sensor in Error: Sensor RAM Corrupted	
"C3007"	LLMC Sensor in Error: Sensor Program Memory Corrupted	
"C3012"	LLMC Sensor in Error: Sensor Gauge Fault	

CODE	DESCRIPTION	RESULTS
"C3014"	LLMC sensor offset	Workgroup functions reduced
"C3015"	LLMC sensor out of range	Workgroup functions reduced
"C3016"	LLMC sensor default	Workgroup functions reduced
"C3017"	LLMC sensor ID error	Workgroup functions reduced
"C3018"	LLMC sensor Rx out of delay	Workgroup functions reduced
"C3022"	LLMC Sensor in Error: Sensor Notch Fault	
"C3042"	LLMC Sensor in Error: Sensor Temperature Fault	
"C3113"	LLMC calibration values out of range	Workgroup functions reduced
"C3121"	LLMC calibration values Inverted	Workgroup functions reduced
"C3122"	LLMC calibration values too close	Workgroup functions reduced
"C3123"	LLMC calibration time-out	Workgroup functions reduced
"C3801"	LLMC EEPROM failure	Workgroup functions reduced
"C3803"	LLMC external watchdog default	Workgroup functions reduced
"C3804"	LLMC wrong RAM test	Workgroup functions reduced
"C3805"	LLMC wrong program checksum	Workgroup functions reduced

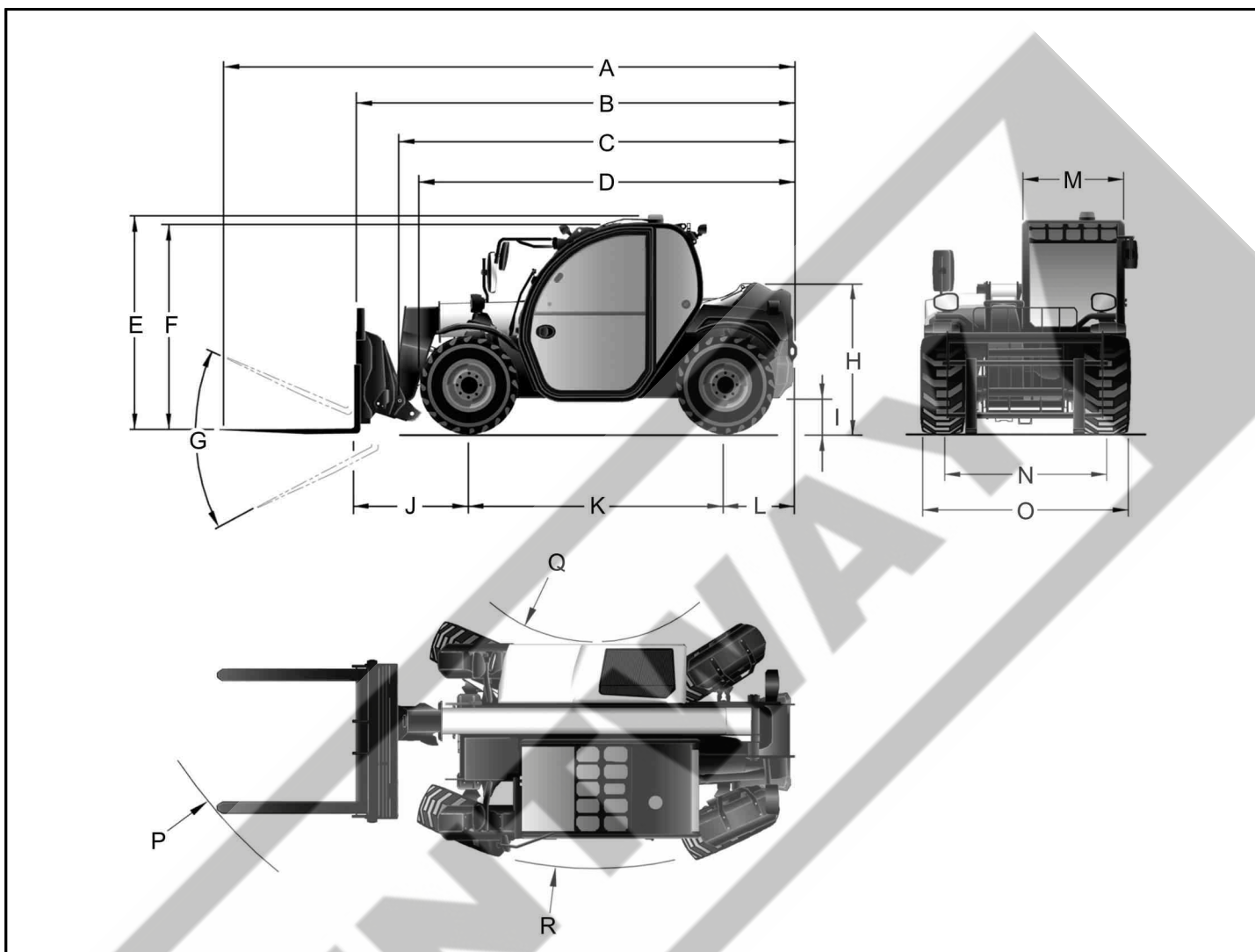
Service Codes List - Cab Controller

CODE	DESCRIPTION	RESULTS
"K1005"	Position Lights Output Short To Battery	Position Lights permanently lighted on
"K1006"	Position Lights Output Short To Earth	Position Lights disabled
"K1007"	Position Lights Output Open Circuit	Position Lights disabled
"K1102"	Position Lights Status Error ON	Position Lights permanently lighted on
"K1103"	Position Lights Status Error OFF	Position Lights disabled
"K1205"	Low Beam Output Short To Battery	Low Beam permanently lighted on → High Beam disable → <i>Feux de route inactifs</i>
"K1206"	Low Beam Output Short To Earth	Low Beam disabled
"K1207"	Low Beam Output Open Circuit	Low Beam disabled
"K1305"	High Beam Output Short To Battery	High Beam permanently lighted on → Low Beam disabled
"K1306"	High Beam Output Short To Earth	High Beam disabled
"K1307"	High Beam Output Open Circuit	High Beam disabled
"K1402"	Fog Light Output Error ON	
"K1403"	Fog Light Output Error OFF	
"K1505"	Left Turn Signal Output Short To Battery	Left Turn Signal permanently turned on
"K1506"	Left Turn Signal Output Short To Earth	Left Turn Signal disabled

CODE	DESCRIPTION	RESULTS
"K1507"	Left Turn Signal Output Open Circuit	Left Turn Signal disabled
"K1602"	Left Turn Signal Status Error ON	Left Turn Signal permanently turned on
"K1603"	Left Turn Signal Status Error OFF	Left Turn Signal disabled
"K1705"	Right Turn Signal Output Short To Battery	Right Turn Signal permanently turned on
"K1706"	Right Turn Signal Output Short To Earth	Right Turn Signal disabled
"K1707"	Right Turn Signal Output Open Circuit	Rights Turn Signal disabled
"K1802"	Right Turn Signal Status Error ON	Rights Turn Signal permanently turned on
"K1803"	Right Turn Signal Status Error OFF	Rights Turn Signal disabled
"K2002"	Front Wiper Output Error ON	
"K2003"	Front Wiper Output Error OFF	
"K2102"	Front Wiper (High Speed) Output Error ON	
"K2103"	Front Wiper (High Speed) Output Error OFF	
"K2202"	Front/Roof Washer Output Error ON	
"K2203"	Front/Roof Washer Output Error OFF	
"K2305"	Roof Wiper Output Short To Battery	Roof Wiper permanently turned on
"K2306"	Roof Wiper Output Short To Earth	Roof Wiper disabled
"K2307"	Roof Wiper Output Open Circuit	Roof Wiper disabled
"K2405"	Rear Wiper Output Short To Battery	Rear Wiper permanently turned on
"K2406"	Rear Wiper Output Short To Earth	Rear Wiper disabled
"K2407"	Rear Wiper Output Open Circuit	Rear Wiper disabled
"K2502"	Rear Washer Output Error ON	
"K2503"	Rear Washer Output Error OFF	
"K2605"	Lateral Wiper Output Short To Battery	Lateral Wiper permanently turned on
"K2606"	Lateral Wiper Output Short To Earth	Lateral Wiper disabled
"K2607"	Rear Wiper Output Open Circuit	Lateral Wiper disabled
"K2702"	Lateral Washer Output Error ON	
"K2703"	Lateral Washer Output Error OFF	
"K4204"	Left Lever No Communication	Road Lights functions disabled
"K4304"	Right Lever No Communication	Wipers/Washers functions disabled
"K4404"	Right Lever No Communication	Road Lights & functions Wipers/Washers disabled

MACHINE DIMENSIONS

Figure 388



NA24042a

REF.	DESCRIPTION	VALUE
A	Overall Length (to fork tips)	5208 mm (205 in)
B	Overall Length (to forks face)	3989 mm (157 in)
C	Overall Length (to carrier pin)	3647 mm (143.6 in)
D	Overall Length (to front tyres)	3442 mm (135.5 in)
E	Overall Height (with rotating beacon)	2085 mm (82.1 in)
F	Overall Height (with roof window wiper)	1930 mm (76 in)
G	Carriage Rotation Angle	134°
H	Height To Back Of Machine	1340 mm (52.8 in)
I	Ground Clearance	250 mm (9.8 in)
J	Length – Front Axle To Forks Face	1044 mm (41.1 in)

REF.	DESCRIPTION	VALUE
K	Wheelbase	2360 mm (92.9 in)
L	Length – Rear Axle To Machine Rear	662 mm (26.1 in)
M	Operator Cab Outside Width	930 mm (36.6 in)
Mi	Operator Cab Inside Width	857 mm (33.7 in)
N	Track Width (front & rear)	1500 mm (59.1 in)
O	Width Over Standard Tyres	1832 mm (72.1 in)
P1	External Turning Radius (with forks spaced 1010 mm ext.)	4271 mm (168.1 in)
P2	External Turning Radius (with forks spaced 1270 mm ext.)	4350 mm (171.3 in)
Q	External Turning Radius (at tyres)	3235 mm (127.4 in)
R	Internal Turning Radius (cab)	1165 mm (45.9 in)

TELESCOPIC HANDLER SPECIFICATIONS

Certain specification(s) are based on engineering calculations and are not actual measurements. Specification(s) are provided for comparison purposes only and are subject to change without notice. Specification(s) for your individual Bobcat equipment will vary based on normal variations in design, manufacturing, operating conditions, and other factors

Performance

Tilt Breakout Force – ISO8313	3300 daN (7419 lbf)
Lift Breakout Force – ISO8313	2700 daN (6070 lbf)
Drawbar Pull	3350 daN (7531 lbf)
Rated Load Capacity*	2500 kg (5512 lb)
Capacity (at maximum height)	1800 kg (3968 lb)
Capacity (at maximum reach)	800 kg (1763 lb)
Tipping Load (at maximum reach)	900 kg (1984 lb)
Lifting Height (forks)	5,9 m (232 in)
Maximum Reach (forks, COG 500 mm [19.7 in])	3310 mm (130.3 in)
Maximum Reach (forks, COG 500 mm [19.7 in], maximum height)	445 mm (17.5 in)
Travel Speed on 16,5" Tyres	
Low Range	0 - 6,9 km/h (0 - 4.3 mph)
High Range	0 - 27,3 km/h (0 - 17 mph)

* Static and dynamic tests have been carried out and passed according to EN1459-1 and ISO 22915

Weights

Weight (unladen)	4445 kg (9800 lb)
Front Axle Weight (unladen)	2059 kg (4539 lb)
Rear Axle Weight (unladen)	2386 kg (5260 lb)
Weight With Pallet Frame And Forks	4717 kg (10399 lb)
Front Axle Weight With Pallet Frame And Forks	2460 kg (5423 lb)
Rear Axle Weight With Pallet Frame And Forks	2257 kg (4976 lb)
Weight With Pallet Frame, Forks and Rated Load	7217 kg (15911 lb)
Front Axle Weight With Pallet Frame, Forks and Rated Load	6529 kg (14394 lb)
Rear Axle Weight With Pallet Frame, Forks and Rated Load	688 kg (1517 lb)

Engine

Make / Model	Bobcat D24
Fuel	Diesel
Cooling	Coolant
Rated Power (ISO 14396)	54,6 kW (73.2 hp)
Rated Speed	2400 rpm
Low Idle Speed	900 rpm
Maximum Torque at 1600 rpm	280 N·m (206.5 ft-lb)
Number of Cylinders	4
Displacement	2,4 L (146 in ³)
Bore / Stroke	90 mm (3.5 in) / 94 mm (3.7 in)
Fuel Consumption (average loading)	4,5 L/h (1.2 U.S. gal/h)
Lubrication	Gear Pump Pressure
Crankshaft Ventilation	Close Breathing
Air Filter	Dry Rechargeable Cartridge With Safety Element
Ignition	Diesel Compression
Cycle Type	4 Strokes
Air Induction	Turbocharged
Engine Coolant	Ethylene Glycol Mix -37°C (-34.6°F)
Starting Aid	Glow plugs automatically activated as needed in RUN position

Controls

Engine	Electronic Engine Speed Governor
Starting	Key-Type Starter Switch And Shutdown
Front Auxiliary	Variable Thumbwheel On Joystick
Hydraulics Lift And Tilt	Joystick Electronic
Hydraulics Telescope In and Telescope Out	Variable Thumbwheel On Joystick
Service Brake	Pedal-Activated Wet Multi-Disk On Front Axle
Parking Brake	Passive Brake
Steering	Proportional Hydraulic Steering Via A Conventional Steering Wheel
Speed Range and Reverse Selection	Switch For Hydrostatic Motor Ratios And Switch On Joystick Or Lever For F-N-R
4WS / 2WS / Parallel Drive Selection	Button And Screen For Selection
Auxiliary Pressure Release	Bobcat Coupler

Drive System

Transmission	Hydrostatic With Electronic Regulation
Main Drive	Hydrostatic Motor
Transmission Oil	Bobcat Transmission Oil GL4

Traction

Standard Tyres	CAMSO 12-16.5 PR12 SKS 532
Optional Tyres	MICHELIN 300/70 R16,5 137A8/137B BIBSTEEL
Optional Tyres	CAMSO 14-17,5 PR14 SKS 532
Optional Tyres	ALLIANCE 400/55-17,5 16PR 149A8 A328
Optional Tyres	MICHELIN 280/80 R18 132A8/132B IND TL XMCL
Optional Tyres	MICHELIN 280/80 R20 133A8/133B IND TL XMCL
Optional Tyres	TRELLEBORG 36x14-20 BRAWLER HPS SOLIDFLEX TRACTION

Steering

Steering Pump	Priority Valve on Pump
Steering Mode	2WS / 4WS / CRAB

Brakes

Engine Braking	Hydrostatic
Parking and Emergency Brake	Passive Brake
Service Brake	Oil Immersed Discs

Fluid Capacities

Front Axle	6 L (1.6 U.S. gal)
Rear Axle	6 L (1.6 U.S. gal)
Wheel Hub (Per Wheel)	0,9 L (0.24 U.S. gal)
Gear Box	0,7 L (0.18 U.S. gal)
Cooling System With Heater	9 L (2.4 U.S. gal)
Engine Oil With Filter	9 L (2.4 U.S. gal)
Fuel Tank	65 L (17.2 U.S. gal)
Hydraulic Fluid Tank	42 L (11.1 U.S. gal)
Hydraulic System Plus Tank	70 L (18.5 U.S. gal)

Hydraulic System

Pump Type	Gear pump with LS valve
Pump Capacity @ maximum rpm	80 L/min (21.1 U.S. gpm)
Relief Valve Pressure Setting	255 bar (3698 psi)
Control Valve Type	Open Centre With Flow Sharing & Flow Compensators Technology
Hydraulic Filter Specification	Full Flow Filtration
Front Auxiliary Flow @ Maximum rpm	80 L/min (21.1 U.S. gpm)
Hydraulic Fluid	Bobcat Transmission Oil GL4

Electrical System

Alternator	13.5V, 90A Nominal Output
Battery	12.0V, 110Ah, 900CCA
Starter	2,7 kW (3.6 hp)

Temperature Range

Operation And Storage	-18°C – +43°C (-0.4 – +109.4°F)
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Altitude

Maximum Altitude	2000 m (6500 ft)
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Instrument Panel

The following functions are monitored by a combination of gauges and warning lights in the operator's line of sight.

The system alerts the operator of monitored malfunctions by way of audible and visual indicators.

Gauges

- Engine rpm
- Total operating hours
- Job hours
- Boom angle
- Vehicle Speed
- Fuel Gauge
- Engine coolant temperature gauge

Indicators

- Front and rear wheel alignment on screen
- Headlight full beam
- Headlight low beam
- Position lights
- Left and right turn
- Trailer turn
- Parking brake
- Longitudinal stability level

- Windscreen wipers
- Work lights
- Flashing warning light
- Hazard warning lights
- Gear speed choice
- Hydraulic function lock
- Rear fog lights
- Heater fan

Warning Lights

- Hydraulic fluid over-temperature
- Engine Coolant over-temperature
- Low oil pressure
- Battery not charged
- Longitudinal stability alarm

Environmental

Declared Noise Emission Values

	Value
Bystander noise Level per Directive 2000/14/EC - LwA	104 dB(A)
Operator noise level per EN 12053 - LpA	75 dB(A)

Declared Vibration Emission Values

	Value [A]
Whole-body vibration per EN 13059 (uncertainty included)	1,1 m/s ² 3.6 ft/s ²
Hand-arm vibration	N/A[B]

[A] Values shown are for standard tyres.

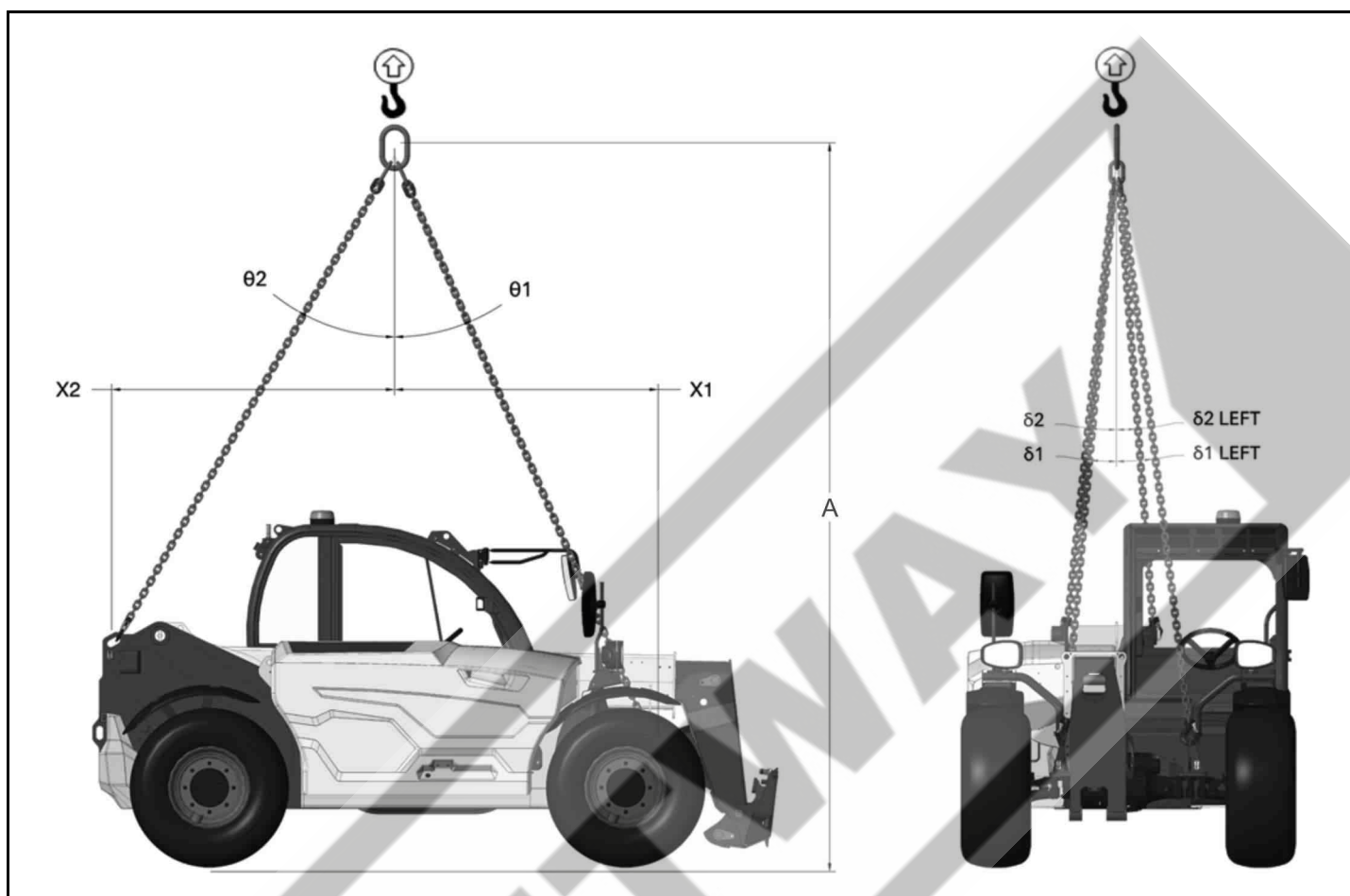
[B] N/A - Not applicable for telescopic handler.

Fluorinated Greenhouse Gas (F-gas) (If equipped with HVAC)

	Value
F-gas Type	HFC-134a
F-gas Mass	0,75 kg (1.65 lb)

Lifting

Figure 389

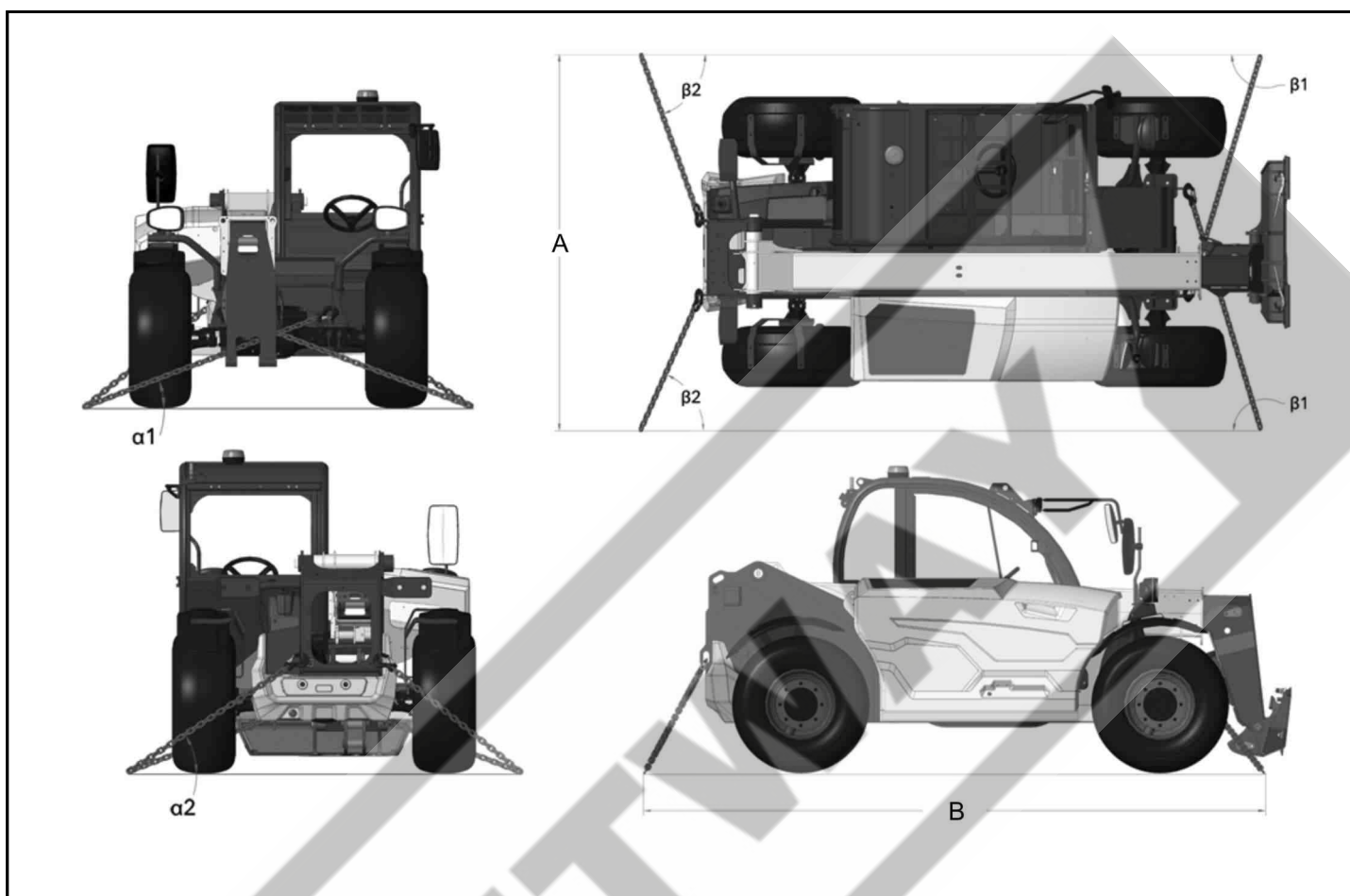


NA2403a

CG Location	(X1) Front	1467 mm (57.8 in)
	(X2) Rear	1571 mm (61.9 in)
Longitudinal Angle	(q1) Front	24°
	(q2) Rear	30°
Lateral Angle	(d1) Front	5°
	(d2) Rear	2°
Sling Length	Front	3630 mm (142.9 in)
	Rear	2610 mm (123.9 in)
Single Sling Force	Front	27770 N (6242.9 lbf)
	Rear	22470 N (5051.5 lbf)
(A) Lifting Hook height minimum		4000 mm (157.5 in)
Operating mass		4540 kg (10009 lb)

Tie Down

Figure 390



NA24064a

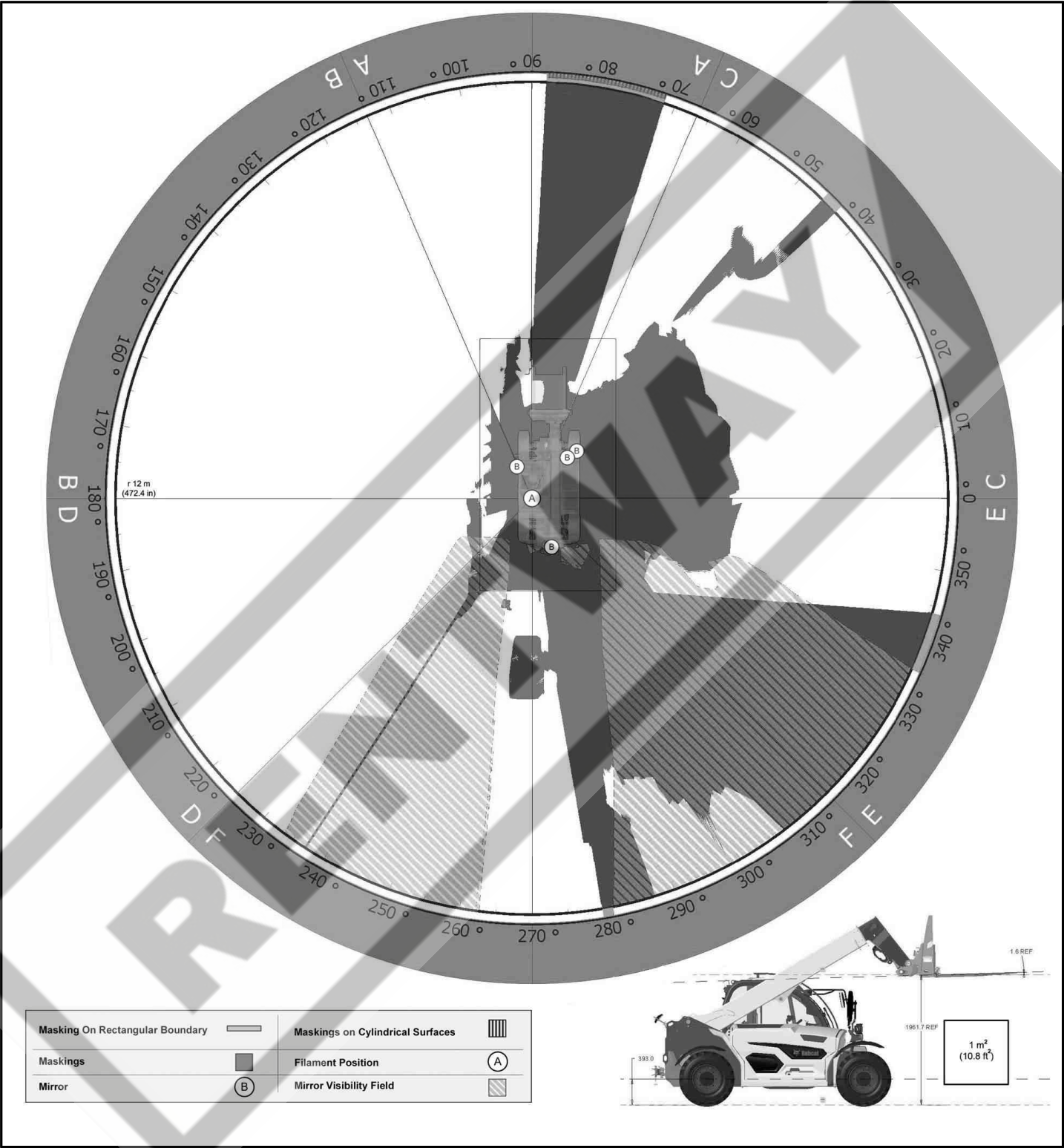
(A) Lateral distance attachment points		2450 mm (96.5 in)
(B) Longitudinal distance attachment points		4057 mm (159.7 in)
Operating mass		4540 kg (10009 lb)
Most compact angle		
Vertical Angle	(a1) Front	20°
	(a2) Rear	31°
Horizontal Angle	(bx1) Front	73°
	(bx2) Rear	70°
Sling Length	Front	1750 mm (68.9 in)
	Rear	1370 mm (53.9 in)
Single Sling Force	Front	38960 N (8758.6 lbf)
	Rear	33730 N (7582.8 lbf)
Angle for < 4000 DaN (8992 lbf) sling forces		

Vertical Angle	(a1) Front	19°
	(a2) Rear	31°
Horizontal Angle	(bx1) Front	68°
	(bx2) Rear	68°
Sling Length	Front	1800 mm (70.9 in)
	Rear	1380 mm (54.3 in)

A large, light gray watermark logo for "RENTWAY" is oriented diagonally across the page. The logo consists of the word "RENTWAY" in a bold, sans-serif font, enclosed within a rectangular border that is also tilted to match the text's angle.

VISIBILITY DIAGRAMS
Handling Suspended Loads

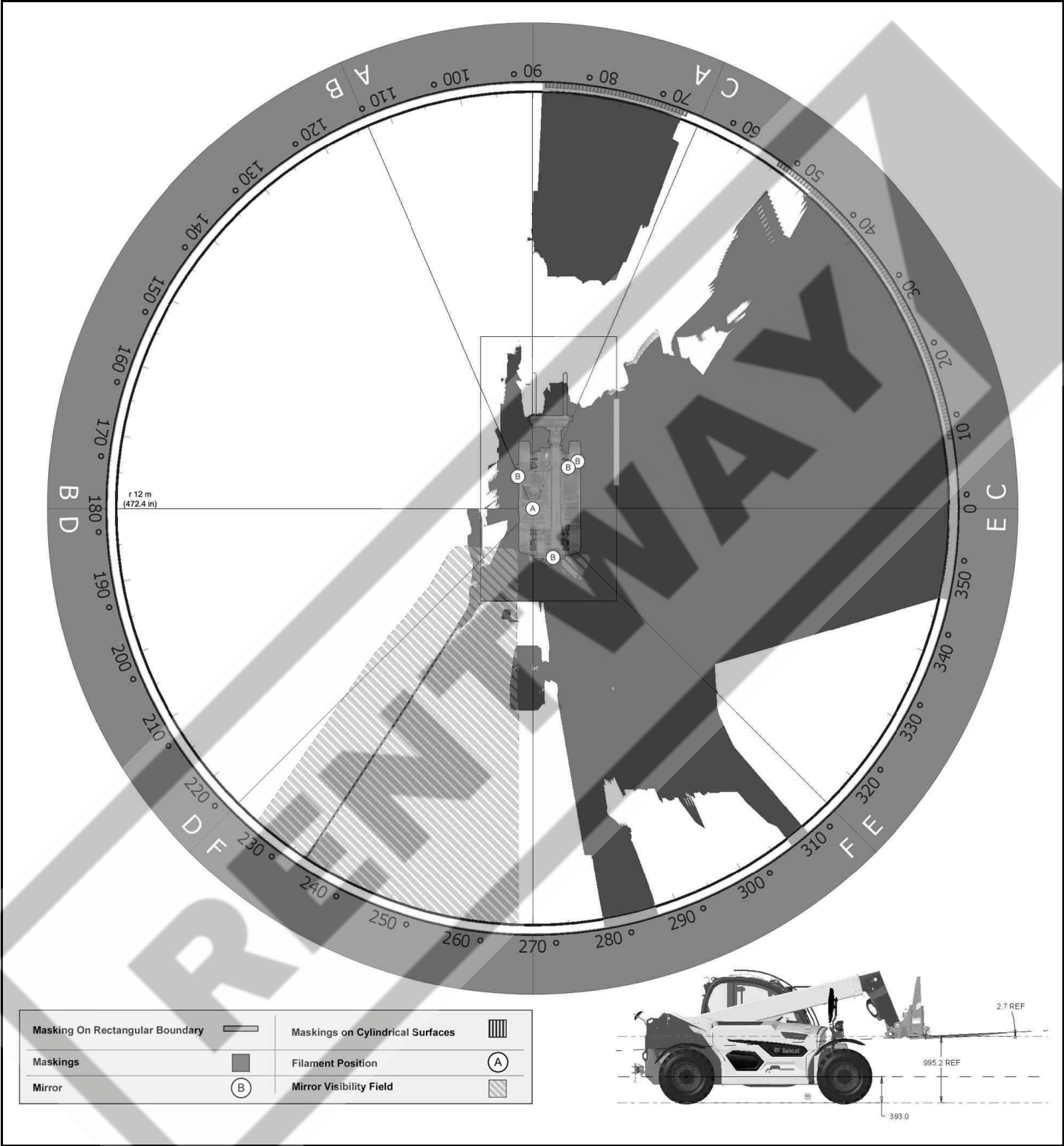
Figure 391



NA24054

Loading The Trailer

Figure 392



NA24053

Bucket

Figure 393



Light Material Bucket

Figure 394



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A

accelerator pedal	53
adjusting rear view camera rear view camera	54
air cleaner	
dust extractor	150
inner filter	150
outer filter	150
replacing filter elements	150
air cleaner service	150
air conditioning belt	180
adjusting	180
replacing	180
alternator belt	179
adjusting	179
checking	179
replacing	179
approved boom stop	146
installing	146
removing	146
attachment angle gauge	
adjusting	98
attachment carrier	186
attachment control connector	83
attachments	97
buckets	98
EC Declaration Of Conformity	97
jib	103
list	19
movement restrictions	119
operation & maintenance manual	97
pallet forks	101
round bale spike	102
serial plate	97
auto reverse cooling fan	81
automatic regeneration operation	
diesel particulate filter (DPF)	62
axles	
checking and adding oil (front differential)	177
checking and adding oil (planetary carrier)	175
checking and adding oil (rear differential)	176
checking and adding oil (reduction box)	178
front and rear	175
removing and replacing oil (front differential)	177
removing and replacing oil (planetary carrier)	175
removing and replacing oil (rear differential)	176
removing and replacing oil (reduction box)	178

B

back-up alarm system	68, 147
description	68, 147
inspecting	147
operation	68
basic operating instructions	118
basic tow hitch	
description	134
operation	134
battery	
removing and installing	170
using a booster battery (jump starting)	169
battery maintenance	168
biodiesel blend fuel	152
boom suspension	70
activating	70
deactivating	70
description	70

operation	70
bucket	
bucket shaking	121
emptying	121
filling	120
filling and emptying	120
buckets	98
choosing the correct bucket	98
mass properties	101

C

centre console panel	45
centre panel	45
Condenser	
cleaning	149
console panel	46
right	46
coolant	
checking level	160
removing and replacing	160
cooling system	159
cleaning	159

D

daily inspection	85
daily inspection and maintenance	85
decals	25
declaration of conformity	7–8
jib	11–12
Declaration of Conformity	
hydrofluorocarbon	13
radio	9
delivery report	16
diagnostic service codes	201
cab controller	303
drive controller	285
engine controller	201
gateway controller	281
LLMC controller	302
LLMI controller	301
workgroup controller	292
diesel particulate filter (DPF)	151
DPF Cleaning	151
DPF Service Description	151
DPF service regeneration	151
diesel particulate filter system	
description	61
DPF icons	61
forced parked regeneration	64
inhibit mode	65
regeneration tables	61
diesel particulate system	61
digging a hole	122
digging and filling a hole	122
dimensions	305
direction signal	43
display	
standard	51
display panel	
monitoring	91
warning and shutdown	92
DPF	61
driving and steering	68
driving and steering the machine	
procedure	68
stopping	69

dual fnr	
operation	82
dual FNR	82
engine cranking condition	82
travel direction control	82
Dual FNR	
change of FNR control	82

E

eco mode	91
operation	91
electrical mirror	
adjusting	89
electrical system	162
description	162
emergency exit	67
rear window	67
engine cover	147
opening and closing	147
engine lubrication system	157
engine oil	
adding	157
chart	157
checking	157
removing and replacing	157
engine oil filter	
removing and replacing	157
entering the machine	86
environmental	
specifications	311
extending the boom	123

F

features and accessories	
options and accessories	18
standard items	17
filling a hole	123
fire prevention	
electrical	22
fire extinguishers	23
fuelling	23
hydraulic system	22
flammable fluids	22
flex drive	
setting engine speed	69
float	
levelling the ground	124
fog lights	43
front differential	
checking and adding oil	177
removing and replacing oil	177
front wheels	
replacing	182
fuel filter	154
removing water	154
replacing element	155
fuel pre-filter	154
fuel specifications	152
fuel system	152
removing air	156
fuel tank	
filling	153
fuel tank breather	
replacing	153
fuse panel	
engine	166

mainframe	164
master	167
options	165
fuses and relays	
engine	166
identification	162
location	162
mainframe	165
options	166

G

grinding safety	23
-----------------------	----

H

handling loads with pallets fork	125
headlights	43
heating, ventilation and air conditioning system (HVAC)	148
horn	44
HVAC	148
cab filter	148
cleaning and maintenance	148
lubrication	149
troubleshooting	149
hydraulic : hydrostatic system	171
hydraulic / hydrostatic filters	
removing and replacing	174
hydraulic controls	74
auxiliary hydraulic release	79
auxiliary hydraulics	76
front auxiliary hydraulics	77
joystick	74
maximum auxiliary flow	
standard display	75
quick couplers	78
hydraulic fluid	
chart	172
fill / breather cap	175
removing and replacing	172
hydraulic hook	
maintenance	135

I

inching control	53
inspection checkbook	142
intended use	41
introduction	14
ISO 9001	
certification	14
BSI	14
ISO 9001	14
TUV	14

J

jib	103
during travelling	105
EC Declaration of Conformity	103
inspection before use	103
load handling	105
mass properties	105
picking up a load from the ground	105
picking up a raised load	106
placing a raised load	106

static test.....	103
suspended loads	105
jog shuttle	49

L

leaving machine	92
leaving the machine	92
levelling the ground using float	124
lifting the machine	131
procedure.....	131
LLMC	118
calibration test	144
calibration test procedure	144
override mode	118
LLMI	49
critical zone	50
secure zone	49
set button	50
warning zone	50
load charts	
bucket.....	99
jibs.....	103
lift eye link	94
pallet forks.....	38
pallet forks with side shift.....	39
round bale spike	102
longitudinal load moment controller	118
lubricating the machine.....	183
lubrication	
front wear pads.....	185
locations	183
rear wear pads.....	186

M

machine dimensions.....	305
machine signs.....	25
pictorial only safety signs.....	24
maintaining rear view camera	
rear view camera	54
maintenance safety	22
manual Bob-Tach	
inspecting.....	186
installing and removing.....	106
installing and removing the attachment.....	106
manual Mani-Tach	
inspecting.....	188
installing.....	113
installing and removing.....	113
removing	115
manual Quick-Tach	
inspecting.....	188
installing.....	113
installing and removing.....	113
removing	115
maximum boom angle	124
mirrors.....	88
adjusting	88
cleaning	88
multi-function lever	43

O

object handling (with lift eye link)	93
during travelling	95
inspection before use	94

load handling	95
picking up a load from the ground.....	95
picking up a raised load	96
placing a raised load	96
procedure.....	93
secondary lifting devices	94
secondary lifting devices (for travel)	94
static test.....	93
suspended loads	93
oil	
engine.....	157
on-the-fly	83
on-the-fly settings	
description	83
selecting	
standard display	83
operating instructions	41
operating near an edge or water	119
operating on slopes	119
operating procedure	118
load capacity charts	123
operating with a full bucket.....	120
operating with an empty bucket	120
operation & maintenance manual	
location	86
operator cab	55
cab door.....	55
cab door window.....	56
cab light	57
cleaning	86
description	55
fuse panel	162
fuses and relays	162
rear cab window	57
operator components	42
operator controls	
acd panel	48
jog shuttle (standard display)	49
right panel components	46
smart functions	48
standard panel	47
operator controls identification.....	42
operator's handbook	
location	86

P

pallet fork	
inspection before use	101
load charts	101
load handling	125
mass properties	102
picking up a load from the ground.....	125
picking up a raised load	127
placing a load on the ground	126
placing a raised load	128
pallet forks	101
parking brake.....	67
picking up a load from the ground	125
picking up a raised load	127
placing a load on the ground	126
placing a raised load.....	128
planetary carrier	
checking and adding oil	175
removing and replacing oil	175
power bob-tach	
installing and removing the attachment.....	109
power Bob-Tach	

inspecting.....	187
installing and removing.....	109
power Mani-Tach	
inspecting.....	189
installing.....	116
installing and removing.....	115
removing.....	117
power Quick-Tach	
inspecting.....	189
installing.....	116
installing and removing.....	115
removing.....	117
pre-starting procedure.....	86
publications and training resources.....	23

R

raising a load.....	123
rear differential	
checking and adding oil.....	176
removing and replacing oil.....	176
rear door	
opening and closing.....	148
rear hitch.....	134
applications.....	133
capacities.....	133
inspection before use.....	134
installation.....	133
maintenance.....	135
rear lights.....	43
rear view camera	
description.....	54
rear wheels	
replacing.....	182
reduction box	
checking and adding oil.....	178
removing and replacing oil.....	178
return to service.....	190
rims	
optional rims.....	19
standard rims.....	19
road position	
bucket.....	119
road position	
pallet fork.....	119
rotating tow hitch	
description.....	134
operation.....	135
round bale spike.....	102
mass properties.....	103

S

seat	
adjusting.....	87
seat adjustment	
air suspension seat.....	87
standard seat.....	87
seat belt.....	143
adjusting.....	88
inspection and maintenance.....	143
serial number	
engine.....	15
location.....	15
other.....	15
telescopic handler.....	15
service brake pedal.....	53
service schedule.....	138

maintenance intervals.....	138
sight level gauge.....	53
smart handling system (shs).....	80
smart handling system (SHS)	
operation.....	80
solid tyres	
travel speed restrictions.....	97
specifications	
lifting.....	312
tie down.....	313
speed management.....	71
operation.....	71
speed management default setting.....	72
standard display	
display settings.....	194
language settings.....	198
machine settings.....	195
navigation bar.....	191
record a service.....	193
security settings.....	196–197
software.....	199
units.....	199
view service codes.....	193
viewing active shortcuts.....	191
vital detail and machine performance.....	192
starting safety.....	23
starting the engine.....	89
cold temperature starting.....	90
warming the system.....	90
starting the engine standard key panel.....	89
steering mode.....	58
quick wheel realignment.....	60
selecting.....	58
selecting steering aligning modes.....	59
steering aligning modes.....	59
steering mode selection	
manual aligning.....	59
semi-automatic aligning.....	59
steering wheel.....	43
adjusting.....	44
stopping engine.....	92
stopping the engine.....	92
storage.....	190
storage and return to service.....	190
system setup and analysis.....	191

T

telescopic handler identification.....	16
towing a trailer.....	133
towing a trailer with the telescopic handler	
connecting the electrics.....	135
towing and retrieving the machine.....	131
towing the machine.....	129
disengaging the park brake.....	129
disengaging the transmission.....	130
engaging the park brake.....	131
engaging the transmission.....	130
procedure.....	129
transporting the machine on a trailer.....	132
fastening.....	132
loading and unloading.....	132
travel direction.....	42
travel direction lever.....	43
travel direction switch.....	42
tyre maintenance.....	181
mounting.....	182
pressure.....	183

replacing wheels.....	181
rotating	181
wheel nuts.....	181
tyres, ,	
optional tyres.....	18
standard tyres.....	18

U

ultra low sulfur fuel	152
USB port	53

V

visibility diagrams.....	315
visibility during operation.....	119

W

warranty	
telescopic handler.....	319
welding safety	23
window guard	
front.....	19
inspection.....	19
maintenance	19
roof.....	19
wiper	
lever	44
work area	
inspecting.....	118



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Reference Information

Product Serial Number:

Engine Serial Number:

Dealer Information:

